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October 8, 2003

204077

via Hand Delivery

PUBLIC VERSION

Hon. Vernon A. Williams
Secretary
Surface Transportation Board
1925 K Street, N.W.
Washington, D.C. 20423

Re: ***Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company*, Docket No. 42071**

Dear Secretary Williams:

Enclosed for filing in the above-captioned matter are the original and 10 copies of the Public Version of the Reply Evidence of Defendant The Burlington Northern and Santa Fe Railway Company ("BNSF"). The Public Version of BNSF's Reply Evidence consists of a two-volume Public Narrative and one volume of Public Exhibits. Three copies of BNSF's Public Reply Narrative are contained in PDF format on the attached CDs. Please note that this filing includes color and oversized documents. BNSF has filed today under separate cover the Highly Confidential Version of BNSF's Reply Evidence.

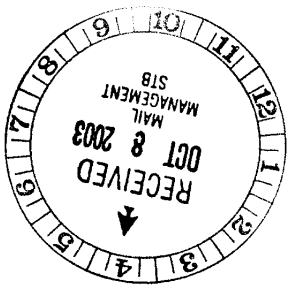
Please date stamp the extra copy of this cover letter and return it to the messenger who delivered this filing.

Sincerely,

Anthony J. LaRocca

Enclosures
cc: Counsel for Complainant

209077



PUBLIC VERSION

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Docket No. 42071

OTTER TAIL POWER COMPANY
v.
THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Reply Evidence of
The Burlington Northern and Santa Fe Railway Company

NARRATIVE

Volume I of II

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ATTORNEYS FOR
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Public Version

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ABBREVIATIONS

Terms:

AAR	Association of American Railroads
AEI	Automatic Equipment Identification
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARN	Administration Radio Network
ATSF	The Atchison Topeka & Santa Fe Railway Company
BN	Burlington Northern Railroad Company
BNSF	The Burlington Northern and Santa Fe Railway Company
CARDS	Computer Aided Railway Design System
CMP	Constrained Market Pricing
CP	Signal Control Point
CTC	Centralized Traffic Control System
DARA	Density Adjusted Revenue Allocation
DCF	Discounted Cash Flow
DED	Defective Equipment Detector
DEM	Digital Elevation Model
EOTD	End-of-Train Device
FTI	FTI Consulting, Inc.
G&A	General and Administrative
HBD	Hot Bearing Detector
HOTB	Head-of-Train Device
ICC	Interstate Commerce Commission

MMP	Modified Mileage Prorate
MOW	Maintenance of Way
OTM	Other Track Materials
OTP Errata	Complainant's Errata Evidence (filed on July 14, 2003)
OTP Opening	Complainant's Opening Evidence (filed on June 13, 2003)
PRB	Powder River Basin
RCAF-A	Rail Cost Adjustment Factor - Adjusted
RCAF-U	Rail Cost Adjustment Factor - Unadjusted
RFP	Request for Production
RTC Model	Rail Traffic Controller Model
RRVW	Red River Valley Western Railroad
RWA	Ralph Whitehead Associates
SAC	Stand-Alone Cost
SARR	Stand-Alone Railroad
SSAC	Simplified Stand-Alone Cost Model
STB	Surface Transportation Board
UBC	Uniform Building Code
USGS	United States Geological Survey
WP	Workpaper
WRPI	Western Rail Properties, Inc.

ICC or STB Proceedings:

APS	*Arizona Public Serv. Co. v. The Atchison, Topeka & Santa Fe Ry.*, 2 S.T.B. 367 (1997).
Coal Rate Guidelines or Guidelines	*Coal Rate Guidelines, Nationwide*, 1 I.C.C.2d 520 (1985).
Conrail	*Potomac Electric Power Co. v. Consolidated Rail Corp.*, 367 I.C.C. 532 (1983).
Conrail II	*National Railroad Passenger Corp. and Consolidated Rail Corp.--Application under Section 402(a) of the Rail Passenger Service Act For an Order Fixing Just Compensation 10 I.C.C. 2nd 863 (1996)*
FMC	*FMC Wyoming Corp. v. Union Pacific R.R.*, STB Docket No. 42022 (STB served May 12, 2000).
General Procedures	*General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*, STB Ex Parte No. 347 (Sub-No. 3) (STB served Mar. 12, 2001).
Georgia Power	*Georgia Power Co., Southern Co. Servs., Inc., Oglethorpe Power Corp., Municipal Auth. of Georgia, & City of Dalton v. Southern Ry. Co. & Norfolk Southern Corp.*, ICC Docket No. 40581 (ICC served Nov. 8, 1993).
McCarty	*McCarty Farms, Inc. v. Burlington Northern Inc.*, 2 S.T.B. 460 (1997).
Nevada Power I	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 6 I.C.C.2d 1 (1989).
Nevada Power II	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 10 I.C.C.2d 259 (1994).
Non-Coal Guidelines	*Rate Guidelines - Non-Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2) (STB served May 8, 2002).
OPPD	*Omaha Public Power Dist. v. Burlington Northern R.R.*, 3 I.C.C.2d 853 (1987).
PPL	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served Aug. 19, 2002).
PPL II	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served March 24, 2003)

I. COUNSEL'S ARGUMENT AND SUMMARY OF EVIDENCE

This is the reply evidence and argument of defendant The Burlington Northern and Santa Fe Railway Company ("BNSF") in STB Docket No. 42071, *Otter Tail Power Company v. The Burlington Northern and Santa Fe Railway Company*. The format of BNSF's submission complies with that prescribed in the Board's March 12, 2001 decision in STB Ex Parte No. 347 (Sub-No. 3), *General Procedures for Presenting Evidence in Stand-Alone Rate Cases* ("*General Procedures*").

A. INTRODUCTION

This rate reasonableness case is the fourth case brought by shippers of Powder River Basin coal since July 2000 challenging BNSF's rates for PRB coal transportation.[1] In each of the four cases, the complaining shipper initiated litigation at the Board upon termination of an existing rail transportation contract after rejecting offers by BNSF to enter into a new contract at rates that were below the rates being charged under the expiring contract. In this case, the transportation rate in the expiring contract was { }and BNSF offered a new contract rate of { }.[2] Otter Tail rejected that offer and requested that BNSF establish a common carrier rate so that it could pursue a lower rate through litigation.[3]

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[1] BNSF is also a defendant in two other pending rate reasonableness cases involving the transportation of New Mexico coal. *See* STB Docket Nos. 42058 and 42077. In addition, AEP Texas North Company filed a rate reasonableness complaint on August 11, 2003 after deciding not to pursue its prior request to have an existing rate prescription extended to cover certain PRB coal movements to its Oklaunion Generating Station. *See* STB Docket No. 41191 (Sub-No. 1). A motion to dismiss that complaint is pending.

[2] *See* BNSF Exhibit I-1.

[3] The challenged common carrier rate of $13.49/ton represents only a { } percent increase over the expiring contract rate. However, a common carrier rate generally exceeds a contract rate for the same movement since rail carriers often agree to lower contract rates in exchange for volume commitments and other benefits of a long-term contract. Otter Tail's claim that this slight increase in the common carrier rate is punitive is obviously misplaced. Moreover,

This case should never have been brought. The Board's regulation of rail rates is intended as a protection against monopoly abuses by market dominant railroads. But there was no such abuse here. Otter Tail had the opportunity to obtain lower transportation rates through contract negotiations. Otter Tail appears to have concluded, or to have been led to believe, that the Board's regulatory standards could be manipulated to produce even lower prescribed rates than it had been offered. It therefore passed up the opportunity for a contract-based reduction in rates for the prospect of a regulatory windfall.

Otter Tail had no valid reason to expect the Board to prescribe rates below those offered by BNSF in contract negotiations. Rates for the transportation of coal and other commodities have declined steadily over the past two decades. But this decline in overall rate levels has been responsible, in part, for the railroads' continuing inability to earn adequate revenues. The Board has never found that BNSF earned adequate revenues for any year. Between passage of the Staggers Act in 1980 and the merger of Burlington Northern Railroad Company ("BN") and The Atchison, Topeka and Santa Fe Railway Company ("ATSF") to form BNSF, neither the Board not the ICC ever found that ATSF achieved revenue adequacy and the ICC concluded that BN did so in only one year, 1989.[4] The Board recently concluded that BNSF would need to earn average revenues of 289 percent of its variable costs (the RSAM level) on traffic that generates revenue in excess of 180 percent of variable cost in order to achieve revenue adequacy.[5]

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as BNSF explained in its opening evidence, the rates at issue here are well within the reasonable range of permissible differential prices given Otter Tail's inelastic demand for coal transportation.

[4] Railroad Revenue Adequacy - 1989 Determination, 7 I.C.C. 2d 580 (1991).

[5] *Rate Guidelines - Non-Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2)(served Apr. 21, 2003).

Congress made the goal of railroad revenue adequacy a fundamental element of national transportation policy, stating that it is the policy of the United States "to promote a safe and efficient rail transportation system by allowing rail carriers to earn adequate revenues, as determined by the Board." 49 U.S.C. §10101(3). The revenue adequacy standard provides that a rail carrier should earn a return on net investment equal to its current cost of capital, thus ensuring that sufficient capital will be available for reinvestment in rail infrastructure and improvements.[6] The governing statute expressly instructs the Board to "recogniz[e] the policy . . . that rail carriers shall earn adequate revenues" in determining the reasonableness of rates, 49 U.S.C. §10701(d)(2), and directs the Board to "make an adequate and continuing effort to assist those carriers in attaining revenue levels prescribed under this paragraph." *Id.* at §10704(a)(2).

When the *Coal Rate Guidelines* were adopted as the test for the reasonableness of coal transportation rates, they were expected to advance the congressional revenue adequacy policy by allowing railroads to engage in differential pricing.[7] As the ICC stated, "the cost structure of the railroad industry necessitates differential pricing of rail services."[8] Competition forces railroads to price much of their traffic at levels that do not enable the railroad to recover much more than directly attributable costs from those movements. Only by charging other shippers

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[6] *Standards for Railroad Revenue Adequacy*, 364 I.C.C. 803 (1981), *aff'd sub nom. Bessemer & Lake Erie Railroad v. I.C.C.*, 691 F.2d 1104 (3rd Cir. 1982), *cert. denied*, 462 U.S. 1110 (1983).

[7] The ICC also expected that the promulgation of the *Coal Rate Guidelines* would allow railroads to increase rates for the transportation of coal. In its *Interim Guidelines*, promulgated two years before the SAC test was adopted, the ICC said that "[w]e believe the maximum rates on market dominant traffic, in general, should be permitted to increase to the extent necessary for a carrier to achieve revenue adequacy." *Coal Rate Guidelines, Nationwide*, Ex Parte No. 347 (Sub-No. 1), slip op. at 15 (served Feb. 24, 1983).

[8] *Coal Rate Guidelines, Nationwide*, 1 I.C.C.2d 520, 526 (1985) ("Guidelines").

higher rates can the railroads be expected to cover their full costs and remain viable without government support. Based on the economic theory known as "Ramsey pricing," the ICC concluded that the most economically efficient method for determining the level of "differential" rates to be paid by a given shipper was to charge shippers with the strongest (most inelastic) demand the proportionately highest rates.[9]

The SAC test was adopted as a surrogate for a more complex and detailed Ramsey pricing analysis. But as a surrogate for Ramsey pricing, SAC analyses should produce results that approximate Ramsey pricing by allowing railroads to charge shippers with inelastic demand significantly higher rates than the rates charged to shippers with competitive options. As BNSF demonstrated in its opening evidence, Otter Tail is precisely the type of shipper that should be paying higher rates because of its inelastic demand for coal transportation service. *See* BNSF Op. Nar. at II-60-72.

Otter Tail's opening SAC evidence reflects a fundamental misunderstanding of these policies underlying the Board's regulation of rail rates. Otter Tail's complaint appears to be that its rates are higher than rates it would pay if it had direct competitive options for service to its Big Stone generating plant. This appears to be the point of Otter Tail's discussion of its efforts to obtain a second rail option at its Big Stone generating station (including its attempts to interfere with BNSF's existing contract rights). According to Otter Tail, it was in light of its failure to obtain rail-to-rail competition at the Big Stone plant that it "has now turned to existing regulatory remedies to obtain a reasonable rate to Big Stone." OTP Nar. at I-8. But this complaint ignores the differential pricing policy underlying the *Guidelines* and the SAC test,

[9] *Guidelines*, 1 I.C.C.2d at 526-27.

which requires that BNSF be able to charge rates to shippers, like Otter Tail, with inelastic demand that are substantially higher than rates resulting from head-to-head rail competition.

BNSF's variable cost evidence shows that the challenged rate yields R/VC ratios in the range of 213-232 percent, well below the RSAM level of 289 percent. Otter Tail, in contrast, urges the Board to prescribe a rate set at the jurisdictional threshold of 180 percent. But it would be contrary to the policies of differential pricing and revenue adequacy for the Board to convert the jurisdictional floor into a maximum rate cap. If application of the SAC test prevents BNSF from charging a shipper like Otter Tail rates that significantly exceed the jurisdictional threshold, then the regulatory standard is being applied in a manner inconsistent with the policies that led to its adoption. BNSF must be able to charge demand inelastic shippers like Otter Tail rates that significantly exceed the jurisdictional threshold if it is to have any meaningful opportunity to achieve revenue adequacy.

The question in this case is whether the challenged rate represents an unreasonable exercise of differential pricing. A properly conducted SAC analysis shows that it does not.

B. OTTER TAIL HAS FAILED TO PRESENT ANY COMPETENT SAC EVIDENCE SHOWING THAT THE CHALLENGED RATE EXCEEDS A REASONABLE MAXIMUM RATE

Otter Tail's coal is transported today over relatively low density rail lines in Montana, North Dakota and South Dakota. From the PRB, the Otter Tail traffic moves north and west over the same lines that were at issue in the *PPL* case.[10] It then travels north and east to Terry, MT over lines that are not substantially different from the *PPL* lines. At Terry, the Otter Tail trains turn east to move over a line through Hettinger, ND and Aberdeen, SD to the Big Stone

[10] *PPL Montana, LLC v. The Burlington Northern and Santa Fe Rwy. Co.*, STB Docket No. 42054 ("*PPL*").

plant. The Terry line was acquired by BNSF's predecessor when the prior owner of the line, the Chicago, Milwaukee and St. Paul Railway Co., went bankrupt. Otter Tail is the largest coal shipper on that line, and from Aberdeen east to the Big Stone plant, Otter Tail's traffic accounts for about half of the total traffic on the line.

SAC complainants whose traffic is served over relatively low density lines have devised a number of strategies to compensate for the fact that, other things being equal, shippers using low density lines, including the complainant, must expect to contribute a proportionately higher amount of revenue to cover the costs of the lines. In *PPL*, the complainant's strategy was to subsidize the costs of the relatively low density lines north and west of the PRB with revenues from PRB traffic that did not use those lines. The Board correctly found that since the SAC test is a test for cross-subsidies, it is improper for the complainant to posit SAC evidence based on an assumption that other shippers contribute revenues to cover the cost of lines they do not use.[11]

Notwithstanding its rejection in *PPL*, Otter Tail relies on the same strategy here. Otter Tail includes in the SARR it posits, the Otter Tail Railroad ("OTRR"), a large volume of coal traffic that originates in southern PRB mines from Cordero to Converse, moves only a short distance over OTRR lines, and exits the OTRR at Converse, WY. That traffic shares no facilities whatsoever with the issue traffic yet it generates an enormous amount of revenue that the OTRR uses to offset the cost of the facilities used by the issue traffic. It is a clear violation of SAC traffic grouping principles to include traffic in the SARR traffic group that does not and would not share any facilities with the issue traffic.[12]

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[11] *PPL*, slip op. at 9 (served Aug. 19, 2002) ("*PPL I*").

[12] As discussed further below, Otter Tail improperly included other short-haul traffic in violation of its own traffic selection criteria. In light of the disproportionately large revenue

Complainants in recent cases have also sought to increase the apparent density of SARR lines, and therefore increase the revenues that would supposedly be available to the SARR, by assuming that the incumbent's traffic moving on lines that are not replicated by the SARR could be rerouted over SARR lines in the stand-alone world. The Board has rejected this strategy in instances where the complainant fails to consider the impact of the proposed rerouting on the quality of service that would be provided or the impact of the rerouting on the residual incumbent who would receive the traffic in an interchange with the SARR.[13] Otter Tail also disregarded the Board's prior treatment of this strategy. Otter Tail sought artificially to increase the traffic density on OTRR lines by rerouting certain time-sensitive intermodal traffic, BNSF's Z trains, from the current route of movement on BNSF's northernmost line onto the lines replicated by the OTRR. However, as in *TMPA*, Otter Tail failed to consider the impact of this rerouting on the quality of service or on the residual incumbent assumed to handle the traffic in cross-over service with the SARR. BNSF shows that the rerouting of these time-sensitive movements would make it impossible to achieve or maintain the same level of service that shippers demand from and that is provided today by the incumbent. Therefore this traffic also must be excluded from the SAC analysis.

Otter Tail employs other strategies designed to inflate OTRR revenues and understate OTRR costs. On the revenue side, Otter Tail, like other recent complainants, relies heavily on cross-over traffic and claims a grossly disproportionate share of revenue on that traffic for the

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division that Otter Tail assumes on this traffic, it is clear that these short-haul movements are also intended to contribute revenues to offset the cost of facilities they do not use.

[13] *Texas Municipal Power Agency v. The Burlington Northern and Santa Fe Rwy. Co.*, STB Docket No. 42056, slip op. at 21-22 (served Mar. 24, 2003) ("*TMPA*"). Xcel also assumed an improper rerouting of the Western Resources traffic in its presentation of SAC evidence. *Public Service Company of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Rwy. Co.*, STB Docket No. 42057 ("*Xcel*"). The Board has not yet ruled in the *Xcel* case.

SARR based on manipulations of real world divisions data. This issue is discussed extensively in BNSF's reply evidence. While BNSF objects to any use of cross-over traffic in SAC analyses, BNSF presents an alternative revenue allocation on Otter Tail's cross-over traffic that limits somewhat the distorting impact of Otter Tail's reliance on cross-over traffic.

On the cost side, Otter Tail's evidence is flawed and superficial. Indeed, Otter Tail's original filing was so flawed that Otter Tail filed a month later an expansive "errata" that significantly altered its stand-alone rail network, modified the string program analysis that supported its capacity assumptions and operating plan, and presented a completely new set of operating statistics. Given the scope of its errata, Otter Tail clearly knew long before filing the errata that it was planning to make fundamental changes to its construction and operating cost assumptions, but it never advised BNSF or the Board that these changes were in the works. Instead, BNSF learned of these substantial changes a month after Otter Tail's opening evidence with the filing of Otter Tail's errata, requiring BNSF to respond to what was essentially a new SAC presentation. As a result, consultants and attorneys for BNSF spent a significant number of hours analyzing and responding to evidence that became irrelevant when Otter Tail filed its expansive errata. This imposed very substantial, unnecessary costs on BNSF.

Even with its errata, Otter Tail's cost evidence remains full of errors and methodological flaws. Otter Tail generates operating statistics and capacity requirements using a string program analysis that is unusable. Otter Tail's assumptions about various unit costs rest ultimately on little more than rhetoric about least-cost, efficient railroads as a substitute for concrete evidence about the costs that would actually be required to serve the OTRR traffic group. In contrast, BNSF presents in this reply a thorough cost study supported by competent and verifiable evidence. As BNSF demonstrates, when appropriate assumptions about SAC costs are made, it

is clear that revenues that would be available to the OTRR do not exceed the costs of serving the OTRR shippers.

1. Otter Tail Manipulated SAC Grouping Principles To Produce An Inflated Estimate Of SAC Traffic Volumes

While Otter Tail, as the complainant, has the right to select its traffic base for its SARR traffic network, there are limits to this right. According to the ICC, "[t]he proponent of a particular stand-alone model must . . . be prepared to defend the assumptions and selections it has made." *Coal Rate Guidelines*, 1 I.C.C. 2d at 544. In this case, Otter Tail has exceeded those limits by including in the stand-alone shipper network three categories of coal and non-coal traffic that cannot be justified under governing SAC principles established by the Board. As explained below and in detail in BNSF's Reply Narrative, these three categories of traffic must be excluded from the SAC analysis.

The first category involves the over 54 million tons of coal that originates at southern PRB mines from Cordero, WY to Converse, WY and moves a short distance south over OTRR lines before exiting the OTRR at Converse. This traffic never moves over any track segment used by the issue traffic. The majority of the issue traffic enters the OTRR from northern PRB mines at Belle Ayre and Eagle Butte. A small amount of the issue traffic originates at the southern PRB mines of Cordero and Caballo Rojo and travels north on the OTRR through Campbell, WY.[14] But *none* of the issue traffic moves on OTRR lines south of Cordero and therefore none of the issue traffic ever shares any facilities with the south-bound traffic originating between Cordero and Converse.

[14] A diagram showing the route taken by the issue traffic and the route taken by this southern PRB coal traffic exiting the OTRR at Converse is included at BNSF Reply Exhibit III.A-1.

Inclusion of this southern PRB coal traffic in the Otter Tail traffic network is inconsistent with the traffic grouping principles established in the Board's Constrained Market Pricing ("CMP") Guidelines and Board decisions addressing those principles. As the Board recently explained, a "shipper should not seek to have its rate reduced by shifting any part of the costs of the lines or facilities that it needs onto traffic that does not use those lines or facilities."[15] Otter Tail's inclusion of tens of millions of tons of southern PRB coal that exit the OTRR at Converse is directly contrary to this principle and, indeed, is nothing more than an attempt to have southern PRB shippers contribute revenues to pay for facilities they do not use. As a review of Otter Tail's own Opening Exhibit III-A-3 vividly illustrates, Otter Tail claims a grossly disproportionate share of the revenues associated with this southern PRB coal traffic. For the PRB coal traffic exiting the SARR at Converse, this exhibit shows that Otter Tail's stand-alone railroad, on average, has only four percent of the total BNSF miles for those movements but claims 28 percent of the total BNSF revenues for those movements.[16]

The second category of coal traffic that Otter Tail improperly includes in the stand-alone traffic group, consisting of over 14 million tons of coal, fails to meet one of Otter Tail's own traffic selection criteria; namely, its 1.1 percent mileage threshold. Specifically, Otter Tail claims that it excluded from the OTRR any coal that moved on the real world BNSF more than 200 miles when the OTRR's share of the movement would be less than 1.1 percent of the total real world movement miles. *See* OTP Nar. at III-A-19, n.24. However, Otter Tail failed to apply this short-haul criterion to coal movements originating at northern PRB coal mines. *See* OTP Nar. at III-A-5, item 3. As a result, several northern PRB coal movements exiting the OTRR at

[15] *PPL*, slip op. at 7 (served Mar. 21, 2003) ("*PPL II*").

[16] *See* OTP Opening Exh. III-A-3, at 4, row "Subtotal off at Converse," columns 18 and 22.

Donkey Creek were included in the OTRR traffic network even though the OTRR transports this traffic less than 1.1 percent of the miles of the real world BNSF route. Otter Tail provided no rationale for selectively applying this traffic selection criterion and, indeed, there is none. When the criterion is applied to all coal traffic and the errors in Otter Tail's mileage calculations are corrected, more than 14 million tons of coal must be removed from Otter Tail's traffic network in base year 2002 alone.

Once again, the distortion produced by including this short-haul traffic in the stand-alone network is apparent. While this traffic moves only a short distance on the OTRR, it is assumed to generate a tremendous amount of revenue. For example, Otter Tail transports the { } traffic less than 1.1 percent of the total miles on the real world BNSF but claims 26 percent of the BNSF revenues associated with that movement.[17]

The third category of traffic that Otter Tail improperly included in its stand-alone traffic group involves high speed intermodal trains, designated as Z trains, that Otter Tail assumed would move over OTRR lines between Snowden and Glendive, MT and Fargo, ND. BNSF's transcontinental Z trains do not move over this route today. This traffic is the highest priority freight traffic on BNSF and, in the real world, it moves over BNSF's line from Snowden through Minot, ND and then to Fargo, ND on a line that Otter Tail did not build. Otter Tail assumes that the OTRR would reroute this traffic from Snowden down to Glendive and then to Fargo over an OTRR line that would be crowded with slower moving coal and grain unit trains.

This assumed rerouting of the Z trains is impermissible. While Otter Tail claims that "the OTRR will provide at least the same level of service" as the real world BNSF for the rerouted traffic, *see* OTP Nar. at I-18, its claims are demonstrably false as applied to the Z trains. Otter

[17] *See* OTP Opening Exh. III-A-3, at 6, row { } columns 18 and 22.

Tail's substantially longer routing of the Z trains (it increases the distance by 101 miles for the overhead segment of the through movement assumed to be handled by OTRR) and proposed operating procedures result in transit times for the rerouted Z train traffic -- using Otter Tail's own calculations -- that are much longer than BNSF's actual transit times for the Z trains over the northern route from which the traffic is supposed to be diverted. Under the Board's recent decision in *TMPA,* the rerouted Z train traffic should not be included in the stand-alone traffic group because the OTRR would provide inferior service to the shippers. Exclusion of the Z train traffic reduces the OTRR's volumes by { } million tons annually.

2. Otter Tail Overstated SAC Revenues Through The Use of Cross-Over Traffic

Reliance on cross-over traffic is the Achilles heel of the SAC test as currently implemented by the Board. CMP (and SAC) were adopted by the ICC as the culmination of a lengthy and arduous process intended to identify a maximum reasonable rate standard that did not rely on arbitrary cost allocations. The SAC test is designed to avoid allocations by relying on a detailed comparison of costs incurred to build and operate a stand-alone railroad with the revenues generated by the traffic that the hypothetical railroad is assumed to handle. Cross-over traffic represents a giant step backward from this direct comparison of costs and revenues because it introduces an arbitrary allocation on the revenue side of the equation. The allocation of revenue on a through movement into separate components is inherently arbitrary.[18]

This problem of introducing arbitrary revenue allocations into the SAC analysis is most acute, where, as here, the complaining shipper relies overwhelmingly on cross-over traffic as the

[18] In its Bottleneck ruling, the Board confirmed that shippers may not mount challenges to separate components of a through rate. *Central Power & Light Co. v. Southern Pac. Transp. Co.*, STB Docket Nos. 41242 et al. (served Dec. 31, 1996).

source of revenue for its stand-alone railroad. Cross-over traffic revenue accounts for about 97 percent of base-year revenues on the OTRR. The determination of whether the challenged rate is reasonable or not will therefore turn in large measure on how much revenue is allocated to the SARR on cross-over traffic movements. Since any method of allocating revenue on cross-over traffic is arbitrary, the outcome of the SAC maximum rate determination will turn on an arbitrary allocation. That was not the ICC's intention or its understanding of what it was doing when it adopted the *Coal Rate Guidelines*.

BNSF urges the Board to reconsider its practice of allowing complaining shippers to rely on cross-over traffic. BNSF's reply evidence explains in detail why reliance on cross-over traffic is inconsistent with SAC principles. Professor Janusz Ordover's testimony on this conceptual aspect of the cross-over issue entails three basic propositions that are discussed in Section III.A.1.a of BNSF's Reply Narrative: (1) Cross-over traffic violates the cost-causality principle underlying the SAC test. That test is supposed to compare the total revenues generated by the traffic group with the full economic costs of all the facilities needed to serve movements in the group. The use of cross-over traffic (and the splitting of a stand-alone railroad into interline segments) severs the responsibility for cost recovery, necessitating an arbitrary allocation of revenues that, by definition, cannot be attributed to particular segments of the cross-over movement. (2) The allocation of revenue on cross-over traffic can distort the outcome of a properly performed SAC test, resulting in a finding that challenged rates are unreasonably high when, in fact, they would be found to be reasonable under a full SAC analysis. The potential for distortion increases as the share of cross-over traffic in the stand-alone traffic group increases. (3) Complaining shippers, like Otter Tail here, have the incentive to use cross-over traffic as a vehicle for strategic revenue shifting that will produce distorted SAC results.

The Board should dismiss Otter Tail's SAC evidence outright because of its reliance on cross-over traffic. Should the Board decline to do so, it should, at a minimum, accept BNSF's proposed density adjusted revenue allocation ("DARA") procedure as the least distorting method available on the record of this case for allocating revenues on cross-over traffic. As Professor Ordover explains, DARA improves upon the mileage-based revenue allocations proposed by Otter Tail by accounting for differences in traffic densities on the SARR versus the off-line portions of the residual incumbent's route.

Otter Tail has allocated revenues using a combination of mileage-based regression results and the modified mileage prorate ("MMP"). Its rationale for this approach is that revenue allocations on cross-over traffic should be based on extrapolations from real world divisions of revenue and that where real world divisions data are not available, the MMP is an acceptable surrogate for them. Otter Tail's approach is conceptually flawed. The implementation of that approach is a grossly overreaching revenue grab by the OTRR. This is accomplished through statistically unreliable regression analyses.

Dr. Ordover explains in Section III.A.3.c of BNSF's Reply Narrative that the assumption that real world divisions negotiations are an accurate predictor of the outcome of assumed negotiations between the SARR and the residual incumbent does not hold true. Real world divisions negotiations result in a benefit for both parties by allowing them to participate in a new movement that would not otherwise exist. Cross-over movements, on the other hand, represent the fragmentation of a through movement into two pieces. Unlike the real world situation, the residual incumbent cannot benefit from this arrangement because the Board's prior rulings prohibit it from pursuing the rational and efficient bargaining objective of retaining its

contribution on the through movement. The assumed resemblance between real world and hypothetical divisions negotiations is therefore nonexistent.

Otter Tail's implementation of revenue allocation through its regression analyses stunningly corroborates the proposition that use of cross-over traffic is a vehicle for strategic revenue shifting by the complaining shipper. As detailed in BNSF's evidentiary narrative, Otter Tail claims revenue divisions for the SARR on short-haul coal movements that are grossly disproportionate. The claimed divisions on traffic exiting the OTRR at Converse Junction and Donkey Creek substantially exceed those that would be allocated under the MMP, which itself is biased in favor of short-haul origin carriers. *See* BNSF Reply Table III.A-13.

Otter Tail accomplishes its revenue grab by designing regressions that are statistically unreliable. Otter Tail purports to calculate divisions for unit coal train movements originating in the PRB, yet none of the five data points it uses for its under 200 mile regression is a PRB unit train coal movement. This small data set includes a flagrant outlier that heavily influences the slope of its linear regression, leading to a prediction that the OTRR would earn 25 percent of the revenue for doing none of the work. Otter Tail applies its regression results to dozens of short-haul coal movements that are outside the relevant range of its observed data. These and other serious flaws with Otter Tail's regressions are fully described in BNSF's evidentiary narrative.

In contrast to the one-sided results achieved through Otter Tail's manipulation of divisions data, BNSF's DARA procedure produces results that are even-handed and that are grounded in the reality of railroad economics. DARA is predicated on the notion that the revenue available to the residual incumbent and the SARR for their portion of cross-over movements should be allocated so as to allow recovery of their respective costs of handling the traffic. It is, after all, a comparison of revenues and costs that is the core of the SAC test.

The issue regarding cost coverage on cross-over traffic is framed by the Board's recent statement in *TMPA*: "The revenue each carrier receives should cover the attributable costs of the service it provides and make some contribution to its unattributable costs." *TMPA* at 37 n.74. Determining coverage of attributable costs for the SARR and the residual incumbent is relatively straight-forward.[19] The question that is critical to the revenue allocation issue in this case is how the residual revenue available for coverage of unattributable costs should be divided between the SARR and the residual incumbent.

Otter Tail makes no effort to answer this question. BNSF does answer this question, and its answer is that the carrier with relatively lower densities on its segment of a cross-over movement will need a relatively greater portion of the residual revenue on the movement to cover its unattributable costs than the carrier with relatively higher densities. This proposition flows logically from the existence of production economies that characterize the economic structure of the rail industry, and in particular from "the fact that greater use of the fixed plant result in a declining average cost."[20]

BNSF's DARA procedure involves an explicit calculation of attributable costs on both portions of cross-over movements and an allocation of residual revenue in direct proportion to

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[19] BNSF calculates attributable costs for both the SARR and residual incumbent portions of cross-over movements under its DARA procedure using the most recent URCS for BNSF and employing the Board's Ex Parte No. 399 costing assumptions. Otter Tail purported to show that its mileage-based revenue allocation procedures give the residual incumbent sufficient revenue to cover attributable costs of off-SARR portions of cross-over movements, but as explained in BNSF's evidentiary narrative, it did not calculate attributable costs correctly. *See* BNSF Reply Nar. Section III.A.4.b.

[20] *Guidelines*, 1 I.C.C.2d at 526; *see also PPL I* at 12 n.21 (referring "to "the declining capital investment needed per unit of output as the rail system is used more intensively").

length of haul and in inverse proportion to traffic density.[21] Thus, DARA represents a refinement and an improvement over mileage-based revenue allocations because it provides a principled basis for allocating that portion of revenue on cross-over movements that is available to cover unattributable costs. DARA allows the SARR to benefit from economies of density by receiving additional revenue in excess of attributable costs for each unit of traffic that it carries, while at the same time recognizing that the less dense residual incumbent must also cover unattributable costs over the long term if it is to be able to interchange traffic with the SARR over the long term.

3. After Correcting Otter Tail's Traffic Group, Otter Tail's Capacity Assumptions Require Only Modest Changes

The adequacy of Otter Tail's capacity assumptions for the OTRR must be considered separately for four discrete segments of the hypothetical railroad: (1) the coal origination lines in the PRB from the Campbell subdivision (Gillette, WY) south to Converse Jct.; (2) the OTRR's lines from the PRB north and west to Moran Jct., where the OTRR turns northeast and continues to Glendive, MT; (3) the OTRR's lines from Snowden, MT in the north to Glendive and then east through Mandan ND to Fargo ND; and (4) the segment from Fargo to Benson and then to the Big Stone plant. *See* BNSF Reply Exh. III.B-2.

Otter Tail posits that two of these four OTRR segments -- the Campbell Sub/Moran Jct/Glendive and Fargo/Benson/Big Stone segments -- have track capacity that is comparable to the capacity on the BNSF lines that the OTRR is assumed to replicate. As to the Campbell Sub/Moran Jct./Glendive segment, Otter Tail assumes that the level of traffic that the OTRR would handle on that line is somewhat higher than the traffic handled by BNSF today on that

[21] The procedure for implementing DARA is described at in Section III.A.3.c of BNSF's Reply Narrative.

line. But BNSF's witness explain that the this line segment is not at capacity today so the existing capacity is probably adequate to handle the slightly higher traffic volumes assumed by Otter Tail for those line segments. BNSF therefore accepted Otter Tail's track capacity assumptions for that segment of the OTRR. Since Otter Tail assumed that the Fargo/Benson/Big Stone segment would handle less traffic than BNSF does today, BNSF also accepted Otter Tail's capacity assumptions for this line segment of the OTRR.

On the remaining two segments, a special capacity analysis was required. As discussed above, BNSF eliminated substantial coal volumes that Otter Tail assumes would move on the southern portion of the Donkey Creek/Converse segment between Cordero and Converse. BNSF also eliminated certain coal movements on the northern portion of that segment to be consistent with the criteria Otter Tail itself employed to identify short-haul traffic for the OTRR. On the Snowden/Glendive/Fargo segment of the OTRR, BNSF eliminated Z train movements for reasons discussed above. Even with these changes, however, the traffic volumes on these two OTRR lines are quite different from BNSF's traffic on these lines today so there is no real world experience that BNSF can rely on to assess the reasonableness of Otter Tail's capacity assumptions.

To assess capacity on these line segments, BNSF first analyzed Otter Tail's approach to determining OTRR capacity requirements and determined that it was seriously flawed.[22] Otter Tail purports to have used a formula in the first instance to determine minimum capacity requirements and then used a string program analysis to confirm that the formula had produced adequate capacity. The many flaws in Otter Tail's capacity formula and how it appears to have

[22] In fact, after several workpaper requests, Otter Tail's capacity calculations and the underlying assumptions remain a mystery.

been implemented are discussed in Section III.B.2.a of BNSF's Reply Narrative. BNSF also explains in detail that Otter Tail's string program analysis in this case shares many of the fundamental shortcomings that have characterized complainants' string program analyses in previous cases. For several reasons, Otter Tail's string program produces totally unreliable results and cannot be used to assess OTRR capacity requirements. *Id.*

BNSF therefore used the Rail Traffic Controller ("RTC") model to assess capacity requirements on the Donkey Creek/Converse and Snowden/Glendive/Fargo line segments. The RTC model is a sophisticated network simulation model that has gained wide acceptance among railroads, transit authorities and government agencies. It is relatively easy to evaluate capacity needs of discrete rail lines with the RTC model through iterations that test alternative capacity assumptions. Unlike the opaque and convoluted string program, the RTC model produces clear and simple output that allows the user to assess the reliability of model results.

The assumptions and methodologies used by BNSF's capacity witness David Wheeler in applying the RTC model are described in detail in Section III.B.2.a of BNSF's Reply Narrative. As discussed in the Narrative, Mr. Wheeler concluded that Otter Tail's capacity assumptions for the Snowden/Glendive/Fargo line were adequate for the reduced traffic levels that would use that line but that Otter Tail's assumed capacity could not be further reduced without adversely affecting transit times. On the Donkey Creek/Converse segment, Mr. Wheeler found that significant mainline reductions were possible given the lower traffic volumes that BNSF assumes will traverse this line segment. These revised capacity assumptions were provided to BNSF's construction cost witnesses.

BNSF also evaluated Otter Tail's yard capacity assumptions and concluded that most yards posited by Otter Tail were appropriate or required only minor changes in capacity. *See*

Section III.B.3 of BNSF's Reply Narrative. However, as described by BNSF's witness Mr. Mueller, Otter Tail significantly understated the capacity required at the Glendive yard by failing to provide yard tracks for certain yard functions that must be carried out on some of the intermodal traffic that Otter Tail assumes is rerouted from BNSF's northern line through Minot, ND onto the OTRR's Glendive line. These functions are performed today on the rerouted trains at BNSF's yard at Minot, on a section of BNSF's real world network that the OTRR is assumed to replace. As explained by Mr. Mueller in Sections III.B.3 and III.C.2.b of the Reply Narrative, the OTRR must also carry out these functions at a yard on the replacement route. BNSF's witnesses concluded that Glendive was the most efficient location for these functions and they identified the yard capacity that would be required. In addition, Mr. Mueller explains that the OTRR would need to build a yard at Mandan, ND to fuel certain coal trains that would otherwise be unable to complete their coal deliveries. These yard capacity requirements were also provided to BNSF's construction cost witnesses.

4. Otter Tail Substantially Understated The OTRR's Operating Costs

The basic operating characteristics of the OTRR are not in dispute. BNSF agrees with Otter Tail's assumptions about the types of locomotives and cars that would be used on the OTRR, the configuration and size of OTRR trains, the use of run-through agreements for the sharing of locomotives, and the location of OTRR crew change districts. Moreover, BNSF accepts Otter Tail's basic assumptions about the interchanges that would occur between the OTRR and the residual incumbent. BNSF also accepts Otter Tail's assumption that certain merchandise trains, including intermodal, automotive and grain trains, would be rerouted from the current route of movement on BNSF to the OTRR to be handled in overhead service,

although BNSF eliminated from the traffic group the rerouted Z trains for the reasons discussed previously.

But the parties differ substantially on the calculation of the costs associated with these OTRR operating characteristics. Otter Tail made numerous errors in its operating cost assessment. It generated operating statistics with flawed programs and incorrect factual assumptions, used improper and illogical methodological assumptions to calculate equipment and crew requirements from these statistics, and applied unsupported and inappropriate unit cost and salary assumptions to produce operating costs. In addition, Otter Tail's superficial approach to calculating G&A and maintenance of way expenditures resulted in cost estimates that are totally implausible and unsupported.

As discussed below and in detail in Sections III.C and III.D of the Reply Narrative, BNSF corrected Otter Tail's methodological flaws and erroneous factual assumptions and applied appropriate costing methodologies to determine operating costs for a SARR that handles the revised level of traffic described above in Section III.A of the Reply Narrative.

a. Equipment Requirements

The starting point for Otter Tail's calculation of OTRR's equipment requirements (locomotives and cars) was its assessment of the amount of time the equipment would spend on the OTRR lines. While this general approach is acceptable, Otter Tail used a flawed string program analysis to determine on-OTRR time that was similar to the analysis used by complainants in several recent cases and rejected by the Board in *TMPA*. The many flaws in Otter Tail's string program analysis are described in BNSF's Reply Narrative. As discussed in Section III.C.2.a of the Narrative, these flaws produced an understatement of transit time, thus resulting in the understatement of OTRR locomotives and cars. Otter Tail further understated on-OTRR time by ignoring a number of time-consuming activities, particularly in yards.

Using its flawed on-OTRR time assumptions, Otter Tail then applied an illogical and clearly erroneous methodology to calculate equipment unit-hours and fleet requirements. The flaws in Otter Tail's methodology should have been obvious. For example, as described in Section III.C.2.d of the Narrative, Otter Tail first derived requirements for the year 2021 and then reduced those requirements to produce base year 2002 requirements, which became the inputs to their DCF analysis. But Otter Tail's mistaken approach suggests that the OTRR would require only 71 percent of the non-coal locomotives in the year 2002 that were required in 2021, even though Otter Tail assumes that the non-coal traffic will not change *at all* over that time period.[23] In addition, Otter Tail ignored peak period equipment requirements, notwithstanding the Board's recent admonition that it is "a carrier's obligation to have sufficient locomotives to serve its customers during peak periods." *TMPA* at 81. Compounding these errors, Otter Tail made several inappropriate and unsupported assumptions in calculating the costs associated with the acquisition and maintenance of the OTRR's equipment. Those errors are discussed in Sections III.D.1 and III.D.2 of the Narrative.

To determine more realistic equipment costs for the OTRR, BNSF also started with assumptions about on-OTRR times. For the two segments that BNSF modeled for purposes of assessing capacity requirements -- the Gillette/Converse and the Snowden/Glendive/Fargo segments -- BNSF used the output of the RTC model to generate transit times. For the Gillette/Glendive segment, BNSF used the actual transit times that BNSF experiences today. The OTRR track capacity on that line segment is comparable to the real world capacity and the traffic volume is higher, so there is no reason to believe that the OTRR could achieve

[23] It is difficult to ascribe these and the multitude of other errors in Otter Tail's calculations to inadvertence, since they almost invariably favor Otter Tail by reducing costs by substantial amounts below the costs that would be generated using correct methodologies.

significantly better transit times than the real world BNSF over those segments. For the Fargo/Benson/Big Stone line, BNSF's witness Mr. Wheeler used a simplified model that assumes that each OTRR train would operate under optimal conditions without any delays attributable to other traffic on the line. *See* BNSF Reply Nar. at Section III.C.2.c.

Using these transit time assumptions and realistic estimates of yard time provided by BNSF's witness Mr. Mueller, BNSF generated equipment requirements for the OTRR using a formula approved by the Board in *TMPA*. BNSF Reply Nar. at Sections III.C.2.d and e. BNSF then applied corrected lease, maintenance and service costs to determine the full costs associated with the OTRR locomotive and car fleets. BNSF Reply Nar. at Sections III.D.1 and 2.

b. Fuel Cost

The single largest operating cost item in the DCF analysis is locomotive operating costs and the most significant component of that cost is the cost of fuel. Otter Tail understated the fuel costs for the OTRR by failing to account for the dramatic increases in fuel price that were experienced in 2002. Otter Tail based its fuel price assumption on a first quarter 2002 fuel price of $0.65/gallon that was an anomaly. By the fourth quarter 2002, BNSF's fuel price had increased to $0.78, with an average price during the year of $0.73. BNSF adjusted the OTRR fuel price assumption to capture the effects of this historical fuel price increase. BNSF also corrected Otter Tail's calculation of locomotive unit-miles and included the fuel costs associated with switching activities, which Otter Tail had ignored. BNSF Reply Nar. at Section III.D.1.d.

c. OTRR Crew

BNSF accepts Otter Tail's basic assumptions as to crew districts and as to the crew operations within those districts. However, there were several errors in Otter Tail's methodology for identifying OTRR crew requirements that resulted in a dramatic understatement of the OTRR's crew count. Once again, the flaws in Otter Tail's methodology should have been

apparent to Otter Tail. As BNSF describes in Section III.D.3.a. of the Reply Narrative, Otter Tail applied an illogical and erroneous methodology to reduce supposed 2021 crew requirements to obtain base year requirements. As a result, while traffic levels in 2002 were 89 percent of those in 2021, Otter Tail assumed that the OTRR's crew requirements would be only 68 percent of the crew personnel required in 2021.

Otter Tail also understated the salary that would be paid to OTRR crew personnel. Otter Tail calculates the number of crew personnel needed by the OTRR based on an assumption that crew members would work 270 train starts per year. While there are some crew personnel in the real world that work 270 train starts per year, they are far and few between and they are paid salaries that are much higher than average crew salaries. If Otter Tail is going to reduce the number of crew personnel required by the OTRR by using an assumption that each crew member will work extremely hard, it must provide for compensation that reflects the level of work that is expected.

d. G&A

Otter Tail's G&A staffing assumptions and most of its corresponding salary and expense assumptions are unsupported by competent and verifiable evidence. Indeed, when BNSF asked Otter Tail "to specify the basis for the staffing levels, salaries and outsourcing costs for OTRR's G&A evidence," Otter Tail pointed almost exclusively to the "experience" of its two witnesses as support for its assumptions without further justification or explanation.[24] The Board cannot accept assumptions that produce unprecedented low operating ratios and high revenue per employee assumptions sponsored by Otter Tail without detailed evidence showing how the SARR could achieve such unprecedented efficiencies.

[24] *See* BNSF Reply electronic workpaper "OTP_G&A_Workpaper_Responses.pdf."

BNSF's G&A witness, Mr. Reilly McCarren, former President and CEO of Wisconsin Central System ("WCS") and current Chairman of the Arkansas & Missouri Railroad, explains in Section III.D.3.c of the Reply Narrative that in terms of size and scope (annual revenues, employment levels, route miles and carloads), the hypothetical OTRR is quite comparable to the former WCS. Many operating practices of the OTRR are also comparable to those of the WCS. For example, the WCS outsourced many of the same functions that Otter Tail proposes to outsource, had comparable total operating expenses, was predominately non-union and was recognized as having very efficient administrative functions, with one of the lowest operating ratios in the railroad industry. Notwithstanding these similarities, Otter Tail assumes that the OTRR would have annual G&A expenses of $11 million compared to WCS' G&A expenses of $31 million in 2000, a result that Mr. McCarren explains is implausible and unsupportable. Mr. McCarren carried out a detailed review of the OTRR's G&A requirements and estimated G&A costs that are more reasonable, although still very conservative compared to real world experience.

e. MOW

Otter Tail's MOW evidence has no foundation in the reality of maintaining a high tonnage railroad. Instead of examining the specific maintenance tasks that would be required to ensure that the SARR provides the same level of service as the incumbent, Otter Tail posits a skeletal MOW staff that would be incapable of handling the most routine maintenance requirements. It then supplements this staff with a third party contractor that would be responsible for most of the OTRR's maintenance. Otter Tail does not identify any competent third party contractor that would be willing or able to do the OTRR MOW work for the amount specified; it bases the contract values on the wrong type of MOW activities, and it provides no

support whatever for the allocation of the contract costs between operating and capital costs. Otter Tail's MOW costs are based on abstractions that are totally unverifiable.

Evidence, like Otter Tail's MOW evidence, that is not verifiable is not competent and it cannot be used to establish SAC costs. Moreover, it is clear from multiple reference points that Otter Tail's flawed and simplistic methodology produces dramatically understated MOW costs. Otter Tail admits that MOW costs vary with the level of traffic, but while its OTRR is assumed to have as much as twice the traffic as the real world BNSF on some line segments, it assumes the OTRR could maintain these lines with as few as half the MOW staff that BNSF has today on these line segments. BNSF Reply Table III.D.4-3. BNSF also shows that the OTRR MOW staff as posited by Otter Tail is dwarfed by the MOW staffs of real world short-line and regional railroads with significantly lower traffic volumes. *Id.* The percentage of the total MOW budget that Otter Tail assumes would be operating expense is unrealistically low. BNSF Reply Table III.D.4-7.

In contrast to Otter Tail's approach, BNSF presents a detailed, bottom-up evaluation of the OTRR MOW needs and associated costs. BNSF's MOW witness does not replicate BNSF's operations or costs, but rather identifies the specific tasks that would have to be performed by the OTRR to carry out the operations posited by Otter Tail and presents verifiable evidence as to the costs that would be incurred to carry out these tasks. BNSF's evidence is the only competent evidence on MOW costs for the SARR.

5. Otter Tail Understated The Cost To Design And Construct The SARR

A multitude of issues must be addressed in assessing the cost to design and construct a railroad the size of the OTRR. Moreover, there is no real world precedent for a construction

project of this type and scope.[25] To establish a reasonably accurate cost estimate for a project of this size, there is no substitute for a detailed examination of the specific tasks, materials and equipment that would be required.

Otter Tail's evidence on these issues is simplistic and result-oriented. Where Otter Tail provides factual support for its cost and engineering assumptions, that support is often erroneous or inappropriate. And on many specific cost items, Otter Tail does not even attempt to examine the complex construction cost issues associated with construction of the particular line segments selected for its OTRR but relies instead on calculations presented in prior SAC cases. But the Board's decisions must be based on the weight and quality of evidence in each case. BNSF's thorough and detailed evidence on the costs to construct the OTRR is the best evidence in the record of this case and it shows that Otter Tail vastly understated the OTRR construction costs.

It is not possible to address all of the issues in dispute in this summary, but some of the most significant issues are summarized below.

Earthworks: The largest difference between the parties on the construction costs for the OTRR involves roadbed preparation. More than any other construction cost area, an accurate assessment of roadbed preparation costs requires a detailed review of a multitude of details. Thousands of smaller cost items add up to the total roadbed preparation costs. For this reason, a

[25] Complainants often suggest that prior SAC determinations can be used as a rough benchmark for the cost to design and construct a railroad in the absence of real world benchmarks. But the costs the Board assesses in a particular case are based exclusively on its analysis of the weight of the evidence presented by the parties in each case. The Board does not carry out its own independent cost assessment. Each SAC case presents unique issues and the evidence in each case is different. Moreover, defendants face an extremely difficult task in developing the myriad costs involved in the construction of a SARR given the amount of time permitted on reply. However, with the proliferation of recent SAC cases, defendants have been able to make increasingly thorough and detailed presentations that substantiate higher levels of cost.

superficial assessment, like that carried out by Otter Tail's witnesses, is bound to understate costs by ignoring many of the individual cost items that drive actual costs in this area. BNSF demonstrates that Otter Tail did, in fact, dramatically understate roadbed preparation costs.

As BNSF explains, Otter Tail's evidence ignores numerous roadbed preparation activities and their associated costs, including costs that were incurred in the construction of WRPI that Otter Tail claims was a model for the OTRR. Moreover, the specific costs sponsored by Otter Tail generally lack any support and appear to have been chosen for the sole purpose of reducing construction costs without any consideration of feasibility or reasonableness. Two examples demonstrates the superficial and result-oriented approach that Otter Tail took to the assessment of roadbed preparation.

In assessing the earthworks costs for the construction of OTRR yards, Otter Tail's witnesses either failed to examine the site where the yard was assumed to be built or ignored altogether the characteristics of the site. Many of the OTRR's yards are built on land where there is no yard today and where substantial earthworks activity would be required to construct a yard. Otter Tail's simplistic assumption that only one foot of fill would be required for the construction of these yards is clearly improper and drastically understates the roadbed preparation costs for OTRR yards. Since these yards did not exist at the time the Engineering Reports were produced or did not exist where Otter Tail places them, reliance on assumptions or data from those Reports to justify a one-foot-fill assumption is misplaced.

A second example involves the choice of earth moving equipment, an important driver of earthworks costs. Otter Tail consistently chose the lowest cost equipment but it failed even to consider whether the equipment was capable of performing the task for which it was selected. In many cases, the equipment chosen by Otter Tail could not physically carry out the work expected

of it. In other cases, the equipment would perform so poorly that the OTRR could never meet its aggressive construction schedule. Otter Tail cannot have it both ways: It cannot on the one hand avoid the enormous capital costs associated with a longer construction schedule and at the same time reduce construction costs by assuming the use of cheap and inappropriate equipment that would slow down the construction process.

Track Construction: Much of the difference between the parties' estimates of the cost to construct the mainline and yard tracks is attributable to a multitude of smaller cost items that Otter Tail ignored or understated through inappropriate assumptions. One issue, however, stands out as a major source of the difference between the parties on track construction, namely the cost to transport construction material to the work site.

There are two elements to materials transportation costs. First, the materials must be delivered from their sources to one of a small number of railheads located along the route of the SARR. Second, the materials must be moved from the railhead to the construction site, which is constantly advancing as the work progresses. The first cost element is referred to as off-line transportation because the materials must be delivered to the railhead using a third party railroad. The second is referred to as on-line transportation because the railroad being constructed can be used to deliver materials to the advancing work sites.

For off-line transportation, BNSF accepts Otter Tail's cost per mile assumption but BNSF recalculates Otter Tail's mileage assumption. Otter Tail's mileages are understated because it appears to assume that the lines that are being constructed would also be used to move materials to the railheads before construction has been completed. That, of course, is physically impossible unless Otter Tail assumes that it is the residual incumbent handling the transportation over the same lines that are being replaced by the SARR. But in assessing construction costs, the

SARR is assumed to replace the residual incumbent. This assumption allows the SARR to avoid numerous construction costs that would be incurred if the SARR were constructed in a location other than where the incumbent's lines are located. Otter Tail relies on the benefits of an assumption that the SARR lines replaces the incumbent's lines for purposes of its construction cost estimate, therefore it cannot make the contrary assumption that the incumbent's lines remain in existence for purposes of further lowering the SARR's material transportation costs. This issue is discussed further at Section III.F.3.k of BNSF's Reply Narrative.

On-line transportation costs involve movement over the SARR lines from the railhead to the constantly advancing work site. Otter Tail included no cost at all for this activity. This error, however, is easy to remedy. Otter Tail relied on a table from the *FMC* case to develop its track labor unit costs and that same table includes costs for on-line transportation. BNSF therefore used those costs to develop its on-line transportation unit cost in its revised cost estimate.

Bridges: Otter Tail devotes slightly more than one page of narrative to the critical issue of OTRR bridges. Otter Tail's bridge calculations and assumptions are equally superficial. Otter Tail established three broad bridge classifications and developed a unit cost for an assumed average bridge in each class based on a simple average of the spans, lengths and heights of the single-track bridges assigned to that class. Otter Tail's average costs per bridge type were seriously understated, however, because Otter Tail ignored multiple track bridges in its averaging process and failed to account for adjustments needed for bridges that include spans of different types. Otter Tail's simplistic approach also avoids any consideration of the significantly higher costs to design and construct three unique bridges along the OTRR route that, because of their great lengths and heights, do not fit the characteristics of the assumed average bridge for their class. BNSF's evidence explains in detail the design characteristics, structural components, and

construction practices that must be considered in developing a realistic estimate of OTRR bridge costs.

Otter Tail also excluded from its cost estimate several bridges that it claims, without evidence, were not paid for by BNSF's predecessors when originally built. Whether or not Otter Tail's factual assumption is true, it is not relevant to the question whether the OTRR should pay for the construction of these bridges. The Board's SAC test excludes as an entry barrier capital costs that were not incurred by the incumbent. But it is beyond dispute that the incumbent has invested capital in these bridges through programmed maintenance. Otter Tail failed to include any costs for these bridges as either OTRR investment or capital maintenance thereby avoiding costs the incumbent indisputably has incurred. In addition, BNSF demonstrates that the ICC Engineering Reports include booked investments for the incumbent's predecessor railroad for bridges that are described in those reports as crossing only over roads. Since the original railroad incurred investments for these types of bridges, there is no basis for assuming that the OTRR could avoid those investments. BNSF therefore included costs for these bridges in its restatement of OTRR investment costs.

Communications: Otter Tail understates OTRR costs for a communication system by positing a system that does not meet the standards required of a railroad communication system and that would be incompatible with the OTRR's interchange partners. While all U.S. railroads use a VHF communications system, Otter Tail proposes use of a UHF system. BNSF explains in the Narrative why a UHF system would be unacceptable. In addition, Otter Tail understated the costs of a communications system by erroneously calculating the distance between microwave towers and the average height of towers. BNSF's witnesses provide a detailed, bottom up

description of the communication system the OTRR would need to support safe and reliable operations.

Engineering: To reduce capital carrying costs, Otter Tail, like other SAC complainants, assumes an extraordinarily fast construction schedule for the OTRR. To accomplish this, the OTRR is assumed to be constructed in multiple units on a parallel time schedule. While theoretically feasible, this type of construction schedule for a project the size and complexity of a major railroad would require enormous engineering and construction management resources. Otter Tail did not even bother to examine the specific tasks that would need to be carried out but instead relied upon rough percentages of total cost applied in the *PPL* case. As BNSF demonstrates, those assumptions do not apply here and their use produces costs that are grossly inadequate.

In addition, the extremely low engineering costs assumed by Otter Tail are inconsistent with the low 10 percent contingency that is added to the construction cost estimate. Industry sources agree that the level of contingency is directly related to the amount of engineering. A project that has been carefully and thoroughly designed may properly assume a low contingency of 10 percent. But it is clearly improper to assume both an unprecedented low amount of engineering work and a low contingency, as Otter Tail does here. BNSF presents a detailed estimate of the engineering costs that would be required to support the aggressive construction schedule of the SARR, and its evidence is the best evidence of record on this important cost item.

6. SAC Results

As explained in Section III.G, Otter Tail deviated from STB precedent in its treatment of inflation in the DCF model. BNSF corrected these errors and prepared a DCF analysis that incorporates the revised revenue and cost assumptions discussed above. The results of BNSF's

revised analysis are set out in the Table below. As demonstrated in the Table, a properly conducted SAC analysis shows that SAC costs for the OTRR significantly exceed revenues that would be available to the SARR.

Table I-1
Summary of Stand-Alone Cost Results - OTRR
(All Figures in Millions of Dollars)

Year	Annual Revenue	Stand-Alone Cost	Difference
2002	$499.4	$916.3	($416.9)
2003	498.2	908.3	(410.1)
2004	500.3	929.9	(429.6)
2005	500.8	954.0	(453.1)
2006	515.6	985.1	(469.6)
2007	511.8	1,007.6	(495.8)
2008	526.7	1,027.0	(500.3)
2009	539.8	1,045.0	(505.2)
2010	556.3	1,065.9	(509.5)
2011	567.5	1,084.3	(516.8)
2012	572.6	1,101.9	(529.3)
2013	581.1	1,119.7	(538.6)
2014	585.3	1,138.1	(552.8)
2015	594.2	1,156.9	(562.7)
2016	603.4	1,176.3	(572.9)
2017	612.7	1,196.3	(583.6)
2018	621.9	1,216.4	(594.5)
2019	631.4	1,237.1	(605.7)
2020	641.2	1,258.5	(617.3)
2021	649.9	1,279.8	(629.8)

C. VARIABLE COST EVIDENCE

BNSF presents its quantitative market dominance evidence in Section II.A of this Reply Narrative. The Board-sponsored technical conference produced an agreement by the parties as to numerous traffic and operating characteristics for the issue traffic. Nevertheless, important differences remain between the parties' variable cost evidence.

More than 40 percent of the difference between the parties relates to the treatment of road property ownership costs. BNSF relies on URCS system-average costs while Otter Tail sponsors a supposed movement-specific adjustment using BNSF's FADB data and a depreciation calculator that BNSF does not use to report financial data. In the course of preparing its evidentiary filings in the *TMPA* case, BNSF discovered that there are several reasons that these road property ownership data cannot be used to make a line segment-specific assessment of road property costs. In the *AEPCO* case, AEPCO's variable cost witness, Joseph Plaistow, acknowledged that BNSF's road property data could not be used to make a movement-specific adjustment. AEPCO Reb. Nar. (public version) at II-A-57, n.51. Mr. Plaistow is Otter Tail's variable cost witness in this case and he has reversed course here. In fact, BNSF's data cannot be used to determine road property ownership costs for particular line segments.

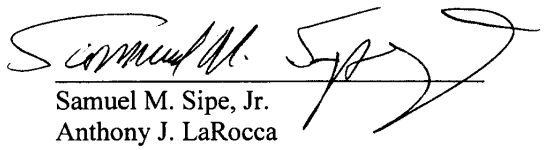
BNSF's FADB data, which records gross investment by line segment, actually shows that the investment in the line segments used by Otter Tail trains appears to be higher than the URCS system average. Otter Tail nevertheless assumes that the *net* investment in the line is 41 percent below system average by using BNSF's depreciation calculator which is not even used to produce depreciation data for financial reports. There are several problems with that calculator, but most important is the fact that it utilizes a methodology different from the Board-approved group depreciation methodology that BNSF's uses to report accumulated depreciation in the R-1. As a result, data produced by that calculator are entirely inconsistent with BNSF's URCS system-average costs and greatly overstate depreciation for the system generally. BNSF Reply Nar. at II.A.1.C.(7)(b). Otter Tail's methodology also ignores the relationship between density and the variability factor that URCS applies to develop system-average road ownership costs.

Another area of disagreement is the development of maintenance-of-way ("MOW") costs. Here again BNSF bases its MOW costs on URCS system-average MOW costs since the data maintained by BNSF do not permit an accurate assessment of line-specific costs. Otter Tail sponsors a purported line-specific adjustment to URCS MOW costs using engineering cost center data produced by BNSF in discovery. However, as BNSF explained at the time it produced the engineering cost center data and as BNSF further explains in the Reply Narrative, those data do not tie to BNSF's R-1. The engineering data are the only source of segment-specific expenditures, but they do not include all MOW expenses that are reported in the R-1, and they include expenses that are not reported as MOW expenses in the R-1. Because of the mismatch between BNSF's engineering data and the R-1, Otter Tail was forced to make multiple convoluted, unnecessary and improper adjustments to BNSF's data. While the data cannot and should not be used to produce segment-specific MOW costs, Messrs. Fisher and Plum show that when the blatant errors and unnecessary reductions are eliminated from Otter Tail's calculations, Otter Tail's methodology would suggest that BNSF's MOW costs for the Otter Tail route are actually higher than its system-average costs.

D. CONCLUSION

Otter Tail has failed to demonstrate that the challenged rate exceeds a reasonable maximum rate under the Board's SAC standard. A properly conducted SAC analysis shows that the costs to serve Otter Tail and other shippers legitimately grouped with the Otter Tail traffic significantly exceed the available revenues. The Board should therefore dismiss Otter Tail's complaint.

Respectfully submitted,



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October 8, 2003

CERTIFICATE OF SERVICE

I hereby certify that on October 8, 2003, I caused six copies of the foregoing Reply Evidence of The Burlington Northern and Santa Fe Railway Company to be served by hand upon the following counsel for Otter Tail Power Company:

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II. MARKET DOMINANCE

A. QUANTITATIVE EVIDENCE

1. Variable Costs

BNSF's reply evidence on quantitative market dominance is principally sponsored by Benton V. Fisher and Robert J. Plum, III, who also sponsored BNSF's variable cost evidence on opening. On reply, Messrs. Fisher and Plum provide a comprehensive critique of Otter Tail's opening evidence. They also present BNSF's updated variable costs for the Big Stone movement. Wilbert Kissner, who also sponsored evidence on opening, and Dale W. Wagoner sponsor evidence here.[1] Mr. Kissner, BNSF's Trainmaster at Aberdeen, South Dakota, sponsors evidence related to crew operations between Hettinger, North Dakota and Big Stone. Mr. Wagoner, Senior Manager Property Accounting-Systems and Control in BNSF's Finance Department, sponsors evidence relating to BNSF's accounting procedures for maintenance-of-way ("MOW").

In BNSF's opening evidence, Messrs. Fisher and Plum calculated BNSF's variable cost of service for moving coal from two PRB origins, Eagle Butte and Belle Ayr, to Otter Tail's Big Stone Generating Station near Big Stone City, South Dakota. In order to calculate BNSF variable costs, they relied on 2002 BNSF URCS unit costs[2] and, where appropriate, incorporated the results of movement-specific studies to adjust or replace URCS system averages. The traffic and operating characteristics they used were based on Big Stone shipments that moved under the

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[1] BNSF also relies on the verified statements of Cami A. Elliott and John C. Klick that were filed on May 1, 2002 as exhibits to BNSF's Reply to Otter Tail's First Motion to Compel Production of Documents. That Reply was incorporated by reference in BNSF's opening evidence at II-44 and is included as BNSF.RP.WP.II.A-0003 to 0048.

[2] As explained on opening, Messrs. Fisher and Plum developed BNSF's URCS unit costs using standard Board procedures and publicly available documents. BNSF Nar. at II-2.

challenged common carrier rate, which went into effect on January 1, 2002.[3] The BNSF First Quarter 2002 through First Quarter 2003 variable costs calculated by Messrs. Fisher and Plum ranged between $5.71 and $6.37 per net ton, depending upon the origin mine, and resulted in revenue-to-variable cost ("R/VC") ratios of between 2.16 and 2.36. BNSF Nar. at II-3, Table II.A-1.

Like BNSF, Otter Tail also based its opening evidence on a 2002 BNSF URCS. For movements originating from Belle Ayr and Eagle Butte, Otter Tail's witness, Mr. Plaistow, calculated that the First Quarter 2002 through First Quarter 2003 variable costs ranged between $4.62 and $5.04 per net ton, depending upon the origin mine, with R/VC ratios ranging between 2.73 and 2.92. OTP Nar. at II-A-41, Table II-A-11.

Following the filing of opening evidence and pursuant to *Ex Parte No. 638*, the parties reached agreement on most of the traffic and operating characteristics. While this agreement has narrowed the issues in dispute, a substantial difference remains between the parties' variable cost evidence.

This difference between the parties' variable cost evidence is principally a result of the following:

- Otter Tail's improper adjustment to BNSF's system-average road property costs;
- Otter Tail's improper reliance on BNSF's locomotive maintenance contracts to estimate the locomotive spare margin;

[3] As explained on opening, the Common Carrier Pricing Authority 90062 and its amendment 90062-A provide rates for movements in shipper-supplied aluminum cars and a separate rate for movements in shipper-supplied steel cars. Since the challenged rates went into effect all shipments have moved under the aluminum-car rate. Accordingly, BNSF's evidence does not address the reasonableness of the steel-car rate. BNSF Nar. at II-2.

- Otter Tail's improper adjustment to BNSF's system-average MOW costs;
- Otter Tail's use of the wrong base year to develop its fuel index;
- Otter Tail's improper adjustment to BNSF's system-average locomotive maintenance costs;
- Otter Tail's improper adjustments to BNSF's crew wage data;
- Otter Tail's failure to adjust the BNSF URCS to include Account 90 and exclude Account 76; and
- Otter Tail's incorrect assumptions regarding the frequency of helper service provided to Big Stone trains.

As Messrs. Fisher and Plum explain, a substantial amount of the difference between Otter Tail's and BNSF's resultant variable costs is attributable to the parties' development of road property costs. BNSF used system-average road property costs. Despite BNSF's representations to Otter Tail that the segment-specific data produced by BNSF cannot be used to develop a reliable ownership cost for any route, Otter Tail sponsors a route-specific adjustment using these data. As a result, Otter Tail substantially understates net investment for the line segments traversed by the Big Stone trains. Moreover, Otter Tail's approach to calculating road property ownership is flawed because, among other things, it fails to adjust the variability factor to reflect the densities on the issue route. This, and the other differences between the parties, are discussed further below.

On reply, Messrs. Fisher and Plum have also adjusted their calculation of variable costs for the First Quarter 2002 through the First Quarter 2003 to (1) reflect the agreement the parties reached pursuant to *Ex Parte No. 638* on certain traffic and operating characteristics and (2) address some minor errors in BNSF's opening evidence. The resulting variable costs for First Quarter 2002 through First Quarter 2003 in this reply evidence range from $5.83 to $6.46 per net

ton. The resultant R/VC ratios range from 2.13 and 2.32 and are set out below in section II.A.2., Table II.A-6 and Exhibit II.A-1.

The organization of this section of the narrative is consistent with the Board's Decision on *General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases.*[4] Section II.A.1.a. addresses the difference in the general cost estimating procedures used by each party. Section II.A.1.b. describes the remaining differences in the traffic and operating characteristics used by each party, and explains why the assumptions used by Messrs. Fisher and Plum are superior to Otter Tail's. Section II.A.1.c. examines the differences in certain cost adjustments made by the parties. Finally, Section II.A.2. presents the variable costs and R/VC ratios for First Quarter 2002 through First Quarter 2003.

a. Differences in General Cost Estimating Procedures

(1) General Overhead Ratio for Return on Investment

The Board recognized in *TMPA* that "unless the construction projects included in Account 90 are long-term in nature," it is appropriate and consistent with ICC precedent to *include* expenditures in Accounts 90 (Construction in Progress) and *exclude* expenditures in Account 76 (Interest During Construction) when determining the General Overhead ratio for Return on Investment.[5] BNSF demonstrated on opening that its construction projects are, in fact, of relatively short duration, and Otter Tail presented no evidence in its case-in-chief to meet its burden of showing that the "construction projects included in Account 90 are long-term in nature." Accordingly, BNSF's variable cost evidence properly includes the adjustment to 2002 BNSF URCS to include Account 90 and exclude Account 76. Because Otter Tail did not make

[4] *Ex Parte No. 347 (Sub-No.3)* (STB served March 12, 2001).

[5] *TMPA* at 40.

this same adjustment in its opening evidence, Otter Tail understated the URCS General Overhead ratio for Return on Investment and, as a result, understated the variable costs of service for Big Stone trains.

(2) Other Mine Origins

In addition to developing variable costs for shipments from the Belle Ayr and Eagle Butte mine origins to Big Stone, in its opening evidence, Otter Tail also estimated variable costs for First Quarter 2003 for eleven mines included in CCPA-BNSF 90062 even though no shipments moved under the challenged rate from any of those mines in the First Quarter 2003. In *TMPA* the complainant also submitted variable cost evidence relating to mines from which no coal had moved under the challenged rate. Because there was insufficient information to develop variable costs for such hypothetical movements, the Board rejected such evidence, and it should do so here.[6]

Otter Tail also calculated variable costs for Fourth Quarter 2002 from the Cordero and Caballo Rojo mines based on one shipment from Cordero and three shipments from Caballo Rojo. The Board should find that there is insufficient information to develop variable costs for those movements as well.

Consistent with Board precedent, BNSF did not sponsor variable cost evidence on opening for movements from mines that have originated little or no coal, and BNSF does not reply to Otter Tail's evidence regarding such movements.[7]

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[6] *Id.* at 38.

[7] Pursuant to *Ex Parte No. 638* (STB served April 3, 2003), after opening evidence was filed, the parties agreed to certain operating characteristics for the movements originating at Belle Ayr and Eagle Butte only. BNSF and Otter Tail's Joint Letter to David M. Konschnik

(Continued ...)

b. Differences in the Traffic and Operating Characteristics Developed By BNSF and Otter Tail

Table II.A-1 sets forth a comparison of the traffic and operating characteristics for the issue traffic used by the parties to develop BNSF's Fourth Quarter 2002 variable costs for the issue movements from the Belle Ayr and Eagle Butte mines.[8] Table II.A-1 is in the format required by *PEPCO*. Both Table II.A-1 and Exhibit II.A-2 reflect the *Ex Parte No. 638* agreements on traffic and operating characteristics. Discussion of the remaining differences between the parties' evidence on traffic and operating characteristics follows the table.[9]

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dated July 17, 2003 included as BNSF.RP.WP.II.A-0049 to 0052. The parties did not discuss operating characteristics for other mine origins.

[8] Exhibit II.A-2 presents the traffic and operating characteristics for originations from the Belle Ayr and Eagle Butte mines for First Quarter 2002 through First Quarter 2003.

[9] Although the inputs listed in Table II.A-1 are limited to the Fourth Quarter 2002 movements, the discussion following the table applies to all issue movements for all quarters.

Table II.A-1
Comparison of the Parties' Traffic and Operating Characteristics for Movements Originating at Belle Ayr and Eagle Butte to Big Stone Station
Aluminum Car Rate, Fourth Quarter 2002

	Item	BNSF Reply	Otter Tail Opening*
1.	Name of origin mines	Belle Ayr, WY Eagle Butte, WY	Belle Ayr, WY Eagle Butte, WY
	Name of destination	Big Stone, SD	Big Stone, SD
2.	Milepost(s) at origin	Belle Ayr MP 16.0 Eagle Butte MP 9.5	Belle Ayr MP 15.5 Eagle Butte MP 9.5
	Milepost at destination	Big Stone MP 602.31	Big Stone MP 602.2
3.	Annual tons	1.9 million in 2002	1.9 million in 2002
4.	Date of first shipment	January 1, 2002	January 1, 2002
5.	Alpha-numeric car type	Plain Gondolas (AAR Code J)	Plain Gondolas (AAR Code J)
6.	Weight of lading per car (in tons)	Belle Ayr 119.3 tons Eagle Butte 119.7 tons	Belle Ayr 119.3 tons Eagle Butte 119.7 tons
7.	Tare weight per car (in tons)	21.6 tons	21.6 tons
8.	Identity of car owner	Otter Tail	Otter Tail
9.	Identity of locomotive owner	BNSF	BNSF
10.	Car lease rental (railroad supplied cars)	N/A	N/A
11.	Locomotive lease rental	See Below	See Below
12.	Present rates per net ton	$13.76 per net ton / Aluminum	$13.76 per net ton / Aluminum
13.	Proposed rate	See Below	See Below
14.	Initial rate and effective date	$13.49 per net ton / January 1, 2002	$13.49 per net ton / January 1, 2002
15.	Amounts (or percent) of rate escalation and date	See Below	See Below
16.	Cars per train or per shipment	Belle Ayr 116.9 cars Eagle Butte 117.0 cars	Belle Ayr 116.9 cars Eagle Butte 117.0 cars
17.	Loaded miles (excluding loop track)	Belle Ayr 908.1 mi. Eagle Butte 900.2 mi.	Belle Ayr 908.1 mi. Eagle Butte 900.2 mi.
18.	Empty miles	Same as loaded miles	Same as loaded miles
19.	Length of origin loop track	Belle Ayr 0.8 mi. Loaded 1.0 mi. Empty Eagle Butte 3.3 mi. Loaded 4.3 mi. Empty	Belle Ayr 0.8 mi. Loaded 1.0 mi. Empty Eagle Butte 3.3 mi. Loaded 4.3 mi. Empty

Table II.A-1
Comparison of the Parties' Traffic and Operating Characteristics for Movements Originating at Belle Ayr and Eagle Butte to Big Stone Station
Aluminum Car Rate, Fourth Quarter 2002

20.	Length of destination track	3.7 Loaded 3.0 Empty	3.7 Loaded 3.0 Empty
21.	Number of locomotive units	Belle Ayr 3.16 units Eagle Butte 3.06 units	Belle Ayr 3.16 units Eagle Butte 3.06 units
22.	Loading hours	Included in Item 24	Included in Item 24
23.	Unloading hours	Included in Item 24	Included in Item 24
24.	Cycle hours	Belle Ayr 108.6 hrs. Eagle Butte 102.4 hrs.	Belle Ayr 108.6 hrs. Eagle Butte 102.4 hrs.
25.	Number of train sets	N/A	2
26.	Trips/year per train set	N/A	Belle Ayr 85 Eagle Butte 83
27.	Crew districts, loaded	See Below	See Below
28.	Crew districts, empty	See Below	See Below
29.	Turnaround crews	Gillette-Gillette (BNSF loading crews) Aberdeen-Aberdeen	Gillette-Gillette (BNSF loading crews) Aberdeen-Aberdeen
30.	Locomotive units required	See Below	See Below
31.	Cars required (RR-supplied)	N/A	N/A
32.	Cabooses	N/A	N/A
33.	Locomotive spare margin	{ }percent	{ }percent
34.	Car spare margin	N/A	N/A
35.	Switching by road-haul locomotives	185 minutes	185 minutes
36.	Switching by yard locomotives	N/A	N/A
37.	Helper service	Belle Ayr Belle Ayr & Sheridan Eagle Butte Campbell & Sheridan	Belle Ayr Belle Ayr & Sheridan Eagle Butte Campbell & Sheridan
38.	Helper crew	See Below	See Below
39.	Location of interchanges	None	None
40.	Location of inter- and intra-train switches	Aberdeen	Aberdeen
41.	Joint facility payments	System-Average	See Below

*Adjusted to reflect *Ex Parte No. 638* agreement on various traffic and operating inputs

(1) Name of mines and power plant (item 1)

The parties agree that Belle Ayr and Eagle Butte mines originated virtually all of the coal destined to Big Stone moving under the challenged rate.[10]

(2) Annual tons (item 3)

CCPA-BNSF 90062 and 90062-A include a minimum annual tonnage requirement of 1.8 million tons per year. The parties agree that in 2002 BNSF transported 1.9 million tons from Belle Ayr and Eagle Butte to Big Stone.

(3) Locomotive lease rental (item 11)

BNSF acquired the locomotives used to power Big Stone trains through purchases and operating leases. Each party used detailed accounting data produced by BNSF in discovery to calculate locomotive ownership costs, but the parties differ on the methodology used to calculate those costs.[11] The differences in the parties' respective approaches are described below in section II.A.1.c.(16)(b).

(4) Crew districts, loaded direction (item 27)

The parties agree that the crew districts in the loaded direction are as follows: Gillette-to-Sheridan; Sheridan-to-Forsyth; Forsyth-to-Hettinger; and Hettinger-to-Aberdeen.

(5) Crew districts, empty direction (item 28)

The parties agree that the Big Stone train typically travels, in reverse direction, the same crew districts traversed by the loaded train.

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[10] BNSF Opening electronic workpaper "opstats.xls."

[11] BNSF.OP.WP.II.A-0042 and BNSF Opening electronic workpaper "OTP Loco Ownership.xls."

(6) Turnaround crews (item 29)

The parties agree that the Aberdeen-to-Big Stone-to-Aberdeen crews and Gillette loading crews operate in turnaround service.

(7) Locomotive units (item 30)

The parties agree that the Big Stone trains are powered predominantly by 4,000 HP SD70MACs drawn from BNSF's Alliance locomotive pool. The parties also agree on the specific locomotive units used on the Big Stone trains.[12]

(8) Locomotive spare margin (item 33)

Messrs. Fisher and Plum include a locomotive spare margin of { } percent based on data produced to Otter Tail in discovery.[13] Their development of the spare margin is described in section II.A.1.c.(16)(c) of BNSF's Opening evidence. Otter Tail inappropriately relies on availability guarantees in BNSF's locomotive maintenance contracts to develop a { } percent spare margin for those locomotives used in Otter Tail service that were covered by such a maintenance contract. For the locomotives used in Otter Tail service that were not covered by a maintenance contract, Otter Tail used the 10-percent spare margin the Board has previously accepted where empirical data of the actual spare margin were not available. The problems with Otter Tail's reliance on the availability guarantees are addressed below in section II.A.1.c.16(a).

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[12] *Compare* BNSF Opening electronic workpaper "Big Stone Trains 2002.xls," Tab "Total Locomotive Use" *with* OTP opening electronic workpaper "2002 Trn Mvmt Loco Hours.xls," Tab "Summary."

[13] BNSF.OP.WP.II.A-0030 and BNSF Opening electronic workpaper "Spare Margin.xls."

(9) Car spare margin (item 34)

Neither party includes a cost for substitute cars used in Otter Tail service.

(10) Helper service (item 37)

The parties agree on the location of the helper services that assist the Big Stone train. As discussed below, however, they disagree as to (1) the number of trains helped per shift and (2) the frequency that the Belle Ayr and the Campbell helper services assist the Big Stone train. These issues are discussed below in Section II.A.1.c.(12).

(11) Helper crews (item 38)

The parties agree on the crew size for each helper service, but disagree on the number of trains helped per shift and the frequency that the Belle Ayr and the Campbell helper services assist Big Stone trains. As explained below in section II.A.1.c.(13), this disagreement results in a difference in the parties' calculation of helper crew wage costs for Big Stone trains.

(12) Joint facility payments (item 41)

By using URCS system-average maintenance-of-way costs, Messrs. Fisher and Plum incorporate system-average joint facility expenses in developing the variable costs for the issue movements.

Otter Tail includes a joint facility between Coal Creek and Shawnee in its development of variable costs. OTP Nar. at II-A-18. Because Big Stone trains originating at either Belle Ayr or Eagle Butte do not utilize this joint facility (which is south of those mines), this joint facility is not relevant to the development of variable costs in this case.

c. Differences in Variable Costs Developed by BNSF and Otter Tail

Table II.A-2 compares Otter Tail's Opening cost calculations with BNSF's Reply calculations for shipments originating from Belle Ayr and moving under the aluminum car rate in Fourth Quarter 2002. In order to make this comparison more meaningful, Messrs. Fisher and Plum adjusted Otter Tail's opening evidence to reflect the traffic and operating characteristics to which the parties agreed pursuant to *Ex Parte No. 638* subsequent to the filing of opening evidence in this proceeding.[14] BNSF Exh. II.A-3 presents similar comparisons for each issue movement from the Belle Ayr and Eagle Butte mines by origin mine, rate, and quarter. The differences between the parties' calculations of the individual cost components are discussed in detail below.

Table II.A-2
Comparison of Variable Costs Per Carload and Ton
Belle Ayr Mine to Big Stone
Aluminum Car Rate, Fourth Quarter 2002

Item		BNSF Reply	OTP Opening*	Difference
1.	Carload O/T - Clerical Expense	{ }	{ }	$0.00
2	Carload Handling - Other Expense	{ }	{ }	$0.00
3.	Switching Expense - Yard Locos	{ }	{ }	$0.00
4.	Loop Track Expense (GTM and LUM)	{ }	{ }	($0.16)
5.	Switching Expense - Road Locos (Non-Yard Tracks)	{ }	{ }	$0.00
6.A	Switching Expense - Road Locos (Yard Tracks, excluding Crew Wages and Loco Ownership)	{ }	{ }	N/A
6.B	Switching Expense - Road Locos (Yard Tracks, excluding Crew	{ }	{ }	N/A

[14] To adjust Otter Tail's evidence to reflect the *Ex Parte No. 638* agreement on various traffic and operating characteristics, Messrs. Fisher and Plum simply replaced the values in Otter Tail's variable cost program with the agreed-upon values. Messrs. Fisher and Plum did not, however, adjust Otter Tail's cost program to calculate the separate categories of switching expenses.

Item		BNSF Reply	OTP Opening*	Difference
	Wages)			
6.C	Switching Expense - Road Locos (Yard Tracks, including Crew Wages and Loco Ownership)	{ }	{ }	N/A
6.D	Switching Expense - Road Locos (Total)	{ }	{ }	($0.74)
7.	Gross Ton-Mile Expense (GTM)	{ }	{ }	($88.44)
8.	Train-Mile Expense – Other Than Crew	{ }	{ }	$0.00
9.	Locomotive Unit-Mile Expense (excluding Ownership)	{ }	{ }	($15.58)
10.	Train-Mile-Expense - T&E Crew	{ }	{ }	($14.48)
11.	Helper Expense - LUM	{ }	{ }	($0.71)
12.	Helper Expense - Crew	{ }	{ }	($2.79)
13.	Freight Car Expense (RR-Owned Only)	{ }	{ }	$0.00
14.	User Responsibility for Freight Car Repairs	{ }	{ }	($0.03)
15.	Loss & Damage Expense	{ }	{ }	($0.12)
16.	Locomotive Ownership Expense	{ }	{ }	($15.79)
17.	EOTD Ownership Expense	{ }	{ }	$0.01
18.	Third Party Loading Expense	{ }	{ }	$0.00
19.	Total Variable Cost per Carload (Lines 1-18)	$727.13	$588.31	($138.83)
20.	RFA-URCS Linking Factor	0.9934	0.9934	0.0000
21.	Linked Variable Cost Per Carload	$722.33	$584.57	($137.76)
22.	Net Tons Per Carload	119.3	119.3	0.00
23.	Variable Cost Per Ton	$6.05	$4.90	($1.15)
24.	Rate Per Ton	$13.49	$13.49	$0.00
25.	R/VC Ratio	2.23	2.75	0.53

*Adjusted to reflect *Ex Parte No. 638* agreements on various operating and traffic characteristics.

(1) Carload Originated or Terminated – Clerical

Both parties apply the standard *Ex Parte No. 399* trainload adjustment to URCS system-average unit costs for station clerical expense.

(2) Carload Handling – Other

Both parties adjust the URCS system-average carload handling costs consistent with recent Board precedent.

(3) Switching Expenses - Yard Locomotive

Following the filing of opening evidence, the parties agreed to include no costs for switching performed using yard locomotives.

(4) Origin and Destination Loop Track Expenses

The parties agree on the loaded and empty loop track miles at Big Stone Station. The remaining differences in the parties' loop track costs are primarily due to Otter Tail's inappropriate adjustments to locomotive maintenance costs and an error in Otter Tail's fuel index, which are described below at sections II.A.1.c(7)(d) and (19), respectively.

(5) Switching Expense - Road Locomotive - Non Yard Tracks

The parties agreed to include no costs for switching by road locomotives on non-yard track.

(6) Switching Expense - Road Locomotive - Yard Tracks

At their *Ex Parte No. 638* technical conference, the parties agreed to develop variable costs based on a total of 185 minutes per Big Stone train of switching performed by road locomotives on yard tracks.[15] The parties also agreed that this total switching time consisted of the following:

[15] BNSF and Otter Tail's Joint Letter to David M. Konschnik dated July 17, 2003 included as BNSF.RP.WP.II.A-0049 to 0052.

1. 132 minutes of switching is performed by Otter Tail road crews (*i.e.*, crews reporting to the Big Stone train symbol) using locomotives that were assigned to the Big Stone train;

2. 42 minutes of switching performed by Aberdeen road switcher crews using road locomotives that are not assigned to Otter Tail service; and

3. 11 minutes of switching performed by other road crews using locomotives that are not assigned to Otter Tail service.[16]

To calculate the switching costs, Messrs. Fisher and Plum followed the procedures described in BNSF's opening evidence. BNSF Opening Nar. at II-32 to 34. As explained in BNSF's opening evidence, the URCS Switch Engine Minute ("SEM") unit cost is developed based on the costs and time associated with both yard and road switching on the BNSF system. *Id.* at II-32. To reflect more accurately the switching costs associated with the Big Stone trains, Messrs. Fisher and Plum created an URCS SEM unit cost specific to the costs associated with switching by road locomotives on yard tracks ("SEM-Road Switching on Yard Tracks"). *Id.* at 33. Messrs. Fisher and Plum then developed two additional versions of the unit cost SEM-Road Switching on Yard Tracks in order to reflect the fact that some of the switching is performed (1) using crews whose wages are already accounted for in Messrs. Fisher and Plum's special study of Otter Tail crew wages, and (2) using locomotives for which the ownership costs are already accounted for in their special study of ownership costs for the units used on the Big Stone trains. *Id.* at II-33 to 34. The next step in developing the switching costs was to apply the appropriate version of the SEM-Road Switching on Yard Tracks to each of the three categories of switching described above.

To the 132 minutes of switching performed by Otter Tail crews using Otter Tail locomotives, they applied an SEM-Road Switching on Yard Tracks unit cost that excluded the

[16] *Id.*

URCS system-average crew wages and locomotive ownership costs.[17] This reflects the fact that crew wage costs and locomotive ownership costs are already accounted for in the respective special studies.

To the 42 minutes of switching performed by Aberdeen road switcher crews using locomotives not assigned to Otter Tail service, they applied an SEM unit cost that *excluded* the crew wage costs but *included* system-average locomotive ownership costs.[18] The crew wages are excluded because they are already accounted for in the special study of Otter Tail crew wages. The system-average locomotive ownership costs were included in the SEM unit cost, however, because these costs are not accounted for in the special study of locomotives used on the Big Stone trains.

Finally, for the 11 minutes of switching performed by non-Otter Tail road crews using locomotives not assigned to Otter Tail service, Messrs. Fisher and Plum applied an SEM unit cost that included both system-average crew wage and locomotive ownership costs.[19] Neither of these costs were accounted for in Messrs. Fisher and Plum's special studies of crew wage and locomotive ownership costs for Big Stone trains.

(7) Gross Ton-Mile Expense

The parties' disagreement on gross ton-mile ("GTM") expense accounts for most of the total difference between the parties' variable cost evidence. GTM expenses include expenses associated with maintenance of way, road property ownership, fuel, locomotive maintenance, and other locomotive and train administrative activities. The parties' disagreements encompass

[17] BNSF Reply electronic workpaper "BNSF OTP REPLY PRG.123," worksheet "I."

[18] *Id.* at worksheet "J."

[19] *Id.* at worksheet "K."

all of these categories. The differences between BNSF's and Otter Tail's GTM expense per carload for the representative movement used in this Reply (*i.e.*, Belle Ayr-Big Stone Station, Fourth Quarter 2002) are shown in Table II.A-3.

Table II.A-3
Comparison of GTM Expense Per Carload
Belle Ayr Mine to Big Stone Station
Fourth Quarter 2002

Item	BNSF Reply	Otter Tail Opening*	Difference
Maintenance of Way	{ }	{ }	($13.79)
Road Property Ownership	{ }	{ }	($56.01)
Fuel	{ }	{ }	($7.48)
Locomotive Maintenance	{ }	{ }	($4.41)
Other GTM	{ }	{ }	($6.75)
Total	{ }	{ }	($88.44)

*Adjusted to reflect *Ex Parte No. 638* agreements on various traffic and operating characteristics.

(a) Maintenance of Way

On opening, Messrs. Fisher and Plum developed variable costs using BNSF's URCS system-average MOW costs. In its opening, Otter Tail sponsors a flawed "route-specific" adjustment to BNSF's system-average costs. Otter Tail's adjustment is based on MOW cost data for the Otter Tail route that BNSF produced in discovery that are incomplete and unusable for the purpose of developing a route-specific MOW cost. BNSF identified and explained these concerns when it produced the data. Nevertheless, Otter Tail attempts to develop a route-specific MOW adjustment. In doing so, Otter Tail not only uses data that cannot reliably be used for such a purpose, it uses a methodology that is fundamentally flawed, inconsistent with URCS, and rife with errors. As a result, Otter Tail significantly understates BNSF's MOW costs for the issue route. Assuming the data produced by BNSF could be used to develop a route-specific

adjustment (and they cannot), correcting Otter Tail's methodological errors in using the data results in a *twenty-percent increase* to BNSF's system-average MOW costs,[20] rather than the 22-percent reduction to those costs that Otter Tail applied. However, because of the unreliability of the data for making such an adjustment and other issues with Otter Tail's methodology, Messrs. Fisher and Plum continue to use BNSF's system-average MOW costs.

To calculate its adjustment, Otter Tail performs the following steps. First, Otter Tail identifies from the data that BNSF provided in discovery approximately { } million in 2001 MOW expenditures with specific location IDs along the issue route.[21] As discussed below, this compilation artificially reduces Otter Tail's result because it includes an improper allocation of a { } credit not associated with segments on the issue route.[22] Next, Otter Tail divides its calculation of BNSF's segment-specific expenditures by the segment's corresponding gross ton-miles to develop unit costs for each segment.[23] It then weights the results for each segment by the number of issue route miles to produce an average 2001 MOW expenditure of { } per million GTM ("MGTM") for the Otter Tail route.[24] As discussed below, however, because Otter Tail erroneously includes segments not on the issue route and overstates GTMs for segments on the route, it understates the cost per MGTM for the Otter Tail route. Otter Tail then makes two reductions to this result. First, it improperly reduces this result by seven percent,[25] purportedly to

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[20] BNSF Reply electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO modified.xls," worksheet "Step 4."

[21] OTP electronic workpaper "total route.xls."

[22] OTP electronic workpaper "Reply to Request No. 9 summarized.xls."

[23] OTP electronic workpaper "total route.xls."

[24] *Id.*

[25] OTP electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO modified.xls."

account for the difference between the MOW data by cost center that BNSF provided in discovery and the expenditures reported in Schedule 410 to the R-1. Second, Otter Tail improperly reduces the result by an additional 12 percent, based on the ratio between BNSF's running maintenance costs and BNSF's total maintenance costs which includes both running and switching maintenance expense.[26] As explained below, because Otter Tail's selection of location IDs for the issue route does not include segments to which yard maintenance costs are reported, neither of the two reductions is appropriate. Next, Otter Tail applies the system-average variability for running MOW of 66 percent to the result for the Otter Rail route.[27] Finally, Otter Tail compares its result ($278 per MGTM) to the URCS variable running MOW system-average cost ($359 per MGTM) and concludes that BNSF's system-average MOW costs should be reduced by 22 percent to calculate variable costs for the Big Stone movement.[28]

Otter Tail commits seven significant errors in its calculation of the adjustment to BNSF system-average MOW costs. Specifically, Otter Tail,

1. includes segments not on the issue route and overstated GTMs for certain segments;

2. ignores the fact that the records it compiled for the issue route do not reflect all MOW expenses associated with the issue route;

3. improperly reduces its result to exclude switching maintenance expenses, despite the fact that the MOW expenditures that it identifies for the issue route do not in fact include any switching maintenance costs;

4. incorrectly assumes that the difference between the BNSF MOW cost center data and the MOW expenditures reported in Schedule 410 to the R-1 was attributable to the Otter Tail route;

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[26] *Id.*

[27] *Id.*

[28] *Id.*

5. incorrectly applies the BNSF system-average variability factor to the segment specific results;

6. inappropriately uses expense data from only one year, despite the fact that URCS recognizes a longer maintenance cycle and normalizes roadway maintenance costs over a five-year period; and

7. improperly fails to account for Otter Tail's share of MOW costs.

i) Otter Tail Includes Segments Not On The Issue Route and Overstates GTMs For Certain Segments

Otter Tail makes two mistakes in its calculation of MOW cost per GTM along the issue route. First, it includes segments not on the issue route in its calculation. Otter Tail includes segments south of the issue mines, including 100 miles along the Orin Line south of Belle Ayr and the Reno Sub to the Black Thunder and Jacobs Ranch mines.[29] As the Big Stone train travels north from the Belle Ayr mine and the Eagle Butte mine is north of the Orin line, none of these segments is relevant to the MOW costs for the issue route. Second, Otter Tail overstates the GTMs associated with certain segments along the route. For example, Otter Tail applies the total GTMs for a five-mile stretch of track to *each* of two partial segments that comprise the five miles.[30] Overstating the GTMs results in an understatement of the unit cost per GTM for these segments. Eliminating the irrelevant line segments and correcting the GTMs by segment changes Otter Tail's MOW adjustment from a 22-percent reduction to a 17-percent reduction to BNSF system-average MOW costs.[31]

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[29] OTP electronic workpaper "total route.xls."

[30] *Id.*

[31] BNSF Reply electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO modified.xls, worksheet "step 1."

ii) Otter Tail Ignores The Fact That The Data On Which It Relies Do Not Reflect All MOW Expenses Associated With The Issue Route

In discovery, BNSF explained to Otter Tail that a significant amount of MOW expense reported to BNSF cost centers and in Schedule 410 to the R-1 is not reflected in any line-specific data maintained by BNSF.[32] According to Dale W. Wagoner, BNSF's Senior Manager Accounting-Systems and Control in BNSF's Finance Department, certain MOW expenses are recorded at only a system, regional, or supervisory level. A significant component of such expenses is BNSF's contract maintenance activities. Payments for rail grinding, vegetation control, and other maintenance functions performed by third parties are not reported to specific line segments but are maintained at the system level. Another example is replacement parts, the cost of which may be charged to the regional location of the manager who placed the order even though the parts are used in various locations. It is also common for BNSF to record ballast expenditures at the system level because of difficulties in associating the underlying Authorization for Expenditure ("AFE") with a more specific geographic location. Other expenditures may be assigned to specific geographic regions even though they then support transportation over other parts of the BNSF rail network. For example, BNSF's maintenance expense for its operations control center is recorded in BNSF line segments associated with Fort Worth, although the control center obviously benefits all line segments, including segments traversed by the Big Stone train.

[32] September 6, 2002 letter from Brooke Gaede to Michael Higgins, included as BNSF.RP.WP.II.A-0053 to 0057.

In response to Otter Tail's opening evidence, BNSF performed a special study to determine the magnitude of the unassigned expenses (*i.e.*, expenses not assigned to a specific line segment) on a system-wide basis. In that study, BNSF identified, by Schedule 410 expense account, the portion of its 2001 MOW expenditures that were assigned to specific location IDs as compared to those maintained at a system, regional, or supervisory level. BNSF's special study showed that { }, of BNSF's 2001 MOW expenses reported in Schedule 410 to the R-1 are not reflected in any line-specific data, including the line-specific data used by Otter Tail.[33] Because none of these expenses are accounted for in the line-specific data that Otter Tail summarized for the issue route, it is improper for Otter Tail to compare these line-specific expenses to BNSF's URCS system-average cost which includes *all* BNSF MOW expenses. Such an apples-to-oranges comparison understates the line-specific MOW expenses for the issue route. When the maintenance expenses assigned to the issue route are compared to the total MOW expenditures that are assigned to specific location IDs, the now 17-percent difference between Otter Tail's adjustment and BNSF's system-average costs is nearly eliminated, becoming only *two* percent.[34]

iii) Otter Tail's Reduction To Exclude Switching Expenses Is Unnecessary

Otter Tail assumes that the MOW monies produced by BNSF in discovery for all location codes include both *running* and *switching* expenses. OTP Narr. at II-A-24 Because Otter Tail's adjustment is to BNSF's *running* maintenance costs only, Otter Tail makes a 12-percent reduction to the MOW costs it calculated for the issue route purportedly to exclude *switching*

[33] BNSF Reply electronic workpaper "R-1 MOW Expense Query 2001.xls."

[34] BNSF Reply electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO modified.xls," worksheet "Step 2."

expenses. This 12-percent reduction is based on the system-average relationship between running and switching MOW costs, *i.e.*, URCS assigns 12 percent of BNSF's total maintenance expense to switching.[35] While Otter Tail is correct that BNSF's *total* MOW monies in the discovery materials include switching expenses, it incorrectly assumes that the expenses it identified for the *issue route* also include *switching* expenses. In fact, the location IDs that Otter Tail used to calculate MOW expenses along the issue route included only *running* segments and do not include location IDs to which *switching* expenses are reported. MOW switching expenses, which consist primarily of yard maintenance costs, are included in yard locations that are not included by Otter Tail for the issue route. As a result, there are no *switching* costs to remove from Otter Tail's calculation of MOW costs for the issue route and, therefore, its 12-percent reduction is wholly unnecessary. Eliminating this reduction, as well as the errors discussed above, results in a 12-percent increase to BNSF's system-average MOW costs.[36]

iv) Otter Tail Reduction To Account For Discrepancy Between Discovery Data And R-1 Is Improper

Otter Tail makes an additional seven-percent reduction to account for a difference between the expenditures reported to BNSF engineering cost centers and the total MOW expenses reported by BNSF in its R-1.[37] Otter Tail determines that the total expenditures in the MOW discovery records ($641M) exceed the MOW expenditures that BNSF reported in

[35] OTP electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO.xls."

[36] BNSF Reply electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO modified.xls," worksheet "Step 3."

[37] OTP electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO.xls."

schedule 410 to its 2001 R-1 ($595M).[38] To account for this difference, Otter Tail improperly ratchets down the MOW issue-route costs derived from the discovery data before comparing to the URCS system-average.[39] This reduction assumes that the line-specific costs that Otter Tail uses to develop MOW expenses for the issue route include monies that are not reported as MOW expenses in the R-1. However, as explained below, there is no basis for this assumption.

When it produced the data in discovery, BNSF explained that certain costs that are included in the engineering costs centers are not reported in Schedule 410 to MOW accounts in the R-1.[40] As Mr. Wagoner explains, the expenses that are not reported in the R-1 as MOW expenses include, for example, mechanical expenses that BNSF captures in its engineering cost centers. Mechanical expenses are typically incurred at yard and shop facilities. Because Otter Tail has not included any expenses associated with yard locations or shop facilities in its total for the route,[41] the route-specific data used by Otter Tail likely include little or no mechanical expenses that are a principal, if not the entire, source of the difference between the expense totals on which Otter Tail bases its reduction. Absent a burdensome special study, BNSF is unable to determine how much of the difference between the R-1 MOW data and the engineering cost center data results from mechanical costs and other costs not included in the line-specific data used by Otter Tail. It is clear, however, that Otter Tail's seven-percent reduction is wrong. Indeed, the difference between the discovery data and the R-1 data and the inability to reconcile the data demonstrate why these data cannot be used to develop movement or even route-specific

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[38] *Id.*

[39] *Id.*

[40] September 6, 2002 letter from Brooke Gaede to Michael Higgins, included as BNSF.RP.WP.II.A-0053 to 0057.

[41] OTP electronic workpaper "total route.xls."

MOW costs. Eliminating this reduction as well as the reductions and errors discussed above, would result in an increase to BNSF's system-average MOW costs of 20-percent.

v) Otter Tail Applies The Wrong Variability Factor

As demonstrated in Table II.A-3 in section II.A.1.c.(7)(b) below, URCS recognizes that the variability of MOW expenses change with traffic density. As density changes, so does the percent of MOW expenses that is variable. Otter Tail's line-specific adjustment ignores this relationship. To calculate the MOW variable costs for the Otter Tail route, Otter Tail developed a system-wide variability factor from BNSF's 2002 URCS.[42] Since the density on the route traversed by Big Stone trains differs from system-average density,[43] Otter Tail's application of BNSF's system-wide variability to line-specific MOW costs is inappropriate.

vi) Otter Tail's Reliance On Just One Year Of Data Is Inconsistent With URCS

Otter Tail's use of only 2001 data is inconsistent with URCS MOW costs that reflect a five-year outlook.[44] URCS's five-year approach recognizes that MOW spending cycles extend well beyond one year. Measuring costs over a five-year period smoothes out the peaks and valleys that are common with MOW costs. Otter Tail bases its adjustment on just one year of data.[45]

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[42] OTP electronic workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO.xls."

[43] BNSF Reply workpaper "DEVELOPMENT OF MOW ADJUSTMENT RATIO modified.xls."

[44] BNSF.RP.WP.II.A-0059 to 0061.

[45] Otter Tail claims, however, that the quality of BNSF's produced data compelled it to restrict its analysis to just one year. OTP Nar. at II-A-25, n.25. Otter Tail claims that the data for the year 2000 showed that that MOW costs for the issue route were negative, *i.e.*, that BNSF's rail maintenance activities on this line were a profit center for the railroad, and therefore

(Continued ...)

vii) Otter Tail's Adjustment Fails To Account For Otter Tail's Share Of The MOW Costs.

Finally, there is a fundamental flaw in Otter Tail's methodology in that it assumes that all traffic bears equal responsibility for MOW costs. This simply is not true. Numerous engineering studies confirm that heavy-wheel loads like the Otter Tail unit coal train cause significantly more damage per ton to track structures than freight and intermodal traffic.[46] By allocating MOW costs on a GTM basis, without making any adjustment for the difference between heavy-wheel load traffic, like Otter Tail's coal traffic, and the other traffic on the line, Otter Tail understates the MOW costs that are incurred by BNSF in handling the Big Stone train.

(b) Road Property Ownership

On opening, Otter Tail tenders an analysis of the property accounting records that BNSF was compelled to provide in discovery. Otter Tail's adjustment to BNSF's URCS system-average road property ownership costs accounts for 40 percent of the difference between the parties' variable cost evidence. Despite the significance of this adjustment, Otter Tail proffers no explanation as to how its analysis overcomes the considerable challenges to such an adjustment raised by BNSF in response to Otter Tail's First Motion to Compel, including the fact that BNSF's line-specific road property data cannot be used to develop a movement-specific adjustment to system-average road property costs because the FADB gross investment line-

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rejected the data as unreliable. *Id.* Otter Tail, however, misconstrued the data produced by BNSF. Review of the 2000 maintenance records from discovery indicates that BNSF's report included locomotive shop costs that are reported to only the "system" level. These costs appear as capital charges to cost code 320-"locomotive," with offsetting credits to operating expenses that are reported to the location ID "500001-System ID," not an ID on the issue route. BNSF Reply electronic workpaper "Data from Reply to Request No. 9.xls," summarized from BNSF/OTP 06391, included as BNSF.RP.WP.II.A-0062 to 0065.

[46] *See e.g.,* BNSF.RP.WP.II.A-0066 to 0085.

specific data are incomplete and the accumulated depreciation data estimated by the depreciation calculator significantly overstate depreciation and are inconsistent with the depreciation reported in the R-1.[47] Indeed, Otter Tail's witness, Joseph Plaistow, acknowledged in the *AEPCO* rate case that BNSF's line-segment specific road property data *could not* be used to develop a movement-specific adjustment to BNSF's system-average road ownership costs.[48] Nevertheless, Otter Tail attempts to do just that here. Otter Tail's flawed analysis does not address the problems with using BNSF's accounting records to develop a movement-specific adjustment, and does not even attempt to demonstrate that such data can be used to make an accurate or reliable adjustment to URCS system-average costs.[49]

Even if the data were usable to make a line-specific adjustment to URCS (and they are not), Otter Tail's methodology is seriously flawed. Otter Tail's analysis, among other things, (1) improperly uses the flawed line-specific depreciation data that were estimated by the FADB depreciation calculator as a basis for adjusting BNSF's system-wide depreciation figures that were generated using group depreciation; (2) improperly uses FADB gross investment and

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[47] BNSF's Reply to Otter Tail's First Motion to Compel Production of Documents, BNSF.RP.WP.II.A-0003 to 0048.

[48] AEPCO Rebuttal II-A-57, n.51.

[49] Otter Tail relies on the *TMPA* decision as a basis for using the Fixed Asset Database (FADB) data and accumulated depreciation data to make a movement-specific adjustment to road property ownership costs. OTP Nar. at II-A-26 to 27. Although the Board accepted complainant's adjustment in that case, the Board did not address fundamental problems with the data and complainant's methodology there. *See TMPA* at 57. The Board accepted the use of the data based on a reconciliation of the FADB road property *gross* investment data to the R-1 at a system-wide level. *Id.* That reconciliation did not address the problems identified in this case with using the FADB data to make a line-specific adjustment. Nor did the Board address the use of data generated by the flawed depreciation calculator which Otter Tail uses in this case. Also, for procedural reasons, the Board did not consider BNSF's argument regarding the variability factor. *See id.* at 56, n.94.

flawed depreciation data that do not include yard investment as a basis for comparison to BNSF's system-wide depreciation figures that include both yard and running investments; and (3) fails to reflect the relationship between density and variability.

a) Otter Tail Uses Data That Cannot be Used to Develop a Movement-Specific Road Property Ownership Adjustment

i. The FADB Line-Specific Data Cannot Be Used to Make a Movement-Specific Adjustment

In its opposition to Otter Tail's First Motion to Compel production of BNSF's road property data, Cami A. Elliott, BNSF's General Director with responsibility for property accounting, explained in detail the reasons why the FADB *gross* investment data and the data generated by the FADB depreciation calculator cannot be used to develop a movement-specific adjustment to road property costs.[50] First, BNSF explained that the line-specific gross investment data produced by BNSF do not include all investments on a specific line-segment. BNSF identified three categories of investment that are either not accounted for in the FADB gross investment data produced by BNSF or are accounted for in a way that renders a line-specific adjustment unreliable. The three categories are:

- investments in service but not yet allocated to a line segment;
- investments that benefit Otter Tail traffic, but are not assigned to a line segment on the Otter Tail route; and
- investment on the Otter Tail route that is not fully accounted for in the line segment-specific road property ownership data because the investment has been assigned on a regional, state, divisional, or system-wide basis.

[50] Elliott VS at 23 to 26, BNSF.RP.WP.II.A-0026 to 0029.

The first category of investments, *i.e.*, investments that have not yet been allocated to a line segment, primarily consists of some $3.0 billion in BNSF's Property In Service Not Unitized Account (PISNU) and another $3.0 billion in Purchase Accounting from the BN/ATSF merger. Otter Tail's treatment of PISNU is improper. Otter Tail accounts for the fact that PISNU is not reflected in the line-segment specific data by removing it from the system-wide investment figure that it adjusts.[51] This approach would be reasonable if the investments reflected in PISNU were spread evenly across BNSF's system. What is far more likely however, is that a disproportionate amount of the PISNU investments were made on BNSF's highest density lines.[52]

There is another problem with Otter Tail's treatment of PISNU. The investments reflected in PISNU, are likely more expensive than the older assets that they replaced because they were recently placed in service. In addition, the PISNU investments will have little accumulated depreciation associated with them because they are new. Thus, because they include assets that have already been replaced by assets reflected in PISNU, the FADB data relied on by Otter Tail understate gross investment and the depreciation data overstate the accumulated depreciation of the assets actually in service. The overstatement of accumulated depreciation is compounded by Otter Tail's use of the flawed data generated by the depreciation calculator which, as explained below, significantly overstates accumulated depreciation.

With respect to the third category of investments, *i.e.,* those that BNSF assigns on a broader geographical basis because it is unable to identify the specific line segments on which they were made, Otter Tail's approach is problematic. Like Otter Tail's treatment of PISNU,

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[51] OTP electronic workpaper "Road Inv OTP Open. 123."

[52] Elliott VS at 26, BNSF.RP.WP.II.A-0029.

Otter Tail's exclusion of these investments assumes that they are made evenly across the system, which they are not. Investments in ballast are a prime example of this third category of investments. Typically, BNSF does not track its investment in ballast at a level that would allow it to pinpoint the amount of ballast installed on any one specific line segment.[53] If BNSF knows the particular region in which the ballast was used, it will assign the investment evenly to all lines in that region even though the ballast may have been used on only a handful of line segments in that region.[54] Spreading the ballast investment across all line segments in the region obviously results in FADB data that understates the investment in ballast on the lines in which the ballast was actually used.

ii. The Accumulated Depreciation Data Significantly Overstates Depreciation and is Inconsistent with the R-1

BNSF has already explained that the depreciation data generated by the depreciation calculator do not correspond to the depreciation data reported in BNSF's R-1. As Ms. Elliott explained, the FADB database and depreciation calculator are legacies of the former Atchison Topeka & Santa Fe Railway ("ATSF"). When the BN merged with the ATSF, BN's property investment data were merged into the ATSF's FADB.[55] As a consequence, the depreciation

[53] *Id.* at 25, BNSF.RP.WP.II.A-0028.

[54] *Id.* at 26, BNSF.RP.WP.II.A-0029.

[55] The data relied upon by the former BN in the *WTU* case were drawn from BN's property accounting records and not ATSF's FADB system as suggested by the Board in *TMPA* at 56-57.

calculator continues to reflect the asset history and depreciation rates of the ATSF.[56] Ms. Elliott also explained that the FADB depreciation calculator is inconsistent with the railroad's use of group depreciation.[57] The Board has approved BNSF's use of group depreciation, and BNSF's road property data in the R-1 are based on group depreciation.[58] It would therefore be inappropriate for the Board to calculate variable costs based on depreciation data using a different and less accurate approach.

BNSF has demonstrated that the depreciation calculator vastly overstates BNSF's actual depreciation. As Table 1 to the Elliott VS shows, the FADB calculator estimates that the investments in all road accounts are 38 percent depreciated, more than twice the amount reported in the R-1. For the route at issue, the depreciation calculator estimates accumulated depreciation for rail that ranges from 3 to 4.5 times BNSF's system-average accumulated depreciation for rail as reported in the R-1.[59] Since BNSF does not use these depreciation data for purposes of financial reporting, these data should not be used here.[60]

The problems with Otter Tail's use of the data generated by the accumulated depreciation calculator are highlighted by a comparison of the *gross* investment reflected in the FADB data for the route and the *gross* investment reflected in the R-1 (less unallocated monies). That

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[56] Elliott VS at 30, BNSF.RP.WP.II.A-0033. This fact alone presents insurmountable challenges to developing an accurate estimate of net investment for the Big Stone route, which is comprised of former BN lines.

[57] *Id.* at 27-29, BNSF.RP.WP.II.A-0030 to 0032.

[58] BNSF Response to Otter Tail's First Motion to Compel, at 11, BNSF.RP.WP.II.A-0014.

[59] BNSF.RP.WP.II.A-0087 and BNSF electronic workpaper "Depreciation Example.xls."

[60] Indeed, BNSF does not maintain in the ordinary course of business the accumulated depreciation data used by Otter Tail. Those data were estimated by BNSF using the depreciation calculator as ordered by the Board's Order of November 15, 2002.

comparison, which is presented in Table II.A-3, shows that BNSF's *gross* investment per gross ton-mile in the route is *five percent greater* than system average.[61] This greater than system average *gross* investment in the Otter Tail route stands in stark contrast to Otter Tail's calculation that *net* investment is 41 percent *below* system average.[62]

Table II.A-3
Gross Investment per GTM and Net Investment per GTM
as Calculated by Otter Tail
for Belle Ayr to Big Stone Route

	Gross Investment (millions)	Accumulated Depreciation (millions)	% Depreciated	Net Investment (millions)	Net Inv/GTM*	Gross Inv/GTM*
Issue Route	{ }	{ }	{ }	{ }	{ }	{ }
Total BNSF System	{ }	{ }	{ }	{ }	{ }	{ }
Issue Route as % of System					59.2%	105.1%

Source: BNSF Reply electronic workpapers "ROAD INV OTP OPEN Gross.123," worksheet "Routes," and "Road Inv OTP Open modified.123," worksheet "Routes."

* Issue Route Inv/GTM weighted by segment-specific Big Stone train GTMs.

b) Otter Tail's Methodology Contains Major Errors

Assuming that a movement specific adjustment to road property ownership costs could be developed from the produced data (and it cannot for the reasons set forth above), Otter Tail's methodology for developing such an adjustment is significantly flawed. Otter Tail attempts to develop line-specific unit costs per gross ton-mile for the *running* portion of road property ownership (*i.e.*, ownership costs associated with running track and not yard track) by calculating

[61] BNSF Reply electronic workpaper "ROAD INV OTP OPEN Gross.123."

[62] OTP electronic workpaper "Road Inv OTP Open. 123."

a ratio of the investment and depreciation per gross ton-mile for the valuation sections traversed by Big Stone trains to the BNSF system-average investment and depreciation per gross ton-mile.[63] Otter Tail then multiplies the adjustment ratio (based on the valuation sections that the Big Stone trains traverse) by the URCS system-average unit costs to develop its movement-specific unit costs.[64] This process is depicted in the following equation, assuming an adjustment to the URCS unit cost for the running portion of return on road property investment:

$$\text{Otter Tail Segment Return Per GTM, Running Portion of Road Property} = \frac{\text{Net investment per GTM, Otter Tail Segments}}{\text{Net investment per GTM, BNSF System}} \times \text{BNSF System-Average Return Per GTM, Running Portion of Road Property}$$

In addition to the problems with the underlying data that are discussed above, there are three major flaws in Otter Tail's methodology.

First, in calculating the adjustment ratio, Otter Tail uses depreciation data estimated by the depreciation calculator to develop the numerator and uses depreciation data from the R-1 to develop the denominator.[65] The depreciation calculator, which is unreliable and unusable for reasons discussed above, estimates depreciation utilizing a methodology that is different than the group depreciation methodology that BNSF uses, with the Board's approval, to track the accumulated depreciation that is reported in the R-1.[66] The two sets of data are wholly incompatible. Such an apples-to-oranges comparison produces below-system-average results for most line segments, due to the significant difference between the accumulated depreciation that FADB depreciation calculator estimates versus that reported in the R-1.

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[63] OTP Exh. II-A-4.

[64] *Id.*

[65] *Id.*

[66] Elliot VS at 27, BNSF.RP.WP.II.A-0030.

Otter Tail makes a similar error with respect to its treatment of running and yard investment. Because Otter Tail adjusts only the URCS unit costs related to the *running* portion of road property investment,[67] the adjustment ratio should reflect only road investment (*i.e.*, exclude yard investment) in both the numerator and denominator. Otter Tail correctly reflects only running investment in the numerator of its adjustment ratios (*i.e.*, the investment per gross ton-mile for the individual valuation sections traversed by the Big Stone trains), but Otter Tail improperly includes both road and yard investment in the denominator of its adjustment ratios (*i.e.*, the BNSF total system-average investment per gross ton-mile).[68] This error is illustrated below.

$$\text{Otter Tail Segment Return Per GTM, Running Portion of Road Property} = \frac{\text{Net } \textit{Road} \text{ investment per GTM, Otter Tail Segments}}{\text{Net } \textit{Road} \text{ and } \textit{Yard} \text{ investment per GTM, BNSF System}} \times \text{BNSF System-Average Return Per GTM, Running Portion of Road Property}$$

By using a denominator that included system-wide investment in both road and yard, Otter Tail develops adjustment ratios that are both (1) inconsistent with their application to unit costs that reflect only the *running* portion of return and depreciation, and (2) understated because the denominator includes more investment than the numerator.

Finally, as BNSF explained on opening, Otter Tail's approach ignores the relationship between density and variability.[69] A fundamental principle underlying URCS is that, as densities increase, so does the portion of total expenses that are variable. This logical conclusion is driven

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[67] Mr. Plaistow adjusts only the cost per *gross-ton mile*, (OTP electronic workpaper "Road Inv OTP Open.123"), which reflects only the *running* portion of investment. The portion of BNSF's road property investment in yard tracks is included in the URCS cost per switch engine minute.

[68] OTP electronic workpaper "Road Inv OTP Open.123."

[69] Klick V.S. at 35 to 42, BNSF.RP.WP.II.A-0038 to 0045.

by the fact that, as densities increase, total costs are increasing. Because fixed costs remain fixed, it is true that both (1) the total variable costs are increasing, and (2) the variable costs' portion of total costs is increasing.[70] While BNSF's opening evidence made this demonstration with a simple example,[71] the real-world effect of this fact also can be confirmed by reviewing the URCS calculation of variable costs. URCS assigns each carrier's costs to specific functional groupings, and then calculates the portion of total costs that are determined to vary with changes in the traffic based on an associated measure of output, or service unit.[72] As examples, URCS develops the variable portion of a railroad's running track maintenance costs based on the relationship of costs related to trailing gross ton-miles and costs related to track miles (*i.e.*, density per track-mile), and develops the variable portion of a railroad's running crew wage costs based on the relationship between train-miles and track miles.[73]

FTI examined the expense groupings and calculations of variable expenses from BNSF's 1996 and 2001 URCS runs. From this examination, FTI determined that the relevant measure of density increased between these two years and, as a result, the percentage of costs that are variable also increased over this time frame. Table II.A-4 presents the results for four of the URCS expense groupings.

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[70] The fact that the percentage of total costs that is variable increases as density increases is a manifestation of the same economic principle discussed below in section III.A.3.c. as underlying the density adjusted revenue allocation procedure that BNSF recommends for allocating cross-over traffic revenues between the OTRR and the residual BNSF. That is, as density increases, the variable component of costs increases proportionately, but the fixed and common costs remain unchanged, resulting in lower fixed, joint, and common costs per unit of volume. As a result, total costs per unit of volume decline as density increases.

[71] Klick VS at 41, BNSF.RP.WP.II.A-0044.

[72] URCS Work Table D at BNSF electronic workpaper "phseiid1.b02."

[73] URCS Work Table C at BNSF electronic workpaper "phseicc.b02."

Table II.A-4
Comparison of Densities and Percents Variable
BNSF URCS, 1996 and 2001

Expense Group and Associated Service Unit[74]	*Changes in Percent Variable and Service Units*		
	1996	2001	Increase
1. Running Track Maintenance	66.6%	72.0%	8%
Trailing GTM / Track Mile	15,875	20,376	28%
2. Running Crew Wages	80.5%	83.1%	3%
Train-Mile / Track Mile	2,979	3,545	19%
3. Running Locomotive Maintenance	71.0%	73.1%	3%
Locomotive Unit-Mile / Track Mile	9,624	10,661	11%
4. General & Administrative	80.2%	85.0%	6%
Trailing GTM / Track Mile	15,470	21,721	40%

As Table II.A-4 shows, as the measure of density increases, whether measured in gross ton-miles, train-miles, or locomotive unit-miles per track-mile, the variable portion of costs calculated by URCS also increases. Otter Tail's approach, however, ignores this interrelationship.

(c) Fuel

Although the parties agree on the mileages and both use BNSF's system-average fuel consumption to calculate variable costs for the issue movements, the parties reach significantly different results. The difference between the parties accounts for more than eight percent of the overall difference between the parties' variable cost evidence and is almost entirely attributable to an error in Otter Tail's development of its fuel index which is discussed below in section II.A.1.c(19).

[74] URCS normalizes running track maintenance expenses and service units over a five-year period, running locomotive maintenance expenses and service units over a three-year period, and running crew wage and general and administrative expenses over a one-year period. An Introduction to the Uniform Railroad Costing System, ICC Bureau of Accounts, at 35, included as BNSF.RP.WP.II.A-0061.

(d) Locomotive Maintenance Costs

The parties disagree on locomotive maintenance costs. On opening, BNSF used URCS system-average locomotive maintenance costs. *See* BNSF Nar. at II-34. In its opening submission, Otter Tail also uses BNSF's system-average locomotive maintenance costs for the locomotives used in Otter Tail service that were not subject to a maintenance contract with the locomotive manufacturer during the period costed. *See* OTP Exh. II-A-5. For locomotives used in Otter Tail service that were subject to a maintenance contract with a third party vendor, however, Otter Tail develops an implausible 60-percent reduction to system-average by misapplying those contracts. *Id.* This results in an overall weighted average reduction to BNSF's 2002 system-average locomotive costs of 36-percent. *Id.*

In this Reply, BNSF continues to rely on its unadjusted URCS system average for locomotive maintenance costs. BNSF does not maintain data that capture the costs of maintaining any specific locomotive or class of locomotives. For the reasons set forth below, Otter Tail's reliance on BNSF's maintenance contracts is improper.

i) Otter Tail Fails to Account for Non-Routine Locomotive Maintenance Costs

As the Board recognized in *TMPA*, payments made pursuant to BNSF's locomotive maintenance contracts[75] account "for only routine locomotive maintenance costs."[76] These payments, however, do not include substantial expenses that BNSF incurs for {

[75] The EMD contracts used by Otter Tail are the same locomotive maintenance contracts that complainants used in the *TMPA* case.

[76] *TMPA* at 58.

}[78] BNSF is unable to identify these costs on a locomotive series, pool, or unit specific basis. Without an ability to discern the magnitude of these items, the Board should find, as it did in the recent *TMPA* decision,[79] that system-average locomotive maintenance costs are applicable to all units that power the Big Stone trains.

ii) Otter Tail Fails to Account for Overhaul Expenses

While Otter Tail purports to include overhaul costs for the locomotives that it estimated would be overhauled during 2002, it includes only costs associated with overhauls of Dash-8 locomotives, which account for a paltry 48 hours, less than one half of one percent of the total locomotive hours in 2002 for Big Stone trains.[80] It includes no overhaul costs for the overhaul of the SD70MACs that were covered by the Fourth Amendment to the Amended and Restated Maintenance Agreement between BNSF and EMD. These locomotives powered the Big Stone

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[77] The maintenance agreements do not cover all repairs. For example, failures due to {

} *See* BNSF.RP.WP.II.A-0090, 0092, 0094, 0098, and 0103 to 0104. {

}

[78] There are {

} *See* BNSF.RP.WP.II.A-0107. These costs, which the Board has consistently found are includable in variable cost analyses, are entirely absent from Otter Tail's adjustment because they are not covered by the EMD contract. *E.g.*, *FMC* at 86; *WPL* at 57. In addition, BNSF incurs labor costs related to locomotive overhauls that are not covered by the EMD contracts. BNSF.RP.WP.II.A-0096 and 0101.

[79] *TMPA* at 58.

[80] *See* OTP electronic workpaper "Loco Maint OTP.123."

train some 38 percent of the time.[81] Otter Tail fails to include overhaul costs for these locomotives even though Otter Tail's calculations indicate that these locomotives would have been overhauled in 2002 once errors in Otter Tail's workpapers are corrected.[82] The contracts provide for overhaul either seven years from the last overhaul or when the unit reaches a certain mileage, whichever comes first.[83] Based on its estimate of average utilization of 12,263 miles per month, Otter Tail estimates locomotives used in Otter Tail service require overhauling every five to seven years.[84] Applying Otter Tail's overhaul assumptions and correcting the contract base years[85] increases Otter Tail's adjustment to BNSF's 2002 system-average locomotive costs from a 34-percent reduction to a 14-percent increase.[86]

Also, Otter Tail's inclusion of locomotive overhaul costs for only the locomotives that it estimates would be overhauled during the period costed is inconsistent with URCS. URCS normalizes locomotive repair costs over a three-year period.[87] Normalization of these repair costs recognizes that such costs can vary significantly from year-to-year, and a longer maintenance cycle should be recognized when calculating variable costs.

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[81] *Id.*

[82] BNSF Reply electronic workpaper "Loco Maint OTP_Fixed.123"

[83] BNSF.RP.WP.II.A-0096 and 0101.

[84] OTP electronic workpaper "Loco Maint OTP.123.

[85] *Id.* Otter Tail uses the base years for the Fourth and Fifth Amendments to the Amended and Restated Maintenance Agreement as the starting point for calculating when the locomotives covered by each amendment will come due for an overhaul. However, Otter Tail mistakenly reversed the base years for the Fourth and Fifth Amendments.

[86] BNSF Reply workpaper "Loco Maint OTP_Fixed.123."

[87] *See* URCS Worktable D3.

iii) Otter Tail Misapplies BNSF's Maintenance Contracts

In addition, Otter Tail misapplies BNSF maintenance contracts in developing its adjustment to locomotive maintenance costs. Specifically, it miscalculates BNSF payments under these contracts. BNSF's maintenance contracts provide(d) for different rate "tiers," based on the relative utilization of the units. The greater the utilization, the lower the per-mile maintenance rate.[88] For example, under the rate structure set forth in the Fifth Amendment to the Amended and Restated Maintenance Agreement {

} miles per month in 2002.[90]

In discovery, BNSF disclosed all the information necessary for Otter Tail to determine the actual amount of BNSF's payments for routine locomotive maintenance to SD70MACs under the EMD contract on a per-mile basis. BNSF disclosed that for 2002 it guaranteed { }miles for the SD70MACs under contract.[91] BNSF also disclosed the contract 2002 payments for that period.[92] In order to calculate a locomotive maintenance contract cost per mile for 2002, Otter Tail could have divided the contract payment total by the total actual miles those

[88] BNSF.RP.WP.II.A-0100.

[89] *Id.*

[90] BNSF.RP.WP.II.A-0108.

[91] *Id.*

[92] BNSF.RP.WP.II.A-0109.

locomotives moved during that period (which were also provided in discovery).[93] Otter Tail did not do this.

In fact, Otter Tail completely ignores the fact that BNSF's payments are based on a guaranteed number of miles, ignores the actual contract rates paid by BNSF, and ignores the actual utilization data. Rather, Otter Tail inexplicably calculates a hypothetical contract rate that differs from the rate BNSF actually paid, and a hypothetical locomotive utilization that differs from actual utilization.[94] Otter Tail's hypothetical contract rate is apparently based on the rate and escalation provisions provided for under the original locomotive maintenance contracts.[95] Its hypothetical locomotive utilization is based on the number of miles that BNSF theoretically could utilize its locomotives in Otter Tail service in a month if the Otter Tail cycle time averaged 108 hours.[96] Otter Tail's approach is unnecessary and improper as BNSF provided to Otter Tail in discovery the actual locomotive utilization data, contract rate information, and payment information. That data show that BNSF utilized its locomotives at a lower rate than Otter Tail estimates and paid a higher per-mile rate than Otter Tail calculates.[97] Otter Tail provides no explanation as to why it disregards this information.

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[93] BNSF Reply electronic workpaper "MAC payments_Reply.xls."

[94] OTP electronic workpaper "Loco Maint OTP.123."

[95] *Id.*

[96] *Id.* The results of Otter Tail's calculations of locomotive utilization are not materially different when the cycle times agreed to by the parties pursuant to *Ex Parte No. 638* are substituted for the cycle times Otter Tail used on opening.

[97] *Compare* BNSF Reply electronic workpaper "MAC payments_Reply.xls," *with* OTP electronic workpaper "Loco Maint OTP.123."

iv) There is No Reason to Expect BNSF's Maintenance Costs for the Locomotives that Power the Big Stone Train to be Less than BNSF's System-Average Maintenance Costs

Otter Tail also suggests that its locomotive maintenance adjustments are "likely closer to BNSF's actual costs of maintaining the locomotives used for the Big Stone Station movement than system-average costs." OTP Nar. at II-A-29 to 30. It goes on to suggest that the reason for this is that BNSF powers these trains with newer, high-horsepower AC locomotives that are 5.4 years old, while the average age of BNSF's locomotive fleet is 12 years old. *Id.* However, locomotive age is not a reliable indicator of dependability. BNSF locomotives typically undergo a major overhaul every seven years. After an overhaul, a locomotive should operate like new. Therefore, assuming that age indicates a unit's reliability, the five-year-old locomotives used on Big Stone trains should have the same reliability as the average 12-year-old locomotives, because it would have been five years since the average system unit was overhauled.

In addition, Otter Tail suggests that the AC units used on the Big Stone trains have fewer moving parts than the DC units in BNSF's locomotive fleet and, therefore, are less costly to maintain. *Id.* at II-A-30. However, the cost of maintaining DC locomotives is not necessarily higher than maintaining AC locomotives. The newer AC locomotives are far more complex and expensive than their DC predecessors and, as a result, could just as likely cost more to maintain.

Otter Tail also claims that the ICC has already found that higher utilization associated with unit train coal service produces maintenance costs well below system-average. *Id.* at II-A-29 to 30 *citing Nevada Power I.* The nearly quarter-century-old *Nevada Power I* decision is not relevant to this case. It involved a different railroad, operating over a different geographical area, with different equipment and different traffic characteristics than today's BNSF. Even if

BNSF better utilizes its coal-fleet locomotives than other locomotives in its fleet, Otter Tail has presented no evidence that this higher utilization results in maintenance costs that are lower than system-average.

There is an efficiency that results from BNSF's use of AC locomotives to power the Big Stone train. BNSF is able to operate longer and heavier trains using fewer locomotives than it could using DC power. In fact, because BNSF is able to use only three units to power the Big Stone trains, the use of AC locomotives decreases the locomotive maintenance costs for the issue traffic. This is because a portion of locomotive maintenance costs is based on the number of total locomotive unit-miles. Thus, Otter Tail's characterization that BNSF's system-average maintenance costs are overstated because older DC units require more maintenance than the newer AC units is misleading, as Otter Tail's trains would require four or five lower-horsepower DC units. By using the SD70MACs to power Big Stone trains, BNSF is producing locomotive maintenance costs that are already lower on a per-train, as well as per-ton, basis.

(e) Other GTM

The differences between BNSF and Otter Tail in the category of other gross ton-mile expenses are primarily due to the impact on overhead costs of Otter Tail's locomotive maintenance adjustment, discussed above.

(8) Train-Mile Expense - Other Than Crew

The parties generally agree on "train mile-other" expenses.

(9) Locomotive Unit-Mile Expense

The parties disagree about the locomotive unit-mile expense. This expense (excluding locomotive ownership)[98] is comprised of (1) fuel; (2) locomotive maintenance; (3) locomotive servicing; and (4) other expenses, including overheads. The differences between the parties with respect to fuel and locomotive maintenance are addressed in sections II.A.1.c.(7)(c) and II.A.1.c.(7)(d) respectively. The parties agree on the unit costs for locomotive servicing. They present differing costs for other expenses, due to the impact on overhead costs of Otter Tail's inappropriate adjustments to locomotive maintenance expenses discussed in Section II.A.1.c.(7)(d) above.

(10) Train-Mile Expense - Crew

The parties disagree on the calculation of train crew expenses. This disagreement varies by quarter, representing between one and five percent of the total difference between the parties' variable cost evidence. BNSF developed crew expenses using BNSF payroll records produced in discovery. Otter Tail also used the payroll records produced in discovery, but its calculations contained errors,[99] omissions, and unsubstantiated adjustments to those records that resulted in an understatement of variable costs.

(a) Corrections to BNSF Opening Evidence

BNSF made two errors in its opening evidence which it corrects here. First, while Mr. Ellis explained that a loading crew generally operates the empty Big Stone train from Gillette to the mine for loading and returns the loaded train to Gillette (BNSF Opening Nar. at II-5),

[98] Locomotive ownership is discussed in section II.A.1.(c)(15).

[99] Among other errors, Otter Tail failed to index the Fourth Quarter 2002 crew wage costs in developing First Quarter 2003 crew wage costs.

BNSF's opening crew wage calculations included crew wages for only 0.5 loading crews for trains originating at Belle Ayr and no BNSF loading crew wages for trains originating at Eagle Butte.[100] On opening, Otter Tail correctly included the crew wages for 1.0 loading crew for each Big Stone train originating at Belle Ayr, but incorrectly included only 0.5 loading crews for trains originating at Eagle Butte.[101] In this reply, Messrs. Fisher and Plum correct the crew wage calculations to reflect the fact that movements originating at both the Belle Ayr and Eagle Butte mines require a full Gillette-based BNSF loading crew to operate the Big Stone train Gillette-mine-Gillette.

Second, in preparing a response to a workpaper request from Otter Tail, BNSF discovered that it had failed to include in its variable cost calculations the payments that BNSF makes to a "productivity fund" for train-crew employees (*i.e.*, conductors and brakemen). Generally, when train-crew employees work a road train (including PRB loading crews) with less than a conductor and two brakemen (a "short-crew"), each train-crew employee receives a special allowance that is reported in the BNSF payroll records as "CA Code 32- Reduced Crew Allowance."[102] In addition to this allowance, BNSF makes a separate payment into a

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[100] BNSF Opening electronic workpaper "BNSF-02-T&E-ADJ.123."

[101] OTP electronic workpaper "Open-Avg Loading Crew Wages.xls."

Otter Tail incorrectly claims that only half a BNSF's loading crew's shift is required to move the Otter Tail train Gillette-Eagle Butte mine-Gillette. The TARs, however, show that Otter Tail is wrong. While a BNSF crew takes the train from Gillette to Eagle Butte, where it is handed off to a third party loading crew, a second BNSF loading crew returns the loaded train to Gillette. Because loading crews generally operate only two trains a shift, the round trip between Gillette and Eagle Butte generally accounts for a half shift each of two BNSF loading crews, or one full BNSF loading crew shift. BNSF.RP.WP.II.A-0116 to 0125.

[102] BNSF.RP.WP.II.A-0126 to 0128.

"productivity fund" of { } for each short-crew.[103] Payments are made from the fund to each qualifying crew member annually.[104] In this reply evidence, Messrs. Fisher and Plum include the productivity payments that BNSF made to the "productivity fund" for short-crews on the Big Stone trains.[105]

(b) Otter Tail's Inappropriate Adjustments to Crew Wage Data

Otter Tail makes a number of adjustments to BNSF's crew wage data for alleged "errors" or inappropriate reporting of crew wages. OTP Nar. II-A-33 to 34. As explained below, BNSF rejects all but a few of these adjustments.

First, Otter Tail improperly excludes wages paid to brakemen who worked the Big Stone train between Hettinger, North Dakota and Aberdeen, South Dakota and between Aberdeen and Big Stone. *Id.* At II-A-33. On occasion, non-Otter Tail cars are transported on the Big Stone train between Aberdeen and Hettinger. According to Otter Tail, BNSF used brakemen on the Big Stone train "only when the train was performing work associated with non-coal traffic." *Id.* This is not a true statement. Messrs. Fisher and Plum reviewed Otter Tail's workpapers and BNSF's train movement records and found that the data show no correlation between the use of a brakeman on the Big Stone train and the performance of work associated with non-coal traffic. Otter Tail's workpapers show that it identified 12 trains that operated with a brakeman.[106] Of

[103] *Id.*

[104] *Id.*

[105] BNSF Reply electronic workpaper "ottertail.bnsf reply roadcrew wages.xls."

[106] OTP electronic workpaper "Open-Avg Road Crew Wages per train.xls," worksheet "5-bmn adj pivot."

these 12 trains, however, five included only Otter Tail cars.[107] Moreover, Otter Tail's workpapers identify at least five other Big Stone trains that do include non-Otter Tail cars, but did not utilize a brakeman.[108] Thus, there is no evidence in the data to support Otter Tail's claim that the brakeman is assigned only to facilitate switching of non-Otter Tail cars. In fact, according to BNSF's Trainmaster at Aberdeen, Wilbert Kissner, the most common reason for including a brakeman is to facilitate switching of Otter Tail bad-ordered cars at Aberdeen. Other reasons include weather, training, and recertification.

Second, Otter Tail reduces certain crew wages to eliminate time that crews allegedly "spent working other trains" based on its flawed study of the hours that crews worked the Big Stone trains. OTP Nar. at II-A-33. To perform its study, Otter Tail first identified a sample of 32 Big Stone trains. For this sample, Otter Tail attempted to identify the trains that included non-Otter Tail cars. Based on its review of the Train Activity Reports ("TARs"), Otter Tail concludes that 12 Big Stone trains included non-Otter Tail cars. Next, Otter Tail identifies from the payroll records the time that each crew reported working each train for the relevant segment. Otter Tail then compares the average crew hours worked for the 12 trains it concludes had non-

[107] To test Otter Tail's claim that there were non-Otter Tail cars on each of the 12 trains, Messrs. Fisher and Plum examined the train movement records for evidence of non-Otter Tail cars. Specifically, they looked to see if the car count changed at or between Hettinger, Aberdeen, or Big Stone. A constant car count suggests no switching activity associated with non-Otter Tail cars. For 5 of the 12 trains Otter Tail identified as including non-Otter Tail cars, the car count remained constant at or near the ideal tender of 117 cars for the Big Stone train. BNSF.RP.WP.II.A-0129 to 0131 and BNSF Reply electronic workpaper "Train Movement Hettinger.xls," worksheet "Brakemen."

[108] BNSF.RP.WP.II.A-0132 to 0133 and BNSF Reply electronic workpaper "Train Movement Hettinger.xls," worksheet "Otter Tail Cars."

Otter Tail cars to the average crew hours worked for all 32 sample trains. Finally, Otter Tail reduces the engineer and conductor wages by the percent difference between the averages.[109]

The principal flaw in Otter Tail's study is that it misidentifies seven trains as including non-Otter Tail cars. The TARs associated with those seven trains describe in detail switching activity at Aberdeen.[110] Otter Tail assumes that this switching activity related to non-Otter Tail cars. This assumption, however, is contradicted by the train movement records. Those records show that for five of the trains, the car count did not change from the Otter Tail ideal tender of 117 cars, *i.e.,* the switching reported involved switching out Otter Tail bad-ordered cars and replacing them with fill cars.[111] The records show that the other two trains arrived at Aberdeen short of the ideal Otter Tail tender of 117 cars, left Aberdeen with 117 cars, and arrived at the mine with 117 cars.[112] Nor, is there evidence of any non-Otter Tail cars getting on or off of these trains. Moreover, Mr. Kissner confirms that a crew assigned to the Big Stone train does not perform switching activity at Aberdeen that is unrelated to the Big Stone train. When the crew hours associated with these seven trains are properly accounted for in Otter Tail's comparison of the average crew hours for trains that included non-Otter Tail cars with the average crew hours for all Big Stone trains, the difference in hours worked all but disappears,[113] thereby rendering the need for an adjustment moot.

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[109] OTP electronic workpaper "Open-switching.xls," worksheet "Hettinger Plant & return."

[110] BNSF.RP.WP.II.A-0132 to 0140 and BNSF Reply electronic workpaper "Train Movement Hettinger.xls," worksheet "Otter Tail Cars."

[111] *Id.*

[112] *Id.*

[113] BNSF Reply electronic workpaper "Open-Switching modified.xls."

Third, Otter Tail eliminates crew wages paid to a handful of road crews that reported to the Big Stone train symbol as working Gillette-to-Gillette, Edgemont-to-Edgemont, and between Gillette and Edgemont. OTP Nar. at II-A-33. These records evidently refer to road crews that worked the Big Stone train for some portion of the Gillette-mine-Gillette portion of the move. In light of the fact that both parties have included the wages of one loading crew for the Gillette-mine-Gillette segment, Messrs. Fisher and Plum accept this adjustment in their calculation of BNSF's crew wages.

Fourth, Otter Tail excludes the wages contained in seven other payroll records because of discrepancies in various date and time fields reported by each of the crew members.[114] OTP Nar. II-A-33. In five of those cases Otter Tail identifies that the "work date" field for one of the crew members did not match the date reported by the other crew member(s).[115] However, the "on duty date," "report date," and "train symbol" fields in those records match for all crew members, confirming that these crew members were properly paid for working the Big Stone train.[116] One of the other payroll records related to a shipment originating from Cordero and, therefore, is not relevant here.[117]

Fifth, Otter Tail identifies six instances where it claims that the crew "noted that they worked another train as well." OTP Nar. at II-A-33. While BNSF does not agree with Otter Tail's conclusion in every instance, the amount in dispute is negligible. Accordingly, in

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[114] OTP electronic workpaper "Open-Avg Road Crew Wages per train.xls," worksheet "9-BA."

[115] *Id.* at worksheet "4-adjustments."

[116] *Id.*

[117] BNSF accepts the exclusion of one of these seven payroll records that Otter Tail identified as erroneous. BNSF Reply electronic workpaper "ottertail.bnsf reply roadcrew wages.xls."

calculating BNSF's crew wages, Messrs. Fisher and Plum incorporate Otter Tail's reductions to these six records.

Sixth, Otter Tail eliminates payments to two engineers because they were paid as "firemen" for a total of nine shifts. *Id.* According to Otter Tail, employees should be paid as firemen only while they train to become engineers. *Id.* Because these two employees had already been identified as qualified engineers, Otter Tail assumes the payroll records must be in error and simply eliminated the firemen payments to these employees from its calculation of crew wages. *Id.* Otter Tail's assumption is wrong. There are instances when a qualified engineer might be paid as a fireman, including certain required training or recertification. Moreover, Otter Tail does not dispute that these employees worked the Big Stone trains for which they were paid the firemen wages. *Id.* There is no basis for excluding these wages when calculating crew wage costs for the Big Stone trains.

Seventh, Otter Tail eliminates crew wage data for what it terms an "inappropriate crew." *Id.* at II-A-33 to 34. According to Otter Tail, the TARs show that on January 3, 2002, a two-person crew reporting to the Big Stone train symbol performed "various yard and hostler related activity." *Id.* Because this crew did not perform "any road crew activity related to the Otter Tail traffic," Otter Tail excludes their crew wages from the crew wage calculations. *Id.* Otter Tail's distinction between road crew activity and yard activity is a red herring, and the elimination of these crew wages is unjustifiable. Indeed, Otter Tail provides no explanation as to why this distinction should make a difference in the treatment of crew wages. The TAR completed by this crew shows that it spent its shift switching out 21 bad-ordered cars on the Big Stone train, attaching fill cars and the Distributed Power engine unit, and conducting the air test,

among other activities it performed, all for the Big Stone train.[118] The fact that this crew did not then take the train from Aberdeen to Hettinger does not alter the fact that it worked the Big Stone train and its wages are properly chargeable to Otter Tail.

Moreover, this crew's wages are not captured elsewhere in the variable cost calculations. If Otter Tail's reference to "hostler activity" is intended to suggest that these costs are included in URCS as "hostling," Otter Tail is wrong. BNSF employs certain employees as "hostlers" to perform hostling activities in certain yards. Only the wages of these "hostler" employees are included in URCS as a hostling expense. Wages paid to a road crew that performs activities that are similar to activities performed by hostlers are not reported as "hostling" costs for purposes of URCS. Moreover, as explained in section II.A.1.c.(6) above, these wages are not captured as a switching cost. This is because, in calculating switching costs associated with switching performed by Otter Tail road crews, Messrs. Fisher and Plum used a modified SEM unit cost that excluded any crew wage expense.

Finally, Otter Tail excludes Constructive Allowance Code 32 - Reduced Crew Allowance payments made to conductors and brakemen working on three-person crews. Otter Tail claims that these payments should be made only to "crews operating without a brakeman." OTP Nar. at II-A-34. Otter Tail is wrong. As explained above, this allowance is paid to all train crew employees that work a train with less than a conductor and *two* brakemen.[119] Thus, on a three-person crew that consists of an engineer, conductor, and brakeman, the conductor and brakeman will be paid this allowance since there are fewer than two brakemen in the crew. Accordingly,

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[118] OTP workpapers 1257 to 1260.

[119] BNSF.RP.WP.II.A-0126 to 0128.

BNSF's reduced crew allowance payments are properly included in the Otter Tail crew wage calculations.

Table II.A-5
Comparison of BNSF and Otter Tail Average Crew Wages per Train

Belle Ayr			
Period	**BNSF Reply**	**OTP Opening**	**Difference**
1st Qtr 2002	{ }	{ }	($1,258)
2nd Qtr 2002	{ }	{ }	($1,341)
3rd Qtr 2002	{ }	{ }	($1,231)
4th Qtr 2002	{ }	{ }	($1,458)
1st Qtr 2003	{ }	{ }	($1,505)
Eagle Butte			
Period	**BNSF Reply**	**OTP Opening**	**Difference**
1st Qtr 2002	{ }	{ }	($1,807)
2nd Qtr 2002	{ }	{ }	($1,925)
3rd Qtr 2002	{ }	{ }	($2,022)
4th Qtr 2002	{ }	{ }	($2,182)
1st Qtr 2003	{ }	{ }	($2,231)

Source: BNSF reply "BNSF-02-T&E-ADJ-REPLY.123"; OTP opening workpaper "Open-Wages Summary.123."

(11) Helper Expense - LUM

On opening, Mr. Ellis explained that every loaded Big Stone train is assisted by two helpers. Trains originating at Belle Ayr are assisted by the Belle Ayr helper[120] and the Sheridan

[120] The Belle Ayr helper is also known as the Whitetail helper.

helper[121] and trains originating at Eagle Butte are assisted by the Campbell helper and the Sheridan helper. BNSF Nar. at II-12 to 13. The parties agree on the location of each of these helper services and the roundtrip miles traveled by each. The parties also agree that the Sheridan helper assists all loaded Big Stone trains. The parties disagree, however, on the number of trains per shift that each helper assists and the frequency that the Big Stone trains are assisted by the Belle Ayr and Campbell helpers. Otter Tail's evidence is based on a sample of Train Activity Reports ("TARs") for the helper service crews.[122] Otter Tail's study of helps per shift produces results that are similar to the helps per shift identified by BNSF in discovery and used on opening by Messrs. Fisher and Plum.[123] In order to reduce the issues before the Board, Messrs. Fisher and Plum use on reply the helps per shift estimated by Otter Tail with one minor adjustment.[124] However, Otter Tail's study of the TARs to determine the frequency with which the Belle Ayr and Campbell helpers assist Big Stone trains is fundamentally flawed and Otter Tail draws conclusions not supported by the evidence. Consequently, BNSF does not accept Otter Tail's approach on the issue, but rather continues to rely on the testimony of BNSF's Assistant Vice President, Unit Train Operations and/or the materials produced by BNSF in discovery showing that all Big Stone trains are helped.[125]

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[121] The Sheridan helper is also known as the Clearmont helper.

[122] OTP electronic workpaper "Open-Gillette Helper.xls."

[123] *Compare* OTP electronic workpaper "Open-Gillette Helper.xls" *with* BNSF Nar II-12 to 13 and BNSF.OP.WP.II.A-04135-04136.

[124] Messrs. Fisher and Plum correct one error in Otter Tail's calculation of Belle Ayr helps per shift. While Otter Tail identified three TARs as unusable and excluded them from the sample count, it failed to exclude the helps associated with these three sample TARs in its calculation of the average helps per shift. Correcting this error reduces the number of helps per shift from 2.9 to 2.8. BNSF Reply electronic workpaper "Open-Gillette Helper modified.xls."

[125] BNSF Nar at II-12 to 13 and BNSF.OP.WP.II.A-04135 to 04136.

To determine the frequency with which the Belle Ayr and Campbell helpers assisted the Big Stone trains, Otter Tail selected 34 Big Stone trains, 24 originating from Belle Ayr and 10 from Eagle Butte. It then identified the TARs completed by each Belle Ayr helper crew that worked on the days that the 24 sample trains originated at Belle Ayr and the TARs completed by each Campbell helper crew that worked on the days that the 10 sample trains originated at Eagle Butte. Next, Otter Tail examined these TARs to identify whether a helper crew reported helping the Big Stone train. For each of the two helper services, Otter Tail identified three TARs that specifically identified helping a sample Big Stone train. If no crew reported helping a Big Stone train on a day on which one of the sample Big Stone trains originated, Otter Tail concludes that the Big Stone train was not helped.[126] The evidence, however, does not support this conclusion.

The fundamental flaw in Otter Tail's study stems from the fact that not all helper crews reported in their TARs the specific train IDs that they helped during their shifts. In many of the TARs relied upon by Otter Tail, the helper crews reported only that they "shoved" trains during their shift, but did not identify which trains they shoved.[127] In fact, for 26 of the 28 sample trains that Otter Tail claims were not helped by either the Belle Ayr or the Campbell helper, there is at least one TAR from that day in which the helper crew did not identify the specific trains helped during the shift.[128] Otter Tail inexplicably assumes that the Big Stone train was not among the trains "shoved" by any of these crews. Since it is not possible to divine from these TARs whether the Big Stone train was helped or not, Otter Tail's assumption is unreasonable.

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[126] OTP electronic workpaper "Open-Gillette Helper.xls."

[127] BNSF.RP.WP.II.A-0141 to 0188.

[128] *Id.* and OTP electronic workpaper "Open-Gillette Helper.xls."

In addition, for five trains that Otter Tail claims were not helped by either the Belle Ayr or the Campbell helper, Otter Tail examined the TARs for the wrong day, *i.e.*, a day other than the day on which a sample train originated.[129] Thus, it is not surprising that no helper crew reported helping the Big Stone trains specifically in the TARs examined by Otter Tail.

Indeed, Otter Tail's conclusions are at odds with basic physics. To demonstrate this, BNSF witness Andrew Cebula calculated the horsepower requirements for a typical loaded Big Stone train (117 cars and 140.6 gross tons per car)[130] traversing the Belle Ayr helper territory under normal operating conditions, *i.e.*, no adverse weather conditions or mechanical events.[131] The results show that the Big Stone train requires more tractive effort than that provided by three SD70MACs in order to traverse the helper territory and, consequently, require helper service.[132]

(12) Helper Expense - Crew

Differences in the parties' development of helper wages for the Big Stone train are primarily a result of the parties' disagreement as to the number of trains helped per shift, and the frequency that the Big Stone train is helped. These issues are discussed in section II.A.1.c.(12) above.

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[129] OTP workpaper "Open-Gillette Helper.xls"; "switching.xls" (for list of study trains) and "2002 Trn Maint Loco Data.xls" (for days trains originated).

[130] BNSF and Otter Tail's Joint Letter to David M. Konschnik dated July 17, 2003, BNSF.RP.WP.II.A-0049 to 0052.

[131] Because Mr. Cebula's calculations do not take into account track curvature, ignore flange and aerodynamic drag component of the train resistance formula, and assume that the locomotives always perform according to manufacturer's specifications, they are conservative.

[132] BNSF Reply electronic workpaper "Belle Ayr_Helper Service_Analysis.xls."

(13) Freight Car Expense (RR-Owned Only)

Neither party included cars associated with this expense in developing variable costs for the Big Stone trains.

(14) User Responsibility for Freight Car Repairs

Both parties calculated this expense using 9.51 percent of URCS system-average costs consistent with precedent.[133] The minor difference between the parties on this expense appears to result from differences in the parties' development of indices used to normalize URCS data.

(15) Loss and Damage Expenses

The parties disagree on the amount of loss and damage expense to include in their variable cost calculations. On opening, BNSF applied 2001 URCS loss and damage costs for coal to develop variable costs. BNSF Opening Nar. at II-48. In its opening submission, Otter Tail claims to have used a four-year average of the loss and damage experience for Big Stone movements. OTP Nar. at II-A-38 to 39. In prior rate cases, the Board has accepted loss and damage costs based on averages for varying durations.[134] The lack of a standard time frame allows parties to pick a time frame that either maximizes or minimizes this expense.[135] This approach provides an opportunity for manipulation and no principled basis for a Board determination of the appropriate variable costs in coal rate cases. In this Reply, Messrs. Fisher

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[133] *See* Car Service Compensation – Basic Per Diem Charges – Formula Revision in Accordance with the Railroad Revitalization and Regulatory Reform Act of 1976, 358 I.C.C. 716, 804 (1977).

[134] *E.g.*, *TMPA*, at 64 (six-year average of loss and damage data for TMPA shipments), *WPL*, at 58 (five-year average of loss and damage data for WPL shipments), and *FMC*, at 83 (one-year average of URCS system-average loss and damage data).

[135] Indeed, Otter Tail's use of a four-year average here dilutes the impact of the loss and damage payments made by BNSF to Otter Tail in 2001.

and Plum continue to use URCS system-average cost, which they believe provides the most reliable measure of loss and damage expenses likely to be incurred in the medium to long run.

(16) Locomotive Ownership Expense

The parties disagree about the proper calculation of locomotive ownership expense. The differences in the parties' calculations are primarily due to the different approaches they take with respect to the following factors: (a) spare margin; (b) development of lease costs; (c) calculation of average acquisition costs; and (d) the parties' different treatment of Accounts 76 and 90 (discussed above in section II.A.1.a.(1)).

(a) Spare Margin

The Board has often applied a 10-percent spare margin in rate reasonableness cases, but has acknowledged that a different percentage may apply if supported by empirical evidence.[136] On opening, BNSF presented empirical evidence supporting a spare margin above 10 percent and explained the basis for its spare margin. *See* BNSF Nar. at II-54 to 57. It continues to rely on that special study of locomotive spare margin in this reply. Otter Tail also advocates that the Board depart from its precedent. Otter Tail, however, argues for a spare margin lower than 10 percent.

Otter Tail's spare margin evidence improperly relies on "availability guarantees" contained in BNSF's locomotive maintenance contracts with third parties. *See* OTP Nar. at II-A-31. Many of the locomotives used to power the Big Stone train, however, were not subject to a

[136] *See, e.g.*, *WTU*, 1 STB at 728 (stating that BN had failed to "substantiate the use of a spare margin different from the 10 percent accepted in past cases").

maintenance contract during the period costed.[137] For those locomotives, Otter Tail used the 10-percent spare margin the Board has accepted in prior rate cases. Otter Tail's spare margin is weighted to reflect the relative utilization (*i.e.*, locomotive hours) in Big Stone service of the units covered by a maintenance contract and units not subject to a maintenance contract. As explained below, the availability guarantees in the locomotive maintenance contracts are not an appropriate basis for developing BNSF's locomotive spare margin.

The Board has already recognized in its *TMPA* decision that BNSF's locomotive maintenance contracts do not account for all maintenance needs with respect to units covered by such contracts.[138] It follows that "unavailability" time under the contract does not include all time that a locomotive is unavailable to the railroad for revenue service. For example, locomotives involved in { } would not be considered as "unavailable" under the contracts, but clearly are not available to the railroad for revenue service.[139]

Moreover, because BNSF and EMD lacked sufficient data to measure "availability" as defined in the contracts, BNSF and EMD {

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[137] {

} BNSF.RP.WP.II.A-0102 and 0110.

[138] *See TMPA* at 58.

[139] BNSF.RP.WP.II.A-0092 and 0098.

}[140]

Thus, those guarantees are meaningless and cannot be used as a measure of locomotive availability.

Otter Tail inappropriately applied BNSF's recent agreement with Alstom to the entire First Quarter of 2003, when it acknowledges, although incorrectly, that the Alstom contract did not become effective until February 1, 2003. OTP Nar. at II-A-29. In fact, the Alstom contract did not become effective until March 1, 2003.[141]

Otter Tail's use of the contract availability percentage as BNSF's locomotive spare margin is also mathematically incorrect.[142] In its opening evidence, BNSF explained that the spare margin is expressed as a percentage of the actual available time, and not as a percentage of total locomotive hours as Otter Tail calculates. BNSF Nar. at II-55.

Finally, by failing to consider locomotive utilization, Otter Tail's approach further understates BNSF spare-margin needs.

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[140] The sixth covenant of the Sixth Amendment to BNSF's maintenance agreement with EMD provides the following:

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} OTP workpapers 0481 - 0483, BNSF.RP.WP.II,.A-0111 to 0113.

[141] BNSF.RP.WP.II.A-0102 and 0110.

[142] OTP electronic workpaper "Loco Maint OTP.123" and "Loco Maint OTP-2003.123."

(b) Development of BNSF Lease Costs

Otter Tail developed lease costs by identifying the specific payments provided for in the lease payments schedules for 2002 for all locomotives in the Alliance pool.[143] OTP Nar. at II-A-31. Otter Tail does not determine lease costs associated with the particular locomotives from the Alliance pool used in Otter Tail's trains. *See id.* Rather, Otter Tail weights the average 2002 lease cost for each locomotive type in the Alliance pool by the percentage that each type was used in Otter Tail service.[144] *Id.* There are two flaws in Otter Tail's approach.

First, Otter Tail's approach ignores the proper accounting and costing practice to treat the sawtooth nature of the locomotive lease payment schedules. Messrs. Fisher and Plum explained on opening that because the lease payment schedules vary from year to year, considering only the payments made in a given year fails to reflect the true lease costs. BNSF also explained that Otter Tail's approach is at odds with GAAP and BNSF's regulatory reporting practices. BNSF Nar. at II-49-50. Messrs. Fisher and Plum's normalization of lease costs over the life of the leases is consistent with FASB No. 13 and the manner in which BNSF reports locomotive lease costs in the R-1. *Id.*

Second, Otter Tail's failure to use the lease costs of the actual locomotives that powered the Big Stone trains is contrary to Board precedent.[145] Indeed, in developing BNSF's locomotive maintenance and spare margin costs, Otter Tail used the actual locomotives that powered the Big Stone trains.[146] Its failure to do so here suggests a results-oriented approach.

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[143] OTP electronic workpaper "Loco Cap Open (OTP).xls."

[144] OTP electronic workpaper "Loco Cap Open (OTP).xls."

[145] *TMPA* at 61, *WPL* at 58-59.

[146] OTP electronic workpaper "Loco Maint OTP.123" and "Loco Maint OTP-2003.123."

BNSF's locomotive lease costs evidence presented in opening provides a truer picture of BNSF's locomotive lease costs and is the better evidence of record, and Messrs. Fisher and Plum continue to use it in this Reply.

(c) Locomotive Acquisition Expenses

Otter Tail bases its locomotive acquisition costs on the average of all locomotives in the Alliance Pool weighted to reflect the use of the different types of locomotives to power the Big Stone trains.[147] By contrast, Messrs. Fisher and Plum developed locomotive costs based on the specific units in Big Stone service.[148] This movement-specific approach is preferable to Otter Tail's use of a weighted average for the Alliance Pool that includes locomotives not used on Big Stone trains.

(17) EOTD Ownership Expenses

Differences in the parties' EOTD ownership costs are largely due to the differences in the parties' treatment of Accounts 76 and 90 (section II.A.1.a.), their calculation of BNSF's equipment spare-margin needs (section II.A.1.c.(16).(a)), and their treatment of the EOTD ownership data produced by BNSF in discovery. In calculating EOTD ownership costs Messrs. Fisher and Plum exclude eighteen records that lacked a unit count.[149] In its opening evidence, Otter Tail excludes eight of these same records.[150] As to the other ten records that Otter Tail did not exclude, six records reflected the purchase of EOTD units.[151] For those

[147] OTP electronic workpaper "Loco Cap Open (OTP).xls."

[148] BNSF Opening electronic workpaper "OTP Loco Ownership.xls."

[149] BNSF Opening electronic workpaper "2002 EOTD Data.123."

[150] OTP electronic workpaper "BNSF 2002 EOTD.123," worksheet "EOTD data."

records, Otter Tail estimates the number of units purchased.[152] Otter Tail's estimates, however, suggest that BNSF purchased fractional amounts of EOTDs.[153] This clearly is wrong.

Otter Tail also makes an error in its development of the average age and value of the EOTDs. Otter Tail develops the average age and dollar value of BNSF's EOTDs as of December 31, 2002 and uses these values for all quarters costed.[154] Because Otter Tail calculates the age and costs as of December 31, 2002, Otter Tail fails to account properly for BNSF's acquisition of additional EOTDs in Fourth Quarter 2002, as well as the passage of time. As a result, it misstates both the average age and price for all five quarters costed.

(18) Third-Party Loading Expense

As explained in BNSF's opening evidence, BNSF pays for a third-party to load trains originating at Eagle Butte. BNSF Nar. at II-58. On opening, Otter Tail fails to include any third-party loading expense.

(19) Indexing

Otter Tail's erroneous development of its fuel index accounts for more than eight percent of the overall difference between the parties. Otter Tail incorrectly bases its fuel index on BNSF's *2001* cost per gallon of $0.82622, rather than the *2002* cost per gallon of $0.72555.[155]

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[151] The other four of the records that Otter Tail failed to exclude were associated with the cost of items related to the EOTD fleet, including racks for mounting EOTDs and upgrade hoses, among other things. BNSF agrees with Otter Tail that these records could be included in the development of EOTD ownership costs. However, since the costs associated with these records is inconsequential, Messrs. Fisher and Plum continue to exclude them on reply.

[152] *Id.*

[153] *Id.*

[154] OTP electronic workpaper "BNSF 2002 EOTD.123."

[155] These fuel prices are derived from schedule 750 in BNSF's R-1.

Otter Tail's use of the wrong base-year fuel costs for its index results in quarterly indices that significantly understate actual fuel costs. On opening, Messrs. Fisher and Plum used the actual cost of fuel from each quarter,[156] and they continue to do so here.

There are only minor differences in the parties' development of the non-fuel indices. To calculate the quarterly values, Otter Tail round the monthly PPI data.[157] BNSF does not round the data.[158]

Also for the First Quarter 2003, Otter Tail used the annual "Wage Rates" index and "Wage Supplements" index for 2002.[159] Messrs. Fisher and Plum incorrectly used the average of the four quarters to develop the 2002 base "Wage Rates" and "Wage Supplements" indices. Messrs. Fisher and Plum correct this error on reply.[160]

2. Rate and Resulting R/VC Calculation

Messrs. Fisher and Plum have updated the variable costs of the Otter Tail traffic for First Quarter 2002 through First Quarter 2003 using actual operating and cost data for the Otter Tail coal trains moving under the challenged tariff rate. The following table shows the results. Exhibit No. II.A-1 presents the cost summaries, and electronic workpaper "BNSF OTP REPLY PRG.123" contains the detailed calculations.

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[156] BNSF.OP.WP.II.A-0050 to 0067.

[157] OTP electronic workpaper "BN02 Index.123."

[158] BNSF Reply electronic workpaper "BNSF-02-IE3-INDEX-REPLY.123."

[159] OTP electronic workpaper "BN02 Index.123."

[160] BNSF.RP.WP.II.A-0189 to 0208.

Table II.A-6
Summary of Variable Costs per Net Ton and R/VC Ratios

Belle Ayr					
Period	Rate/Ton	BNSF Reply		OTP Opening*	
		Variable Cost/Ton	Revenue to Variable Cost Ratio	Variable Cost/Ton	Revenue to Variable Cost Ratio
1st Qtr 2002	$13.49	$5.89	2.29	$4.78	2.82
2nd Qtr 2002	$13.49	$5.94	2.27	$4.81	2.80
3rd Qtr 2002	$13.49	$5.93	2.27	$4.81	2.80
4th Qtr 2002	$13.49	$6.05	2.23	$4.90	2.75
1st Qtr 2003	$13.76	$6.39	2.15	$5.10	2.70

Eagle Butte					
Period	Rate/Ton	BNSF Reply		OTP Opening*	
		Variable Cost/Ton	Revenue to Variable Cost Ratio	Variable Cost/Ton	Revenue to Variable Cost Ratio
1st Qtr 2002	$13.49	$5.83	2.32	$4.66	2.89
2nd Qtr 2002	$13.49	$5.91	2.28	$4.72	2.86
3rd Qtr 2002	$13.49	$5.93	2.27	$4.74	2.85
4th Qtr 2002	$13.49	$5.96	2.26	$4.75	2.84
1st Qtr 2003	$13.76	$6.46	2.13	$5.08	2.71

* Adjusted to reflect *Ex Parte No. 638* agreements on various operating and traffic characteristics.

B. QUALITATIVE EVIDENCE

BNSF does not contest Otter Tail's evidence on its that there is no effective intramodal or intermodal competition with BNSF for the issue traffic movement. *See* Otter Tail Nar. at II-B-1.[161] Indeed, in BNSF's opening evidence, BNSF witness Kenneth J. Slater demonstrated that Otter Tail's demand for coal transportation to Big Stone is highly inelastic. *See* BNSF Nar. at II-60 to 72. Mr. Slater's observation is consistent with a lack of effective intramodal or intermodal competition. Mr. Slater's evidence also demonstrates that it would be entirely appropriate for BNSF to charge Otter Tail rates with an R/VC ratio well above the jurisdictional threshold. Under SAC theory, railroads are expected to charge their most demand inelastic customers the proportionately highest rates. *See* BNSF Nar. at I-3 to 6. Otter Tail is among this group of demand inelastic customers.

[161] Otter Tail complains about BNSF's refusal to admit to the lack of intermodal and intramodal competition in the discovery phase of this case. OTP Nar. at II-B-1, n.4. But the complainant in SAC case has the burden of proof and the defendant has the right to assess the complainant's evidence on this question before taking a position on it. Moreover, the Board's discovery rules make it clear that a party is required to respond to discovery questions seeking factual information, not legal conclusions. *Sunwise Corp. v. RTC Transp, Inc. and Delta Traffic Serv. Inc.*, No. MC-C-30130, 1989 WL 237871, at *2 (ICC Director, Office of Proceedings decided Feb. 2, 1989); *Golden Valley Microwave Foods, Inc. v. Weaver Popcorn Co., Inc.*, 130 F.R.D. 92, 96 (N.D. Ind. 1990). BNSF responded to Otter Tail's discovery directed at factual issues. *See* April 4, 2003 letter from Anthony J. LaRocca to Jeffrey O. Moreno, included as OTP Opening Exh. II-B-3. Otter Tail relied on those responses in part in submitting its market dominance evidence.

III. STAND-ALONE COST

A. TRAFFIC GROUP

Otter Tail has developed a hypothetical rail carrier called the Otter Tail Railroad ("OTRR") that transports coal and general freight traffic from 2002 through 2021. In base year 2002, Otter Tail hypothesizes that the OTRR will transport over 180 million tons of coal and 25 million tons of non-coal traffic.[1] The Big Stone station is the only destination directly served by the OTRR railroad. The vast majority of the traffic handled by the OTRR – about 99 percent of Otter Tail's estimated volume in base year 2002 – is cross-over traffic.[2]

Otter Tail assumes that total volumes on the OTRR increase by 12 percent from 205.6 million tons in 2002 to 230.3 million tons in 2021, the last year of the discounted cash flow ("DCF") period.[3] Otter Tail assumes that total revenues will increase by a much higher percentage during the DCF period. Specifically, Otter Tail projects that revenues for the OTRR railroad will increase by about 56 percent from about $877 million in 2002 to almost $1.4 billion in 2021.[4]

As a threshold matter, BNSF challenges Otter Tail's use of cross-over traffic as the predominant source of revenue for the OTRR. Reliance on cross-over traffic precludes a

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[1] OTP Opening Exh. III-A-5 at 1, column 5, rows 101 and 107, respectively.

[2] "Cross-over traffic" is traffic currently handled by the incumbent railroad (here BNSF) that the Complainant assumes would move in interline service between the stand-alone railroad ("SARR") and the incumbent railroad. *See PPL* at 7, n.13.

[3] OTP Opening Exh. III-A-5 at 1, column 5, row 108 and at 5, column 43, row 108, respectively.

[4] OTP Opening Exh. III-A-5 at 1, column 6, row 108 and at 5, column 44, row 108, respectively.

thorough comparison of revenues and costs which is the essence of the SAC test. The Board should reject Otter Tail's SAC evidence on this basis.

Apart from the fundamental threshold problem with cross-over traffic, Otter Tail's volume and revenue evidence is demonstrably flawed in numerous respects and results in a vast overstatement of the volumes and revenues – both coal and non-coal -- to be transported by the OTRR.

With respect to coal volumes, a very significant flaw is Otter Tail's inclusion of coal volumes originating at southern PRB mines, *i.e.*, from Cordero to Antelope, that move south on the OTRR through Converse Junction. Under the Board's recent *AEPCO* and *PPL* decisions, this southern PRB coal traffic should not be included in the stand-alone traffic group because it does not share any facilities with the issue traffic which moves north out of the PRB on the SARR.[5] Exclusion of this southern PRB coal traffic reduces the SARR's volume by 54 million tons in base year 2002.

A second significant flaw is Otter Tail's failure to consistently apply its own coal traffic selection criteria. Otter Tail claims that it excluded coal movements more than 200 miles long whenever Otter Tail's share of the movement was less than 1.1 percent of the total movement miles on the real world BNSF;[6] but, Otter Tail did not, in fact, apply this criterion to coal from all PRB mine origins. When Otter Tail's 1.1 percent mileage floor is applied consistently and its mileage calculations are corrected, the OTRR's coal volumes are reduced by another 14 million

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[5] A diagram showing the northern movement of the issue traffic and the southern movement of the south PRB coal traffic exiting at Converse is attached as BNSF Reply Exhibit III.A-1.

[6] OTP Nar. at III-A-19, n.24.

tons in 2002. Otter Tail also overstates coal volumes by improperly assuming that tonnage will move to Xcel's Riverside and Highbridge plants even after they are converted from coal to gas, and by improperly calculating volumes destined for Superior, Wisconsin.

With respect to non-coal volumes, the most fundamental flaw is Otter Tail's inclusion of high speed intermodal trains, designated as Z trains, in the stand-alone traffic group. This traffic is the highest priority freight traffic on BNSF and, in the real world, it moves over BNSF's line from Snowden, Montana through Minot, North Dakota and over to Fargo, North Dakota, a line that Otter Tail did not build. Under the Board's recent decision in *TMPA,* the rerouted Z train traffic should not be included in the stand-alone traffic group because the OTRR provides inferior service to the shippers. Exclusion of the Z train traffic reduces the SARR's volumes by { } million tons annually. Otter Tail also has overstated non-coal volumes by improperly including (a) certain grain trains originating at Williston, North Dakota and (b) small blocks of coal cars originating in Colstrip, Montana that are attached to general freight trains.[7]

Otter Tail's coal and non-coal revenue assumptions are also fundamentally flawed. Cross-over traffic revenues should be excluded in their entirety. But if the Board permits the use of cross-over traffic, it should adopt BNSF's density adjusted revenue allocation ("DARA")

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[7] In contrast to the complainant in the *AEPCO* case, which also involved substantial volumes of non-coal traffic, Otter Tail did not apply large, unjustifiable "adjustments" to non-coal revenues and tonnages that had the effect of significantly overstating actual BNSF revenues and tonnages. *See AEPCO*, Reply Evidence of The Burlington Northern and Santa Fe Railway Company, at III.A-2 (Public Version May 27, 2003). Like the complainant in *AEPCO*, Otter Tail had some difficulty locating all of the non-coal trains included within its traffic group in BNSF's revenue data. Otter Tail, however, calculated the revenues and tonnages for the trains it could not locate using reasonable average figures that did not misrepresent the actual revenues earned and tonnages transported by BNSF. Because Otter Tail did not commit the errors that occurred in *AEPCO*, it was feasible for BNSF to identify specific non-coal traffic that should not have been included and delete it from Otter Tail's traffic group.

procedure in lieu of the distorted revenue divisions that Otter Tail proposes. The grossly excessive revenue divisions claimed by Otter Tail are apparent from a review of Otter Tail's Exhibit III-A.3. For example, for the coal exiting the SARR at Converse, the OTRR has, on average, only 4 percent of the miles but claims 28 percent of the revenues associated with the real world BNSF movements.[8] Use of BNSF's DARA procedure to determine revenue divisions for cross-over traffic would reduce Otter Tail's overstated revenues by over { } million in base year 2002.

Otter Tail also overstates revenue growth by using an outdated DRI-WEFA projection of railroad cost indices and made-for-litigation revenue forecasts that contain several errors. BNSF uses the most current DRI-WEFA forecasts and corrects Otter Tail's made-for-litigation revenue forecasts. Further, Otter Tail's revenue forecast is inflated because it does not reflect the fact that sole-served destinations generally experience rate reductions upon contract renewals. Indeed, Otter Tail was offered a rate reduction by BNSF upon the expiration of the Big Stone contract. Other flaws in Otter Tail's revenue assumptions are discussed below.

BNSF's evidence in this section III.A. is supported by six witnesses. John C. Klick, a Senior Managing Director and Julie Murphy, a manager, in FTI's Financial Consulting Division, analyze Otter Tail's volume and revenue assumptions and explain the flaws in Otter Tail's approach. Mr. Klick and Ms. Murphy also sponsor the evidence regarding Otter Tail's cross-over revenue divisions methodologies, BNSF's rebased rates for both sole-served and competitive traffic on the OTRR rail network at the expiration of existing contracts, and BNSF's revised revenue forecasts. Mr. Klick also sponsors evidence on the implementation of DARA.

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[8] OTP Opening Exh. III-a-3 at 4, row "Subtotal off at Converse," columns 18, 22.

Janusz A. Ordover, a Professor of Economics at New York University and a former Deputy Assistant Attorney General for Economics in the Antitrust Division of the U.S. Department of Justice, addresses the conceptual flaws in Otter Tail's reliance on cross-over traffic. Thomas G. Kraemer, Group Vice President-Coal Marketing of BNSF, sponsors evidence regarding a study of BNSF coal rates under contracts that have expired since January 1, 1998. Benton V. Fisher, a director in FTI's Financial Consulting Division, sponsors evidence concerning non-coal traffic assumptions. Finally, Bill H. Slaughter, Assistant Vice President Intermodal/Automotive Operations at BNSF until October 1, 2003, sponsors evidence regarding service requirements for high-priority intermodal traffic. The qualifications and verifications for these witnesses appear in Section IV.

1. Stand-Alone Railroad Traffic

This section identifies the traffic that Otter Tail improperly included in its SARR network. While the Complainant has the right to select its traffic base for the SARR network, there are limits to this right. As the ICC explained, "[t]he proponent of a particular stand-alone model must . . . be prepared to defend, the assumptions and selections it has made." *Coal Rate Guidelines*, 1 I.C.C. 2d at 544. In this case, Otter Tail has exceeded those limits by including several categories of traffic in its stand-alone shipper network that cannot be justified under governing SAC principles established by the Board.

As an initial matter, Otter Tail's heavy reliance on cross-over traffic is improper because it violates SAC principles. Moreover, Otter Tail's inclusion of coal traffic originating at southern PRB mines and moving south through Converse, and its inclusion of non-coal Z trains in the SARR are also inconsistent with SAC principles. Otter Tail has further overstated traffic volumes by applying its traffic selection methodology inconsistently and making unfounded assumptions. Each of these problems is addressed in detail below.

a. Otter Tail's Reliance On Cross-Over Traffic Is Inconsistent With The Fundamental Economics Of The SAC Test

In this case Otter Tail has designed a SARR that carries a traffic group consisting almost entirely of cross-over traffic. Indeed, the only traffic that is local to the SARR is the issue traffic movement to Otter Tail's Big Stone plant, which constitutes less than one percent of the traffic selected by Otter Tail. This reliance on cross-over traffic is improper because it violates SAC principles. The Board should dismiss Otter Tail's complaint on the basis of this improper traffic selection.

BNSF's witness Janusz A. Ordover addresses the conceptual flaws in Otter Tail's reliance on cross-over traffic and explains why a cost-based approach to allocating revenues on cross-over traffic is appropriate if such an allocation must be made.[9]

(1) The Economic And Public Policy Rationale For The SAC Test

It has long been recognized that for railroads to recover their efficiently incurred costs (both fixed and variable) some form of differential pricing must be permitted. *Coal Rate Guidelines* 1 I.C.C. 2d at 526-27. Because railroading is characterized by substantial fixed costs relative to variable (or marginal) costs, pricing rail services at marginal cost would generate insufficient revenues to defray the total forward-looking costs of the railroad. Indeed, pricing at variable or marginal cost would condemn the railroad to revenue inadequacy and ultimately lead it to exit entirely from the market.

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[9] The following discussion in this section and the discussion in portions of Section III.A.3.c are drawn from Professor Ordover's declaration, attached as Exhibit III.A-2.

A second important feature of railroading as an economic activity is that it is characterized by joint and common costs. These are costs that are incurred on behalf of more than one shipper and, as such, can and should be recovered from more than one shipper. The presence of these joint and common costs generates scope economies (defined as savings that are created by having one railroad serve more than one customer, as compared to a base case in which each customer is served by one railroad), which can potentially benefit all shippers. Because of these scope economies, it is generally efficient for a railroad to serve multiple shippers with its route structure. Furthermore, because of substantial fixed costs, railroads also can and often do exhibit economies of density whereby average costs per unit of traffic decrease as the number of units of traffic using particular facilities increases.

At least since the Staggers Act, it has been widely recognized that cost recovery in the railroad industry cannot be achieved by requiring that each shipper pay the same mark-up per ton-mile or the same mark-up per dollar of variable cost. As has been demonstrated many times, such an approach to cost recovery is a prescription for inefficiency. It prevents socially profitable services from being offered, and it distorts shipping volumes by suppressing unduly the services utilized by those shippers whose demands are relatively more elastic, while "under-recovering" revenues from those shippers whose demands are relatively less elastic. The principle of Constrained Market Pricing ("CMP") recognizes that differential pricing is consistent with economic efficiency. CMP also recognizes that differential pricing can potentially lead to unduly elevated rates for some shippers. To protect against this eventuality, the current regulatory regime subjects market dominant railroad rates to the SAC test.

As originally intended, the SAC test was devised to ensure that no shipper was required to pay more than the full costs of the railroad facilities that it uses. A shipper who paid in excess

of the full costs was said to be cross-subsidizing other shippers by paying for facilities from which it derived no benefit. Conceptually, this test is quite compelling and sound as a matter of economics and public policy. Indeed, if entry into railroading were unimpeded by entry barriers – *i.e.*, if the market for provision of railroad services were perfectly contestable, in the language of economics – a railroad seeking to collect from the shipper more than the long-run economic costs of the facilities used by the shipper would be replaced by an entrant that could attract that shipper by charging slightly lower rates, yet sufficient to cover its full economic costs. In this way, the SAC test mimics the operations of a perfectly contestable market *even though* railroading as an activity is hardly contestable because a huge share of the overall costs of each railroad is not only fixed but also sunk.

As the name implies, and as initially conceived, the *stand-alone* cost test was designed to compare the costs incurred to build and operate a *stand-alone railroad* serving the needs of an individual shipper (or a group of shippers) with the revenues generated by that shipper (or a group of shippers) at the existing rate levels charged by the defendant railroad. The adoption of CMP, and in particular the application of the SAC test, obviated the need to examine whether the railroad's existing rates were consistent with the Ramsey pricing principles. The ICC considered this a significant regulatory advantage because calculating Ramsey prices requires information on demand elasticities that may not be readily available. *Coal Rate Guidelines*, 1 I.C.C.2d at 527.

In light of the economies of scope and density discussed above, the ICC determined that complaining shippers should be permitted to design a SARR that could handle both the traffic of the complaining shipper (the "issue" traffic) and other "non-issue" traffic that shared facilities with the issue traffic. *Id.* at 544. The ICC's decision to allow a shipper to group issue and non-

issue traffic that was to be carried end-to-end was fully consistent with the basic precepts of constrained market pricing and with the twin goals of ensuring railroad viability and extending protection to captive shippers.

However, the inclusion of cross-over traffic as a component of the stand-alone railroad has undermined the proper SAC construct – and its public policy rationale. As shown below, inclusion of cross-over traffic revenues in the base of revenues attributed to the SARR distorts the applicability of the SAC test as a test for cross-subsidy. By permitting cross-over traffic to be included in a SAC analysis, the Board has enabled the complaining shipper to use strategic revenue shifting and to game the regulatory process by constructing a hypothetical railroad that is neither stand-alone nor required to contribute to the recovery of the long-run costs of the residual incumbent who must defray all of its remaining costs, including the costs of facilities without which cross-over traffic would not be possible.

The inclusion of cross-over traffic in the SAC analysis necessitates arbitrary allocations of net revenues from such traffic. This, in turn, creates a real danger that the SAC test is rendered meaningless and that regulatory policy will be set back to the pre-Staggers Act era in which rates were evaluated using arbitrary cost allocation standards. Indeed, once the revenues from cross-over traffic are incorporated in the SAC test, the finding that the issue rate is excessive does not imply at all that the issue traffic is cross-subsidizing other traffic. As vividly demonstrated by Otter Tail's strategy in this proceeding, the inclusion of cross-over traffic in the SAC test can lead to unwarranted claims for rate reductions on the issue traffic despite the fact that the properly constructed SARR would not fail the SAC test.

(2) The Economic Dangers Of Permitting Cross Over Traffic In A SAC Test

There is no economically defensible way to "attribute" un-allocable joint and common costs to different traffic groups or different shippers. By definition, these costs are not caused by any particular shipment and thus cost-causality cannot be depended upon to guide cost recovery from any given shipment. Instead, economic efficiency requires that differential pricing (*i.e.*, Ramsey pricing principles) be used to recover these costs from the totality of the traffic that uses the pertinent facilities and, in the aggregate, causes these costs to be incurred. This is the basic principle of cost-causality which states that those who cause costs to be incurred should be responsible for their recovery. SAC recognizes and builds on this principle of cost-causality because it tests whether revenues from a group of traffic exceed (or fall short) of all the costs *caused* by that group of traffic. In line with the cost-causality principle, the SAC test compares the total revenues generated by the traffic group with the full economic costs of *all* the facilities needed to serve the movements in the traffic group.

Introduction of cross-over traffic vitiates this approach. It splits what should be a stand-alone railroad into interline segments, strategically chosen by the complaining shipper, some of which are included in the SARR and some that are not built and thus remain with the residual incumbent.[10] As a result, while after this strategic split the quantum of costs remains unchanged (besides the putative reduction in costs because the SARR is allegedly designed to be more

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[10] This artificial severing caused by the use of cross-over traffic must be distinguished from the real world interlining of traffic between railroads. Interlining is a result of arm's length transactions between willing railroads, neither of which in the ordinary situation could provide the through service on its own; whereas, as noted, the dismemberment of the incumbent is a strategic move designed to ensure that the shipper's rate is found to be excessive.

efficient), the responsibility for the recovery of the efficiently incurred costs is now divided between two entities – the SARR and the residual incumbent. This severing of the joint responsibility for cost recovery and the consequent arbitrary allocation of revenues is inconsistent with the economic rationale for the SAC test and creates the incentives for strategic revenue shifting, the objective of which is to ensure that the challenged rate is deemed to be excessive.

The hypothetical SARR carries the cross-over traffic only for a portion of the end-to-end movement that currently occurs over the defendant railroad(s). That traffic is originated, terminated (or both) on the off-SARR portions of the track owned and controlled by the defendant railroad (the residual incumbent) whose rates are being subjected to regulatory scrutiny. It is apparent from the definition of cross-over traffic that the hypothetical stand-alone railroad that incorporates cross-over traffic does not stand-alone after all; it is a SARR only in name but not as an economic entity. Cross-over traffic moves on the SARR for only a portion of its journey, not from end-to-end. The SARR remains "attached" to the residual incumbent by means of the cross-over traffic that they jointly carry, potentially siphoning revenue from the residual incumbent without removing any of the non-attributable costs of that traffic. But for the presence of the residual incumbent, the so-called "stand-alone" railroad would not, in fact, be able to carry the cross-over traffic, since it chooses not to build all the facilities needed to serve that traffic. The SARR is thus critically dependent on the residual incumbent to carry traffic from and to it, but since it does not build the lines that carry that traffic end-to-end, the SARR does not incur all the costs required to generate those revenues. Nevertheless, through the allocation rule, it claims a portion of revenues that, before the split, helped to defray (a portion) of these costs.

The inclusion of cross-over traffic puts the two railroads – the SARR and the residual incumbent – in a "vertical relationship" in which the profitability of the SARR is directly (*i.e.*, proportionately) linked to how *unprofitable* the complaining shipper can make the residual incumbent by means of strategic revenue shifting. When cross-over traffic is permitted, the complaining shipper no longer has the incentive to design the most efficient stand-alone railroad. Instead it has the incentive to siphon off as much revenue as possible from the residual incumbent while shedding responsibility for contributing adequately to the recovery of all the costs that must be incurred over a long run in order to generate the claimed cross-over traffic revenues.

Reliance on cross-over traffic invites distortion into the SAC analysis because it precludes the comparison of total through revenues and end-to-end costs that are at the heart of the SAC test. The unattributable off-line costs that must be incurred to enable cross-over traffic, as well as other traffic that may move on these off-line portions of the residual incumbent, cannot be ascertained *unless* the off-line facilities are actually "built" as a part of the SARR. Thus, there is no way of identifying and eliminating the potential distortion created by use of cross-over traffic short of requiring the proponent of a stand-alone system to conduct the test properly by building all the facilities needed to carry its non-issue traffic end-to-end.[11]

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[11] Any time a facility is built out, it may have an additional "layer" of cross-over traffic associated with it. The first layer of cross-over traffic is the traffic that shares facilities with the issue traffic. The next level of cross-over traffic, layer 2 cross-over traffic, does not share such facilities. Hence, the complaining shipper may argue that it has no incentive to build out the initial layer of facilities to handle cross-over traffic unless it receives a share of layer 2 net revenues. The issue raised by the ever-expanding SARR network is how the proponent of a SARR can benefit from the existence of layer 2 cross-over traffic without building still more facilities. The concern this issue raises must not be exaggerated, however. The problem that

(Continued ...)

The Board should have no illusions regarding the incentives that complaining shippers have to exploit cross-over traffic in the manner described above. It should also be clear to the Board that the potentially distorting effect of cross-over traffic increases in magnitude as the proportion of cross-over traffic in the overall traffic group carried by the putative stand-alone railroad increases, as in Otter Tail's case. The Board could limit the incentives and ability of the complaining shipper to rely on cross-over traffic to lower its rate(s) by limiting the amount of cross-over traffic that it permitted to be included in a SAC model. Similarly, the Board could require that the complaining shipper who wished to include some cross-over traffic in the SAC test actually build as part of the SARR those "off-line" facilities that are effectively dedicated to the claimed cross-over traffic. Plainly, if the non-included off-line facilities are totally dedicated to cross-over traffic, the cross-over traffic should have to pay for them. The Board can further constrain these incentives and the concomitant misallocations by insisting that the shipper justify why it prefers not to build out all the requisite facilities for the carriage of claimed traffic.

(a) Distorting Effects Of Cross-Over Traffic Revenues On The Results Of The SAC Test: A Simple Example

This sub-section sets forth a simplified example which illustrates how use of cross-over traffic can lead to a finding that the issue rate is excessive, where, in fact such a finding is economically irrational and would undermine the viability of the residual incumbent. Assume that the Board is assessing the reasonableness of a rate charged for traffic moving between origin O and destination D through point A. The fixed costs for that movement, standing alone, are

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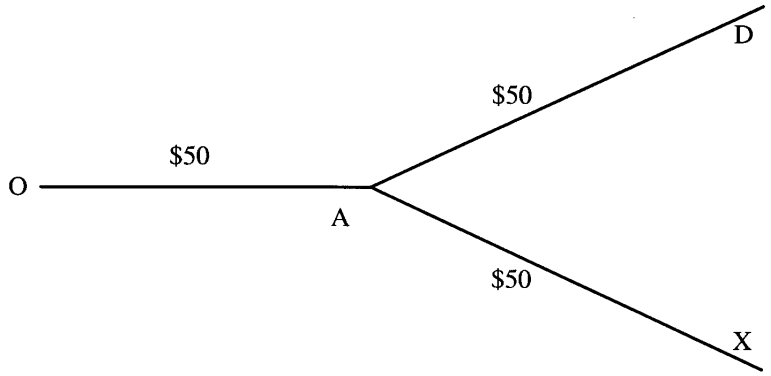
exists now is that recent SARRs do not even approach "stand-alone" status and therefore the results of SAC analyses do not even approach the results that would be realized under a true stand-alone analysis.

$100 with $50 in costs for segment OA and $50 in costs for segment AD (operating costs are ignored for purposes of this example). Assume that the rates charged by the defendant for the issue traffic generate $90 of revenue. Therefore, when the issue traffic is analyzed on its own, without any grouping of other traffic, the costs of providing the issue traffic service ($100) exceed the issue traffic revenues ($90) by $10 ($100-$90).

Figure III.A-1

Hypothetical Railroad System



Now assume that the defendant railroad also moves traffic for a different shipper between origin O and destination X through point A. Assume the line segment OA has sufficient capacity to handle traffic for *both* shippers without additional investment. The additional cost of line segment AX is $50. Also assume that the second shipper has a more elastic demand for the rail service than the complainant. This limits the revenues the incumbent can charge for this movement to $60 rather than the $90 which the complainant pays on the issue traffic movement. The total cost for this traffic group is now $150 ($50 + $50 + $50) and the total revenues are $150 ($90 + $60). In other words, the revenues from the traffic group exactly match the costs of providing service. Recall that the issue traffic standing alone could not cover its full SAC. The

grouped traffic can cover the SAC because of the economies of scope that exist in handling both the issue and the non-issue traffic over the line segment OA. This simple example illustrates how shippers presenting SAC evidence can potentially benefit from grouping end-to-end non-issue traffic with issue traffic and realize cost savings from economies of scope. In the example, there is no finding of an excessive rate, however, since the pertinent revenues exactly match pertinent costs.

To this point, the example does not include cross-over traffic. In fact, it illustrates a circumstance in which the shipper can readily present evidence on the stand-alone costs of the entire system, as the complaining shippers in fact successfully did in the *WTU* and *APS* cases. Presenting the stand-alone costs of the complete SARR system required to provide the stand-alone traffic with the same service as the incumbent does today is the only accurate way to ensure that the full economic costs of all of the lines are covered on a stand-alone basis, and to ensure that there is no payment by the stand-alone traffic for facilities it does not use and from which it derives no benefit.

Now, assume that the complainant does not want to build the AX segment but, nevertheless, wants to claim some revenues for carrying traffic on the OA portion of the OAX movement. The complaining shipper thus chooses not to present evidence on the costs of segment AX. It therefore posits a stand-alone railroad that runs only between OA and AD. The OX traffic becomes "cross-over" traffic, *i.e.*, it moves over segment OA but interchanges with the residual incumbent at the fictional interchange point A. The costs of this reduced railroad are only $100 ($50 + $50). The issue traffic contributes $90 of revenue, as noted above. What then is the revenue contribution from the non-issue traffic for the OA portion of its OAX end-to-end movement? The simple, and the only correct answer, is that this question cannot be answered at

all![12] The $60 worth of net revenue from the OAX traffic, *i.e.*, revenue in excess of variable cost, cannot be attributed to either segment, be it OA or AX. As explained earlier, the movement requires that both segments be in place and thus the costs of both segments need to be covered from *all* sources of revenues in order to make the SARR and the residual incumbent sustainable over the long run where all costs are variable.

If the movement from O to A is the same distance as the movement from A to X, the MMP approach used by Otter Tail in this proceeding to allocate revenues on certain cross-over movements would generate equal division of revenue from the cross-over traffic to each carrier, or $30 contributed to the SARR and $30 to the residual incumbent. (Recall that in this example the incumbent receives $60 of revenue for the through OAX movement.) While having the air of objectivity and even-handedness, it is clear that this approach actually biases the SAC test in favor of the complaining shipper. The theoretical rationale behind this conclusion is that if the complaining shipper believed that it could maximize the excess of total contribution (*i.e.*, maximize the difference between total revenues and total SARR costs) by building out the railroad to include the "off-line" segment, it would have done so! Hence, the mere fact that the complaining shipper prefers to include in its base of revenues the pro-rate *while incurring no additional costs* is evidence that this strategy is intended to yield a higher alleged overcharge on the issue traffic movement than the alternative of building out the full end-to-end railroad.

As was demonstrated above, when the SAC analysis is done correctly and the full costs and revenues are considered, the revenues from the two movements ($90 + $60) just equal the

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[12] Another, equally unhelpful answer is that the number is either $0 or $60, or any number in-between.

full economic costs of providing service to the two shippers ($50 + $50 + $50). In other words, the incumbent's costs are fully covered and the rates charged for the issue traffic do not exceed a reasonable maximum. But in the cross-over example, if the modified mileage prorate is used to calculate the contribution from cross-over traffic to the SARR that does not include the AX segment (the "reduced" SARR) then the stand-alone "revenues" of $120 ($90 + $30) substantially exceed the costs of $100 ($50 + $50). This strategic revenue shift lowers the AX residual incumbent's share of revenues below its full economic costs of serving the cross-over traffic.

In the cross-over example, therefore, the rate charged for the issue traffic is determined to be unreasonably high, while in the full SAC analysis the rate would be deemed reasonable. Importantly, this finding would result in a lower rate for the shipper whose demand has been deemed inelastic and a need to increase the rate for the shipper (the one moving on the OAX segment) whose demand has been deemed potentially more elastic. Such "rebalancing" of rates, assuming that the rate to the elastic shipper could even be raised, would harm economic efficiency and would be counter to the principles of Ramsey (differential) pricing. Of course, if the rate to the elastic shipper cannot be raised, because the shipper may not be willing to pay more than $60, the residual incumbent will become revenue inadequate and, over the long term, will have to withdraw service on the AX segment.

Note that in the example there is an allocation of revenue that would make the proponent of the SARR indifferent between performing the SAC test properly by building out the AX segment, on the one hand, and using the cross-over traffic assumption, on the other. This allocation would give only $10 to the O-A-D SARR and $50 to the AX residual incumbent, thereby ensuring that revenues on each of these two entities are just sufficient to cover costs (the

same result achieved by properly constructing the SARR to include both the OAD and AX segments).

However, as explained above, there is no formula or algorithm that, in the abstract, can calculate the ideal allocation in an individual cross-over traffic situation – the only way to determine the allocation that leads to the postulated indifference is to determine what it would cost to construct and operate the lines of the residual incumbent required to move the cross-over traffic to its end-points on the defendant railroad. No single allocation formula can determine that point unless the actual incremental costs of the off-line are calculated and presented. Because shippers have an incentive to use cross-over traffic only when the resulting net revenue contribution to the SARR is higher than it would be if the test were conducted properly, it is a reasonable presumption that any allocation "rule" advocated by shippers is likely to bias the SAC results in favor of the shipper, no matter how vociferously the shippers claim it is "fair" or "even-handed."

The foregoing example illustrates three critical problems arising from the use of cross-over traffic in a SAC analysis.

***First**, when cross-over traffic is introduced, the stand-alone railroad is no longer "stand-alone."* In the example, segments OA, AD, and AX taken together comprise a stand-alone system. They constitute all the facilities needed to handle all the traffic that the shipper has selected. When cross-over traffic is introduced, the new, putative stand-alone comprises segments OA and AD; these are now severed from segment AX. Nevertheless, the new stand-alone is inextricably linked to the residual incumbent serving the AX movement, because the traffic that moves over from AX is the source of revenue that affects the outcome of the SAC analysis. If the AX segment ceased to exist, the OAX traffic would not move, and the only

revenue available to cover the $100 of costs on the OAD segments would be the $90 in revenue generated by the OAD issue traffic. The complaining shipper cannot have it both ways; if it is entitled to assume that cross-over traffic revenues will be available to defray a portion of the costs of the OAD segment, it must also demonstrate that the AX segment will be viable over the long run. Otter Tail has made no such showing in this proceeding with respect to the lines of the residual BNSF upon which the movement of cross-over traffic relies.[13]

Second, *the use of cross-over traffic is a vehicle for strategic cross subsidy.* Of the $30 in revenues from the movement OAX that is allocated under the modified mileage prorate to the stand-alone, $20 is actually needed to cover the costs of segment AX. If cross-over traffic is permitted, this $20 becomes a strategic subsidy from the residual incumbent to the SARR.

Third, *the potential for distortion in the use of cross-over traffic increases as the share of cross-over traffic in the stand-alone traffic group increases.* In the example, the cross-over movement yields contribution to the SARR in excess of costs, and the more such cross-over movements are added to the SARR, the greater the potential magnitude of the alleged overcharge on the issue traffic movement.

b. Exclusion Of Coal Traffic

Otter Tail has improperly included several coal movements in its stand-alone traffic group. These issues are described below.

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[13] Otter Tail purports to show that off-line attributable costs are covered. The flaws in that analysis are addressed below in section III.A.4.b.

(1) Traffic Grouping Principles --Exclusion Of Coal Traffic From Southern PRB Mines Moving South Through Converse

The Otter Tail issue traffic movements originate from northern PRB mines. Most of it originates at the Eagle Butte and Belle Ayr mines, although a small amount also originates at the Caballo Rojo and Cordero mines.[14] The issue traffic exits the PRB via the northern route through Campbell, Wyoming, then travels northwest to Moran Junction, Montana, northeast to Glendive, Montana, east to Fargo, North Dakota, south to Benson, Minnesota and then west to the Big Stone plant.[15] Otter Tail improperly includes in its traffic group significant volumes of coal traffic that originate at southern PRB mines and never move over any segment of track that constitutes the issue traffic route of movement.[16] Specifically, OTRR transports enormous volumes of coal that originate at the southern PRB mines from Cordero to Antelope,[17] travel south from the mine and exit the OTRR at Converse Yard. For example, in base year 2002, Otter Tail includes 54 million tons of coal originating at these southern PRB mine that then move south from the mine to exit the OTRR at Converse Yard.[18] This coal traffic, which moves south

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[14] *See* OTP Opening Exh. III-A-3, at 1; BNSF electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2003 Coal O-D Pair," rows 37-41.

[15] OTP Opening Exhibit III-A-1 is a map showing the route of the issue traffic.

[16] A diagram showing the route traveled by the issue traffic and the route traveled by this southern PRB coal mine traffic exiting the OTRR at Converse appears at BNSF Reply Exh. III.A-1.

[17] These southern PRB mines are: Cordero, Jacobs Ranch, Black Thunder, North Rochelle, Rochelle/North Antelope and Antelope. They are shown on OTP Opening Exh. III-A-1 at 2.

[18] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2003 Coal O-D Pair."

of the Cordero mine, does not share any facilities with the issue traffic, which moves north of the Cordero mine.[19]

Inclusion of this traffic in the OTRR rail network is inconsistent with the traffic grouping principles established in the Board's Constrained Market Pricing Guidelines and Board decisions addressing those grouping principles. The SAC test is designed to answer the question whether the issue traffic movement and other movements grouped with the issue traffic are cross-subsidizing other shippers by paying more than the full cost of the facilities needed to serve the chosen traffic group. As the Board recently stated, the "*Guidelines* do not envision that a captive shipper may shift responsibility for paying for facilities it uses to other shippers who do not benefit from those facilities."[20]

The economic test for assessing traffic grouping is whether the non-issue traffic should share the cost of issue traffic facilities. The answer to that question turns on the shared use of the issue traffic facilities. As the Board recently explained, "[a] shipper should not seek to have its rate reduced by shifting any part of the costs of the lines or facilities that it needs onto traffic that does not use those lines or facilities."[21]

These statements of SAC principle clearly apply here. The facilities that the Otter Tail issue traffic needs and uses are those from the northbound lead of the Cordero mine, moving north to Donkey Creek, Wyoming then northwest to Moran Junction, Montana, northeast to

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[19] Southbound coal originating at Cordero does not share facilities with northbound coal originating at the mine. Specifically, northbound Cordero coal uses the northbound lead to exit the mine whereas the southbound Cordero coal uses the southbound lead to exit the mine. *See* diagram of Cordero Mine at BNSF Reply Exh. III.A-3.

[20] *PPL II*, at 6.

[21] *PPL II*, at 7.

Glendive, Montana, east to Fargo, North Dakota, south to Benson, Minnesota and then west to the Big Stone plant. *See* OTP Nar at III-A-1.[22] The Otter Tail issue traffic never uses the facilities from the southbound lead of the Cordero mine to Converse Yard. The facilities that Otter Tail builds from the Cordero mine south do not handle the issue traffic or any traffic that is local to the SARR. Consequently, under the Board's governing SAC principles, the coal traffic originating at southern PRB mines from Cordero to Antelope that moves south on the OTRR to Converse should be excluded from Otter Tail's traffic group.

Otter Tail's inclusion of this southbound coal traffic is nothing but an attempt by Otter Tail to inflate SARR revenues, as Otter Tail claims a grossly disproportionate share of the revenues associated with this traffic for its stand-alone railroad. This outcome is readily apparent from a review of Otter Tail's Opening Exhibit III-A-3. That exhibit shows information about the individual traffic movements selected by Otter Tail, including SAC miles as a percent of total miles for each current BNSF coal movement and SAC revenues as a percent of total BNSF revenues for each coal movement.[23] A review of the coal traffic exiting the SARR at Converse (75 percent of which BNSF excludes on the ground that it shares no facilities with the issue traffic),[24] shows that Otter Tail's stand-alone railroad, on average, has only 4 percent of the

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[22] A map showing the route of the issue traffic appears at OTP Opening Exhibit III-A-1.

[23] *See* OTP Opening Exh. III-A-3, columns 18 and 22.

[24] The coal traffic selected by Otter Tail that moves off the SARR at Converse appears at pages 1 to 4 of OTP Opening Exh. III-A-3. Seventy-five percent of the coal traffic exiting the SARR at Converse in 2002 originates at southern PRB mines from Cordero to Antelope. This percentage is calculated by dividing the 53.7 million tons of coal originating at southern PRB mines and exiting the SARR at Converse by the 71.5 million total tons of coal exiting at Converse in 2002. The sources for the 53.7 million ton and 71.5 million ton figures are BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at

(Continued ...)

total miles for the movements but claims 28 percent of the total BNSF revenues for those movements.[25]

As a result of the exclusion of coal originating at southern PRB mines from Cordero to Antelope and exiting the SARR at Converse, BNSF has reduced Otter Tail's stand-alone traffic by the following amounts annually:

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worksheet "DetailSummary" and OTP Opening Exh. III-A-3 at 4, row "Subtotal Off at Converse," column 11, respectively.

[25] *See* OTP Opening Exh. III-A-3, at 4, row "Subtotal Off at Converse," columns 18 and 22.

Table III.A-1
Southern PRB Mine Coal Traffic
Excluded By BNSF From OTRR Network

Year	Southern PRB Mine Coal Traffic Removed from OTRR Network (tons)[26]
2002	54,028,180
2003	54,627,068
2004	55,088,368
2005	55,484,978
2006	56,309,335
2007	57,109,640
2008	57,718,534
2009	58,274,928
2010	59,151,618
2011	59,190,218
2012	59,176,953
2013	59,254,015
2014	59,337,033
2015	59,413,770
2016	59,527,438
2017	59,671,187
2018	59,755,319
2019	59,815,052
2020	59,851,773
2021	59,861,234

(2) Exclusion of Traffic for consistency With Otter Tail's Traffic Selection Criteria

Otter Tail selected the traffic for its stand-alone network according to certain criteria. One of the coal traffic selection criteria adopted by Otter Tail was a mileage floor. Specifically,

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[26] The detailed list of the tonnages, by individual movement and southern PRB mine, excluded by BNSF from the SARR appears in BNSF Reply Exhibit III.A-4. There is an additional reason to exclude the approximately { } tons of coal moving annually to Omaha Public Power District's North Omaha and Arbor plants. As of 2004, BNSF will no longer transport coal to these competitively-served plants. *See* BNSF.RP.WP.III.A-0150 to III.A-0153.

Otter Tail said it would exclude a coal movement that in the real world was more than 200 miles long if the SARR would transport the coal for less than 1.1 percent of the real world BNSF movement.[27] As Otter Tail explained, "Otter Tail set the mileage movement floor at 1.1 percent for this group. Stated differently, a movement was included only if each railroad handled the traffic at least 1.1 percent of the total movement miles."[28] At another point in its narrative, Otter Tail appears to assert that it applies this criterion only to coal originating at southern PRB mines. *See* OTP Nar. at III-A.5, item 3.

Otter Tail's failure to apply this traffic selection criterion consistently to all PRB mine locations is illogical and results in overstated volumes. Otter Tail's flawed mileage calculation

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[27] Otter Tail's explanation for eliminating coal movements where the OTRR handles the move for less than 1.1 percent of the end-to-end mileage is set forth in footnote 24 on page III-A-19 of Otter Tail's Opening Narrative. While this footnote provides information sufficient to understand how the value of 1.1 percent for the "mileage floor" was derived, the rationale for adopting the mileage floor is unclear. Conceivably Otter Tail may be attempting to eliminate movements that fall outside the relevant range of the data points used by Otter Tail in its regression analysis to predict divisions of revenue on cross-over traffic movements. As discussed in section III.A.3.c below, Otter Tail's regression for the stratum of coal movements on which BNSF's portion of the haul is under 200 miles does present a very serious "relevant range" problem. If that is Otter Tail's objective, its use of a 1.1 percent mileage cutoff is much too low to solve the problem. As shown in section III.A.3.c, the shortest percentage of haul for any BNSF movement used by Otter Tail to develop its under 200 mile regression stratum is 10.69 percent. Thus, Otter Tail could have solved the "relevant range" problem only by eliminating from the OTRR traffic group all movements for which the OTRR handles the movement for less than 10.69 percent of the end-to-end mileage. Had it done so, Otter Tail would have eliminated the vast majority of the PRB coal movements it includes as part of the OTRR stand-alone traffic group. *See* OTP Opening Exh. III-A-3. (It is also worth noting that the regression for the under 200 mile stratum is constructed based on the real world BNSF percentage length of haul. The 1.1 percent cutoff adopted by Otter Tail is based on the shortest length of haul in the divisions data of a connecting carrier, not BNSF's shortest length of haul.)

In any event, as explained above, since Otter Tail adopted a 1.1 percent mileage threshold, it should, at a minimum, have applied the threshold consistently to all coal movements.

[28] *See* OTP Nar. at III-A-19, n.24.

also results in overstated volumes. As explained below, BNSF corrected these flaws in the application of the 1.1 percent mileage threshold.

Otter Tail's error of inconsistency results from applying its 1.1 percent mileage floor only to coal originating at southern PRB mines. *See* OTP Nar. at III-A-5, item 3. Numerous moves, summarized in Table III.A-2, below, that originate in the northern PRB region areas (namely Eagle Butte and Buckskin mines) and exit the OTRR at Donkey Creek, also fail to meet Otter Tail's 1.1 percent mileage threshold even under Otter Tail's own mileage calculations.[29] Nonetheless, Otter Tail erroneously includes these movements in the SARR.[30]

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[29] As shown in BNSF Table III.A-2, Otter Tail calculates the SARR's percentage of the movement's mileage in both its workpapers and an exhibit. As the table shows, Otter Tail's percentages differ somewhat in these two sources.

[30] *See* OTP Opening electronic workpapers "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 SAC Moves" and "Exhibit III-A-3.xls" at worksheet "sheet1."

Table III.A-2
2002 Traffic that the OTRR Carried For Less Than 1.1 percent of the Haul (According to Both of Otter Tail's Mileage Sources)[31]

Origin	Destination	Tons	Percentage of Total Haul Miles: OTP Workpapers Train Miles[32]	Percentage of Total Haul Miles: OTP Exhibit Train Miles[33]	Percentage of Total Haul Miles: BNSF Corrected Ton Miles
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }

In addition, Otter Tail's mileage calculation is flawed because it relies on a train mile calculation rather than a more realistic ton mile calculation. Otter Tail uses waybills as the source for its mileages.[34] Otter Tail's train mile calculation equally weights the miles for trains moving on the standard route of movement and the miles associated with any outlier car data

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[31] *See* OTP Opening electronic workpaper "BNSF Coal Traffic Analysis.doc" for Otter Tail's documentation on its traffic methodology. *See* BNSF Reply electronic workpaper "Summary of Coal Move Miles.xls" for a sample of waybills that BNSF extracted from Otter Tail's underlying workpapers and used to replicate Otter Tail's mileage calculation for coal moves originating at Buckskin Junction and terminating at {

}.

[32] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 SAC Moves."

[33] *See* OTP Opening electronic workpaper "Exhibit III-A-3.xls" at worksheet "sheet1."

[34] *See* BNSF Reply electronic workpaper "Detailed Calculation of OTP's Mileage Calc.xls."

taking an atypical route.[35] Outlier data are typically associated with mechanical failures or bad orders that force a few cars on the train to be rerouted. These outlier moves are identifiable because they consist of only one or two cars that travel on multiple trains as reported on the traffic tapes. Otter Tail calculated the total miles for these bad-order cars as the summation of the miles that the cars were carried by the first two trains on which they traveled (apparently to recognize the fact that mechanical failures/bad order cars might require multiple trains to complete the movement.)[36] However, these bad-car movements sometimes require three or more trains to carry them to the final destination.[37] In these instances, Otter Tail has artificially understated the total movement miles for the bad-order cars by excluding the miles traversed on the 3rd and 4th (or more) trains.[38]

Since the outlier data typically involve only a few cars, weighting these atypical data points the same as an entire unit train of one hundred cars or more distorts the calculated mileage for the movement, making it appear that the stand-alone railroad's percentage of the haul is

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[35] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 SAC Moves."

[36] *See* OTP Opening electronic workpaper "coal02od.qpr."

[37] For example, the outlier data associated with { } often requires four trains to deliver the small car movements to the final destination. Therefore, Otter Tail's reliance on the mileages associated with only the first two trains understates the total miles of the haul. *See* BNSF Reply electronic workpaper "Summary of Coal Move Miles.xls" at worksheet SMBUCNSLT.

[38] *See* BNSF Reply electronic workpaper "Summary of Coal Move Miles.xls." for a sample of waybills that BNSF extracted from Otter Tail's underlying workpapers and summarized to replicate Otter Tail's mileage calculation. The waybills separately report the mileage for the cars on the train that completes the movement to the plant. *See, e.g.,* BNSF Reply electronic workpaper "Summary of Coal Move Miles.xls." at worksheet "NSTLOUI7" where one row of the record for train C BKMSLC4 13A shows the train carried 14,332 tons for 1,195 miles (row 565) and a second record (row 566) reflects the fact that this train carried one additional car for 594 miles and a second train (HDENGAL104A) carried the car for 373 miles.

larger than it actually is and increasing the likelihood that the SARR will reach its 1.1 percent mileage floor.

The following example, based on a subset of four waybills for { }, illustrates Otter Tail's flawed mileage calculation. Three of the waybills show mileages of 967 and reflect Otter Tail's mileage summary for the first two trains associated with the outlier data of some bad order cars removed from the train before it reached the plant.[39] The fourth waybill shows mileage of 1,195 and approximately reflects the movement of a train to the plant.[40] By relying on a simple average train mile calculation, Otter Tail would have calculated mileage for the { } move at 1,024 miles because its calculation equally weights every data point (*i.e.*, 967, 967, 967 and 1,195) regardless of the volumes of traffic associated with each data point. *See* Table III.A-3 below. In this example, Otter Tail would have ignored the fact that the longer haul movement to the plant accounted for 96.5 percent of the total volumes. *Id.* While 1,195 miles is the most accurate estimate of the length of haul for this movement using the waybills, at a minimum, Otter Tail should have relied on a weighted average mile calculation rather than the single average it uses. This calculation would have minimized the impact of Otter Tail's mileage calculation error for the unrepresentative traffic moves. The mileage calculations for this example are shown in Table III.A-3, below.

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[39] *See* BNSF Reply electronic workpaper "Detailed Calculation of OTP's Mileage Calc.xls."

[40] *See* BNSF Reply electronic workpaper "Detailed Calculation of OTP's Mileage Calc.xls" at worksheet "NSTLOU17," rows 2-4 and 14.

Table III.A-3
Otter Tail's Mileage Calculation for { }[41]

BNSF Destination		Move Miles	Tons	Percent of Total
{ }		967	121	0.8%
{ }		967	121	0.8%
{ }		967	242	1.7%
{ }		1,195	14,069	96.5%
Total			14,530	
Simple Average		1,024		
Weighted Average		1,187		
Percentage Difference		-13.76%		

BNSF has revised the mileage calculations for coal movements to (1) use the cycle mile field in the traffic tapes produced by BNSF (which appropriately includes the mileage associated with the entire movement) and (2) develop total route miles that are weighted by the tonnages associated with each waybill.[42] By correcting the mileage calculation, BNSF demonstrates that other coal movements, such as the { }, fall below Otter Tail's 1.1 percent mileage floor and, thus, should be excluded from the traffic network. *See* Table III.A-4,below.

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[41] *See* BNSF Reply electronic workpaper "Summary of Coal Move Miles.xls."

[42] BNSF's corrected calculation of the mileage associated with the coal movements selected by Otter Tail appears at BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002 SAC Moves."

Table III.A-4
2002 Traffic That The OTRR Carried For Less Than 1.1 percent Of The Haul
(Correcting Otter Tail's Erroneous Train Mile Calculations)[43]

			Percentage of Total Haul Miles		
Origin	Destination	Tons	OTP Workpapers Train Miles[44]	OTP Exhibit Train Miles[45]	BNSF Corrected Ton Miles
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }	{ }	{ }
{ }		{ }			

By excluding PRB coal traffic that does not meet Otter Tail's 1.1 percent mileage floor, BNSF has reduced Otter Tail's stand-alone traffic by the following amounts annually:

[43] *See* BNSF Reply electronic workpaper "Summary of Coal Move Miles.xls." As this table shows, most movements met the 1.1 percent mileage threshold under at least one of Otter Tail's incorrect mileage calculations.

[44] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 SAC Moves."

[45] *See* OTP Opening electronic workpaper "Exhibit III-A-3.xls" at worksheet "sheet1."

Table III.A-5
Exclusion of Coal Traffic Failing to Meet
Otter Tail's 1.1 Percent Mileage Floor[46]

Year	Coal Traffic Failing to Meet 1.1 Percent Mileage Floor Removed from OTRR Network (tons)
2002	14,337,862
2003	12,629,000
2004	12,708,891
2005	12,793,601
2006	13,015,927
2007	13,337,803
2008	13,598,815
2009	13,765,866
2010	14,002,632
2011	14,148,239
2012	14,251,433
2013	14,323,353
2014	14,399,528
2015	14,469,941
2016	14,561,887
2017	14,632,422
2018	14,675,321
2019-2021	14,729,377

(3) Exclusion Of Riverside And Highbridge Volumes In 2005 And Beyond

Otter Tail includes in its OTRR rail network coal movements to Xcel's Riverside and Highbridge plants.[47] Otter Tail assumes that coal will continue to be delivered to the Riverside

[46] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Mile Summary."

[47] Otter Tail combined the traffic destined to Xcel's Riverside and Highbridge plants into one record reported for Highbridge. *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage," row 91 and 92.

and Highbridge plants from 2002 through 2021, the last year of the DCF period.[48] However, public documents, including those submitted by Xcel to the Minnesota Public Utility Commission, demonstrate that Xcel plans to convert these plants from coal to gas with construction to begin in mid-2006.[49]

Given Xcel's plans to retrofit these plants, it is improper for Otter Tail to assume that coal volumes will continue to be transported to them in 2005 and subsequent years. BNSF has modified the stand-alone traffic to limit the annual tonnage level to Riverside and Highbridge to { } tons for 2005-2006 (as required by Xcel's transportation contract with BNSF)[50] and to exclude Riverside and Highbridge volumes from 2007 through 2021. As a result of this modification, BNSF has reduced Otter Tail's stand-alone traffic by the following amounts annually:

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[48] *See* OTP Opening Exh. III-A-5, rows 82, 84.

[49] *See* BNSF.RP.WP.III.A-0089 to 0126. Xcel's preferred long-range production plan submitted to the Minnesota Public Utility Commission assumes that Highbridge and Riverside will be converted to gas-fired units. Full regulatory approval for this plan is expected later this year.

[50] The relevant provision of the Riverside/Highbridge contract is included in BNSF's workpapers at BNSF.RP.WP.III.A-0088.

Table III.A-6
Riverside/Highbridge Traffic Excluded
By BNSF From OTRR Network

Year	Riverside/Highbridge Traffic Removed from OTRR Network (tons)[51]
2005	{ }
2006	{ }
2007	{ }
2008	{ }
2009	{ }
2010	{ }
2011	{ }
2012	{ }
2013	{ }
2014	{ }
2015	{ }
2016	{ }
2017	{ }
2018	{ }
2019	{ }
2020	{ }
2021	{ }

(4) Exclusion of Superior Dock Coal Traffic Based on Calculation Errors

Otter Tail has incorrectly calculated BNSF coal tonnages moving to the Superior Dock in Wisconsin. A significant amount of the coal traffic originated by the SARR ultimately moves to the Superior Dock in Wisconsin on BNSF. The SARR is hypothesized to move almost { } million tons destined for the Superior Dock in 2002 and that volume rises to { } million tons by 2021, the last year of the DCF period.[52] Otter Tail makes two errors in its Superior Dock

[51] For 2007 through 2021, BNSF simply subtracts out the volumes of coal that Otter Tail attributes to the Riverside/Highbridge movements. *See* OTP Opening Exh. III-A-5, rows 82 and 84.

[52] *See* OTP Opening electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "Multi-Move Analysis."

tonnage calculations. First, the Superior Dock tonnages assumed by Otter Tail improperly exceed BNSF's share of the Dock's capacity even under Otter Tail's own calculations of that capacity. Second, Otter Tail's calculation of BNSF's share of the Superior Dock's capacity is flawed. Each of these errors is explained below.

As an initial matter, Otter Tail assumes that the maximum total capacity of the Superior Dock is 25.5 million tons per year.[53] However, since BNSF is not the only railroad to deliver tons to Superior Dock (UP also does so), Otter Tail calculates BNSF's share of the total Superior Dock capacity. Under Otter Tail's calculations, BNSF's share is 24.5 million tons per year.[54] Otter Tail assumes that the OTRR cannot participate in the transportation of more than BNSF's share of capacity, or 24.5 million tons annually, to Superior Dock.[55]

Otter Tail's first error in calculating Superior Dock tonnage is to assume that the tonnages moving to Superior Dock will exceed the 24.5 million ton BNSF capacity that Otter

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[53] *See* OTP Opening electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "Superior Analysis." This capacity figure, a substantial increase from the previous capacity of 18 million tons, is currently under consideration by the regulators. *See* In the Matter of the Air Pollution Control Construction Permit Issued to Midwest Energy Resources Company, Superior, Wisconsin, Case No. 1H-02-04 (Wisconsin Division of Hearings and Appeals, Aug. 4, 2003) at 4-5. This decision is attached hereto as BNSF.RP.WP.III.A-0129 to III.A-0147.

Since Midwest Energy is seeking regulatory approval of the higher 25.5 million ton capacity figure, BNSF does not challenge Otter Tail's use of that maximum total capacity figure here. This approach is consistent with BNSF's elimination of Xcel's Riverside/Highbridge volumes since Xcel is seeking regulatory approval to convert these plants from coal to gas fired plants.

[54] *See* OTP Opening electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "Superior Analysis."

[55] Otter Tail does not apply its 85 percent capacity constraint to Superior Dock tonnages. *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "Superior Analysis."

Tail calculated in some years. As a general matter, Otter Tail determines whether a movement has reached its maximum capacity by comparing the annual volume forecast for that movement to the maximum capacity for the power plant receiving the coal. Since several customers in OTRR's traffic network ultimately receive coal transloaded from the Superior Dock, Otter Tail compares the annual volume forecast for those customers to the 24.5 million ton BNSF maximum capacity calculated by Otter Tail. However, Otter Tail failed to consider one such customer – { } – in checking whether the Dock's capacity had been reached. As a result, as the following table demonstrates, Otter Tail continued to increase volumes to Superior Dock well after it reached the 24.5 million ton maximum BNSF capacity.

Table III.A-7
Superior Dock Coal Tonnages in 2021 by Customer[56]

Customer	Rail Destination	Plant	2021 Tons
{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }
{ }	{ }	{ }	{ }
{ }			{ }
{ } { } { }[57]			{ }
{ } { } { }			{ }

Second, Otter Tail has overstated volumes to the Superior Dock by miscalculating BNSF's share of the Superior Dock capacity. To make this calculation, Otter Tail improperly divides the tons that BNSF delivered to the dock by *rail* by the total tons *shipped* by vessel from Superior Dock.[58] Otter Tail's calculation mixes apples (tons delivered by *rail*) with oranges (tons *shipped by vessel*). The proper calculation would be to divide the tons that BNSF delivered to the dock by *rail* by the total tons that BNSF and UP delivered to the dock by *rail*. As the following table demonstrates, correcting this error reduces BNSF's share of the Superior Dock

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[56] *See* OTP Opening electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage."

[57] *See* BNSF Reply electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Superior Analysis."

[58] *See* OTP Opening electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "Superior Analysis, " row 41 titled "2001 Tons Shipped From SMET." Otter Tail's source for BNSF's delivered tons is the traffic tapes produced by BNSF and its source for the total tons shipped from the Superior dock is in Otter Tail's opening workpapers at 1745.

capacity from 96.3 percent to 94.8 percent of total dock capacity, or by 378,008 tons to 24.16 million tons.

Table III.A-8
BNSF's Share of the Superior Dock Capacity[59]

	Eqn.	2001	2002	Average
BNSF Tons Delivered to Superior[60]	a	15,955,650	17,761,016	
Tons Shipped by Vessel from Superior[61]	b	16,925,015	18,079,010	
OTP's Calculation of BNSF's Share of Superior Traffic	c = a / b	94.3%	98.2%	96.3%
Total Tons Delivered to Superior by UP and BNSF[62]	d	17,033,873	18,524,449	
BNSF's Calculation of BNSF's share of Superior Traffic	e = a / d	93.7%	95.9%	94.8%

Due to its correction of Superior Dock tonnages, BNSF has removed the following volumes from the SARR on an annual basis:

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[59] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Superior Analysis."

[60] Source is BNSF produced traffic tapes.

[61] Source is Otter Tail's opening workpaper at 1745. Other references indicate that the actual coal tons shipped by Midwest Energy from the Dock equaled 18.4 million tons in 2002. *See* http://www.midwestenergy.com/info/

[62] Source is Midwest Energy website, www.midwestenergy.com, included in BNSF's workpapers at BNSF.RP.WP.III-A-0148 to 0148A.

Table III.A-9
Superior Dock Coal Traffic
Excluded By BNSF From OTRR Network[63]

Year	Superior Dock Coal Traffic Removed from OTRR Network (tons)
2011	{ }
2012	{ }
2013-2021	{ }[64]

c. Exclusion Of Non-Coal Traffic

In addition to unit coal trains, Otter Tail included substantial volumes of grain, intermodal, manifest and auto trains in its traffic group. In 2002, this non-coal traffic accounts for just over 12 percent of the net tonnage transported by the OTRR, but generates nearly 23 percent of OTRR revenue. By the end of the 20-year DCF period, non-coal traffic falls to just under 11 percent of total traffic, and accounts for more than 16 percent of revenue.[65] Otter Tail declined to build BNSF's Minot line over which most of its included non-coal traffic actually moves, and instead elected to reroute this traffic over a line from Snowden, Montana, through

[63] The detailed workpaper showing BNSF's calculation of the Superior Dock tons excluded from the SARR appears at BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Superior Analysis."

[64] The { } million tons are derived by taking the total tons Otter Tail forecasted for the Superior Dock in 2021 ({ } million) minus the BNSF's corrected maximum capacity for BNSF's share of the dock (24.167 million tons).

[65] OTP Opening Exh. III-A-5, at 1, 5.

Glendive, Montana, and Fargo, North Dakota.[66] Otter Tail's proposed routing adds 101.1 miles, or approximately 26 percent, to the more efficient real-world routing via Minot.[67]

Otter Tail's non-coal traffic consists of through traffic "moving in overhead service." OTP Nar. at III-A-2. Otter Tail sought to exclude non-through traffic, *i.e.*, traffic that originates or terminates on the SARR. *Id.* at III-C-3, III-C-6. Otter Tail's stated intention was to include only "unit train and trainload shipments in overhead, run-through service." *Id.* at III-C-3. Despite a routing that is substantially longer than that used for the same traffic by the real-world BNSF, Otter Tail makes the unsupported assertion that "the OTRR will provide at least the same level of service for this non-coal traffic as BNSF at reduced cost." *Id.* at I-18. As demonstrated below, this claim is dubious with respect to the OTRR's non-coal traffic in general, and demonstrably untrue with respect to high-priority intermodal traffic.

As described in detail below, BNSF has made several adjustments to the non-coal traffic group specified by Otter Tail. First, because OTRR transit times are much longer than actual BNSF times for the same trains, the OTRR would not be able to provide service at the level required by Board precedent for rerouted "highest priority" intermodal traffic (referred to hereafter as "Z train" traffic). BNSF has therefore excluded this traffic. Second, BNSF excluded a small number of local grain trains, coal car blocks, and local carloads that do not meet Otter

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[66] A map showing the Minot Line over which this non-coal traffic moves in the real world and the OTRR line over which Otter Tail has rerouted this traffic appears as BNSF Reply Exhibit III.A-5.

[67] *See* OTP Nar. at III-C-6.

Tail's stated intention to include only overhead traffic.[68] The scope of these exclusions is summarized in Table III.A-10 below. For comparison purposes, in this table BNSF has used Otter Tail revenues as calculated by Otter Tail using the modified mileage pro-rate method rather than revenues calculated with an appropriate divisions methodology (discussed in Section III.A.3.c):

Table III.A-10
Summary of Excluded Non-Coal Traffic[69]

	Net Tons	Through Revenue (000s of $)	OTRR Revenue (000s of $)
OTP Opening	{ }	${ }	${ }
BNSF Exclusions	{ }	${ }	${ }
BNSF Reply	{ }	${ }	${ }
Percent Decrease	-16%	-25%	-24%

(1) Rerouted Z Train Traffic Must Be Excluded From Otter Tail's Traffic Group Because Otter Tail Cannot Provide The Same Or Superior Level Of Service For These Trains

Otter Tail's longer routing and proposed operating procedures result in cycle times for rerouted Z train traffic that are substantially longer than BNSF real-world times. The Board specified in *TMPA*, at 19, that a plaintiff is entitled to include rerouted cross-over traffic in its traffic group only if the SARR can satisfy the transportation needs of the shippers whose traffic was rerouted. Longer cycle times and increased transportation costs for shippers are key

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[68] BNSF also excluded from non-coal revenues and volumes { } coal cars moving between Nerco Junction, MT, and Walhalla, MN, that Otter Tail had double-counted by including them in both its coal and non-coal traffic numbers.

[69] Source: BNSF Reply electronic workpaper "non coal drop traffic.xls." As this workpaper shows, of the excluded revenues, 93.3 percent is attributable to exclusion of the Z trains.

indicators that the transportation needs of shippers are not being satisfied. *TMPA,* at 18 n.39, 22. While the Board suggested in *TMPA* that increased costs could be offset in the SAC calculation by lower rates, *TMPA*, at 21, no similar cure is available when, as here, the rerouting produces an unacceptable increase in cycle times. As a result, all of the Z train traffic rerouted by Otter Tail must be excluded from the Otter Tail traffic group.

(a) Otter Tail Unacceptably Increases Z Train Cycle Times

Although Otter Tail asserts that "the OTRR will provide at least the same level of service" as BNSF (OTP Nar. at I-18), Otter Tail's own flawed string program evidence shows that this statement is patently untrue with respect to the Z trains Otter Tail has rerouted. Table III.A-11 below compares average transit times between Snowden and Fargo generated from Otter Tail's string data to the actual BNSF transit times for the same trains over their real-world routing via Minot.

Table III.A-11
Comparison of String to
Actual BNSF Transit Times[70]

	Average Actual BNSF Time (Via Minot)	Average Otter Tail String Output (OTRR Route)	OTRR Percent of Actual	OTRR Extra Transit Time
Westbound Trains	{ }	{ }	202%	{ }
Eastbound Trains	{ }	{ }	132%	{ }
Average OTRR Delay			167%	{ }

Otter Tail's own data show that rerouted westbound Z trains take twice as long to travel between Fargo and Snowden as the very same trains take on the real-world BNSF.[71] In the eastbound direction, transit times are also increased substantially. These increased transit times clearly represent a lower level of service than that offered by the real world BNSF and demonstrate that Otter Tail is not entitled to include this traffic.

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[70] *See* BNSF Reply electronic workpaper "Revised Transit Times Comparison.xls" at worksheet "Summary." Real-world transit times for BNSF trains are derived from BNSF's train event data produced in discovery. The averages are for Z trains on the OTRR system between October 11 and October 18. The workpaper itself is based on a workpaper produced by Otter Tail on August 8 entitled "Transit Times Comparison.xls." The BNSF workpaper verifies that Otter Tail used the correct real world transit times from the train event data, *see* worksheet "Comparison of Matched Z Trains," at columns BJ – BL, and then uses the real world time data (upon which Otter Tail itself relied) in the comparison of real world to string program transit times. Worksheet "A Train Marry" shows the derivation of the total time spent by each train on the OTRR based on Otter Tail's string program data.

[71] Because the comparison is between the hypothetical string program transit time and the real-world transit time for the very same trains, there is no basis to argue that the slower times on the OTRR are caused by some form of "peak" period congestion.

It should be no surprise that Otter Tail's rerouted trains take longer than trains in the real world. As noted previously, Otter Tail has increased the distance those trains must cover by 101 miles. In the real world, BNSF moves these trains at the fastest possible speeds across the Minot line. As shown by Table III.A-11 above, even under the most favorable assumptions embodied in the string analysis, Otter Tail cannot cover the additional miles in the same elapsed time by running faster trains.[72] The extra miles required by Otter Tail's new routing will obviously require additional time. In addition, Otter Tail's rerouting moves the Z trains from a real-world line that, as explained below, is optimized to permit these trains to move with minimal interference from slower moving traffic to a line where most of the traffic – consisting predominantly of coal and manifest trains – is slow-moving traffic. This slow traffic would constantly interfere with Otter Tail's ability maintain higher speeds for Z trains.

There is every reason to believe that the OTRR times shown in Table III.A-11 above substantially understate time that would be spent on the OTRR. First, Otter Tail makes the completely unrealistic assumption that only 15 minutes would be required for interchange of trains between the OTRR and BNSF at Fargo and Snowden. As discussed in Section III.C.2.b.(2) below, and as accepted by the Board in *TMPA*, at 75, a much more realistic estimate of the time required for interchanges is one hour. Using one hour instead of 15 minutes for each BNSF-OTRR interchange would increase transit times for rerouted Z trains by an additional 1.5 hours

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[72] Indeed, BNSF's westbound trains average { } mph over BNSF's 382.8 mile route while OTRR westbound trains average only { } mph over Otter Tail's 483.9 route. *See* BNSF Reply electronic workpaper "Revised Transit Time Comparison.xls," at worksheet "Comparison of Matched Z Trains," columns BS14 – BU18. Even if the OTRR ran its westbound trains at 60 mph (the maximum speed on any OTRR segment) without any stops for crew changes, interchanges, fueling, or inspections, it would not be able to match BNSF's time for the same trains over BNSF's shorter route.

in each direction. Second, as described in detail in Section III.C below, numerous errors in the string program's modeling of train movement produce faster transit times than are possible in the real world. Again, these errors would increase the already excessive transit times reported above.

(b) Z Train Traffic Is Highly Time-Sensitive

According to BNSF witness Bill Slaughter, Otter Tail's substantially increased transit times for Z trains would unacceptably reduce the level of service offered below what is acceptable to intermodal shippers. Until his retirement on October 1, 2003, Mr. Slaughter was Assistant Vice President Intermodal/Automotive Operations at BNSF. In that position, Mr. Slaughter was responsible for the design and oversight of intermodal and automotive schedules, trains, service, and operations to provide that service. He is intimately familiar with Z train traffic and the requirements for providing high-priority intermodal service.

Z trains provide a special class of high-priority service to intermodal shippers with time-sensitive shipments. They are the most time sensitive of BNSF's intermodal traffic. Time from origin to destination is designed to be competitive with over-the-road trucks operated by teams of drivers, and trains cover as much as 1100 miles per day. Fast transit times are of critical importance to customers. In addition, Z trains operate in regularly scheduled service. For each train, shippers are given both the latest time a shipment can be delivered to BNSF for loading on a departing train and the time at which the shipment will become available at the destination. Having a dependable drop-off and pick-up schedule allows the shippers to organize their own workflow at each end.

The nature of Z train service is dictated by the requirements of the customers who use it. Significant shippers include package delivery services such as United Parcel Service ("UPS") and less-than-truckload carriers such as Roadway Express and Yellow Transportation. Of

rerouted Z trains included in Otter Tail's traffic group, { } percent carried UPS trailers, { } percent carried Roadway trailers, and { } percent carried Yellow trailers during the October 11 to October 18, 2002 period.[73] {

} These shippers have their own tight delivery schedules which they can satisfy only if Z train transit times are sufficiently quick and only if trains reliably depart and arrive as scheduled. Extra transit times of the scope proposed by Otter Tail would be unacceptable to these shippers due to the impact on their ability to adequately serve their own customers.

Z trains are the highest priority freight traffic on the BNSF system.[74] Special steps must be taken to ensure that they meet their tight schedules. All potential causes for delay are minimized. Hence, little or no switching activity occurs on most Z trains. Dispatchers give priority to Z trains, directing other trains to pull into sidings to allow Z trains to pass when necessary. Z trains, in turn, rarely stop for other trains to pass or meet, and would usually do so only if meeting another Z train running on a tighter schedule. Even track maintenance windows are scheduled to avoid delaying Z trains.

The Z trains that Otter Tail has rerouted in this case travel primarily between Chicago and Portland or Chicago and Seattle. In these traffic lanes, {

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[73] *See* BNSF Reply electronic workpaper "oct z by contract.xls."

[74] *See* BNSF.RP.WP.III.A-0186, produced by BNSF at BNSF/OTP 00205.

} Increased BNSF's cycle time – such as those proposed by Otter Tail – would result in the loss of business to UP.

Competition to reduce cycle times remains intense. {

}

The competitive pressure that UP continues to exert in other key intermodal corridors also demonstrates the continuing need to reduce transit times for high-priority intermodal traffic. In July 2003, UP announced an arrangement with CSX that would allow the operation of intermodal trains for UPS between Los Angeles and New York in 63 hours, an improvement of 12 hours over previously available transit times.[76] According to one source, such speed is possible only if UP completes the Los Angeles to Chicago leg in 41.5 hours, which requires their trains to average 54 mph over the entire 2200 miles and permits less than one hour during which trains can stop for fueling, crew changes, and inspections.[77]

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[75] *See* BNSF Reply Exhibit III.A-6.

[76] *See* BNSF Reply Exhibit III.A.-7, "Battling Trucks, Trains Gain Steam," *Wall Street Journal* (July 25, 2003 on-line ed.).

[77] *See* BNSF Reply Exhibit III.A-8, "UP Wins, BNSF Loses Big United Parcel Contract," *Railroad*, Sept. 2003, at 8-9.

Clearly, in the face of such competition, time is of the essence for BNSF's Z train service. Slower moves are not acceptable. The same would be true in the SAC world for the OTRR. Otter Tail's increase in transit times over its relatively short portion of the 2200-mile plus Seattle/Portland-Chicago corridor would eliminate the limited flexibility available to the residual BNSF to make up for unexpected delays over the remainder of the route. In addition, shippers would be unlikely to accept a slower routing over the OTRR. As described above, UP would be an attractive alternative to the longer transit times imposed by OTRR. Nor would a shipper be likely to continue to give its business to BNSF in the future if BNSF insisted on routing traffic over the longer, more time-consuming, less-efficient OTRR routing. The shipper would either switch to another carrier or insist that BNSF provide the best service available by using the current routing over the Minot line that would not require use of the OTRR as an unnecessary bridge carrier.

(c) Otter Tail's Operating Plan Makes No Provision For The Special Procedures Necessary To Carry Z Train Traffic

Otter Tail's operating plan does not make any provision for the special handling that is necessary to offer high-priority intermodal service like the Z trains. The only evidence Otter Tail has offered of how OTRR trains would operate is the string program output. The string program, however, does not provide any priority for Z trains vis-a-vis other traffic. Instead, the string program treats all eastbound traffic as having priority over all westbound traffic, regardless of train type. The string program also does not permit faster trains to overtake slower trains. As a result, westbound Z trains on the OTRR stop and wait in sidings for loaded coal trains and loaded and empty grain trains to pass moving east.

Nor can Otter Tail argue that, if given the opportunity to submit yet more new evidence, it could show that giving higher priority to westbound Z trains would bring service levels on the

OTRR up to the current BNSF standard. It is not physically possible for a train moving on OTRR's system with a maximum 60 mph speed limit to cover the longer OTRR route in the same time it takes a real-world BNSF Z train to cover the shorter real-world BNSF route. In addition, the mix between fast and slow moving traffic on the OTRR route and the time required to interchange trains at Snowden and Fargo both dictate longer transit times. Prioritizing westbound Z trains would also inevitably slow down the remaining traffic on the OTRR.

(2) Grain Trains Originating At Williston Are Not "Overhead" Traffic And Should Be Excluded

Otter Tail included within its traffic group { } loaded and empty unit grain trains that originate or terminate in Williston, North Dakota – 26 miles east of Snowden – on the Minot line that Otter Tail chose not to build.[78] In BNSF's real-world operations, these trains never pass through Snowden. Rather, loaded trains are assembled at Williston and travel east along BNSF's Minot line. Returning empty trains travel west along BNSF's Minot line and terminate at Williston before reaching Snowden.

Otter Tail appears to have selected this traffic in error. The traffic is not "through" traffic as Otter Tail has defined the term. Otter Tail specifically disavowed any intention to take traffic if doing so would require that traffic to traverse a different route on the residual BNSF than it does in the real world: "Simply stated, there is no off-SARR rerouting on the OTRR system." OTP Nar. at III-C-6. As these trains never travel through Snowden in the real world, off-SARR rerouting would obviously be required to cause them to do so in the OTRR world. Otter Tail

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[78] *See* BNSF Reply Exhibit III.A-5. The referenced trains can be identified in OTP Opening Exhibit III-A-3, at 18, 19, 21, and 26. { }

should have excluded this traffic under its own selection criteria. BNSF did so in its restatement of Otter Tail's revenue and tonnage data.[79]

(3) Blocks Of Coal Cars From Colstrip Area Mines Are "Local" And Should Be Excluded

Otter Tail also included in its traffic group small blocks of coal cars that originate from mines in the Colstrip, Montana, area that are transported by BNSF from Forsyth, Montana, after being added to freight trains passing through Forsyth.[80] Otter Tail included in its traffic revenue and tonnage numbers both the freight trains that pass through Forsyth and the coal cars that are added to the freight trains in Forsyth on the real-world BNSF. Otter Tail appears to have included the coal cars by mistake. Otter Tail made no provision in its operating plan for trains stopping at Forsyth or for the switching at Forsyth that would be necessary to add the cars. Moreover, the traffic originates on the SARR and is not through traffic. As a result, it should have been excluded by Otter Tail under Otter Tail's own traffic selection criteria. BNSF has excluded this traffic from the freight trains in question.[81]

(4) "Local" Carload Shipments Originating In North Dakota Should Be Excluded

Otter Tail erroneously includes as part of traffic on trains that traverse the OTRR carloads that are not through traffic. These carloads originate or terminate in Boyle, Mandan, Minot, and Spiritwood, North Dakota.[82] Carloads that originate or terminate in Boyle, Mandan, and Spiritwood – all of which are on the line constructed by Otter Tail between Fargo and Glendive –

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[79] *See* BNSF Reply electronic workpapers "Bnrvwb.dbf," "non coal drop detail.xls."

[80] *See* OTP Opening electronic workpaper "BNRV2002.dbf."

[81] *See* BNSF Reply electronic workpapers "Bnrvwb.dbf," "non coal drop detail.xls."

[82] *See* OTP Opening electronic workpaper "BNRV2002.dbf."

obviously are not "through" carloads since their origin or destination is within the SARR. Carloads that originate or terminate in Minot either do not pass through Fargo or do not pass through Snowden on the real-world BNSF. They would have to be rerouted on the off-SARR residual BNSF so that they could be placed on a through train on the OTRR. As noted above, however, Otter Tail specifically disclaimed any intention of including traffic that requires off-SARR rerouting. All of these carloads fail to meet Otter Tail's specified standard for traffic inclusion and BNSF has excluded this traffic.[83]

2. OTRR Volumes (Historical And Projected)

Otter Tail includes both coal and non-coal volumes in its traffic network. BNSF addresses coal and non-coal volumes separately.

a. Historical Volumes (*i.e.* 2002 Volumes)

Otter Tail assumes that the OTRR would begin operations on January 1, 2002. BNSF accepts that starting date.

(1) Coal Traffic

Otter Tail develops coal volumes for the 2002 base year from the traffic tapes produced by BNSF which show the actual volumes transported to particular destinations by BNSF. *See* OTP Nar. at III-A-4. BNSF accepts use of the traffic tapes to establish the 2002 base year volumes but modifies those coal volumes to exclude the tonnages described in Section III.A.1, for the reasons set forth above.

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[83] *See* BNSF Reply electronic workpapers "Bnrvwb.dbf," "non coal drop detail.xls."

(2) Non-Coal Traffic

Otter Tail also develops non-coal volumes for the 2002 base year from the traffic tapes produced by BNSF which show the actual volumes transported to particular destinations by BNSF. *See* OTP Nar. at III-A-4. BNSF accepts use of the traffic tapes to establish the 2002 base year volumes but modifies those non-coal volumes to exclude the tonnages described in Section III.A.1, for the reasons set forth above.

b. Projected Volumes

BNSF addresses Otter Tail's volume projections for coal and non-coal traffic separately below.

(1) Projected Coal Volumes

(a) Projected Coal Volumes -- 2003

Otter Tail uses BNSF's 2003 origin/destination ("O/D") coal forecast dated October 18, 2002 to develop tonnages for coal movements. *See* OTP Nar. at III-A-11, item 2. BNSF accepts use of this source to establish 2003 coal tonnages. While BNSF accepts Otter Tail's use of the 2003 BNSF O/D coal forecast, it has reduced coal volumes from the SARR network in 2003 for the reasons set forth in Section III.A.1 above.

(b) Projected Coal Volumes -- 2004 Through 2021

Otter Tail develops tonnage for coal movements from 2004 through 2021 using a PRB demand forecast published in January 2003 by the U.S. Department of Energy, Energy Information Administration ("EIA") titled *Annual Energy Outlook 2003 With Projections to 2025* (hereafter referred to as "EIA PRB forecast"). *See* OTP Nar. at III-A-10; III-A-11, item 3. Otter Tail takes the 2003 tonnages for the coal movements and adjusts them each year based upon the annual change projected by EIA's PRB forecast. *Id.* at III-A-11, item 3. Except for

Superior Dock volumes, Otter Tail also caps future coal volume growth at 85 percent of plant capacity. *Id.*

To minimize the disputes that must be resolved by the Board, BNSF accepts Otter Tail's use of the 85 percent plant capacity factor. BNSF also accepts use of EIA's PRB forecast to project future coal volumes.

(2) Projected Non-Coal Volumes

Otter Tail maintains non-coal traffic volumes at the 2002 level of 25.2 million net tons throughout the DCF period. OTP Nar. at III-A-10. BNSF accepts Otter Tail's assumption of level volumes, but has adjusted net tonnages downward to 21.17 million tons to reflect the excluded non-coal traffic for the reasons set forth in Section III.A.1 above.

c. Summary

The following Table III.A-12 compares the total OTRR volumes developed by BNSF with those developed by Otter Tail. The total volumes projected by BNSF are lower than those projected by Otter Tail due to BNSF's exclusion of certain coal and non-coal traffic as described in Section III.A.1.

Table III.A-12
OTRR Volumes
Comparison Of Otter Tail And BNSF[84]

	Otter Tail Volumes	BNSF Volumes	Difference
2002	205,616,902	133,493,993	72,122,909
2003	204,291,570	132,964,229	71,327,341
2004	205,961,535	134,093,003	71,868,532
2005	207,589,295	134,421,226	73,168,069
2006	211,251,289	136,944,395	74,306,893
2007	215,441,079	138,378,605	77,062,473
2008	218,439,116	140,398,562	78,040,554
2009	220,650,530	141,783,022	78,867,508
2010	224,073,254	143,924,714	80,148,540
2011	225,652,809	144,810,605	80,842,204
2012	226,724,635	145,158,566	81,566,069
2013	227,415,521	145,308,865	82,106,656
2014	227,786,427	145,466,664	82,319,763
2015	228,129,276	145,612,526	82,516,750
2016	228,624,769	145,828,585	82,796,184
2017	229,192,649	146,088,824	83,103,825
2018	229,520,393	146,232,761	83,287,632
2019	229,892,356	146,417,593	83,474,763
2020	230,233,773	146,635,732	83,598,041
2021	230,312,875	146,683,071	83,629,803

BNSF compares its modified coal traffic volumes with Otter Tail's coal traffic volumes by year in Exhibit III.A-9. BNSF compares its revised non-coal traffic with the non-coal volumes developed by Otter Tail by year in Exhibit III.A-10.

3. OTRR Revenues (Historical And Projected)

OTRR revenues are affected by (1) the shippers included in the stand-alone traffic network, (2) the tonnage assumed to be handled by the OTRR, (3) the rates that OTRR shippers are assumed to pay, and (4) the revenue divisions between the OTRR and any interchange

[84] *See* BNSF Reply electronic workpaper, "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls"at worksheet "Summary."

carriers (including the residual BNSF). As shown above in Section III.A.1, there are fundamental flaws in Otter Tail's traffic selection assumptions that result in the vast overstatement of volumes in the stand-alone network.

As shown below, there are also critical flaws in the revenue divisions calculated by Otter Tail and in the projected rates Otter Tail assumes the OTRR shippers will pay. The most significant flaw in Otter Tail's revenue forecast is its disproportionate allocation of cross-over traffic revenue to the stand-alone railroad. Since the overwhelming majority of the traffic on the hypothetical OTRR railroad is cross-over traffic, Otter Tail's improper approach results in a sizeable overstatement of revenues for the stand-alone network. Due to this improper allocation, Otter Tail's revenues are overstated by more than 142 million of millions of dollars in each year of the DCF period.

Otter Tail's projected rates are also exaggerated by its reliance on a revenue forecast developed for purposes of this litigation, its use of outdated railroad cost indices, and its assumptions regarding the rates that will apply when a contract expires.

a. Single-Line Revenues

Only one movement on the Otter Tail system travels in single-line service on the OTRR; that is the issue traffic moving to Big Stone Station. *See* OTP Nar. at III-A-16. This { } ton movement accounts for less than 1 percent of the total OTRR volume estimated by Otter Tail for base year 2002.[85] BNSF accepts Otter Tail's escalation of revenues for the issue traffic over the life of the OTRR.

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[85] *See* OTP Opening Exh. III-A-5 at 1, column 5, rows 59, 108.

b. Divisions Of Revenue -- Existing Interchanges

The only traffic that Otter Tail includes in this category is the approximately { } tons of coal transported by OTRR in the base year that it interchanges with the Otter Tail Valley Railroad Company ("OTVRC") at Fargo for final destination to { }. *See* OTP Nar. at III-A-16. {

} Consequently, the OTRR should not receive 100 percent of the revenues associated with this movement as Otter Tail has assumed. BNSF corrected Otter Tail's error.[89]

In addition, BNSF does not accept Otter Tail's methodology for projecting revenues for this movement from 2004 to 2021. Otter Tail escalates the rate for this traffic using the BNSF O/D coal forecast in 2003 and using the contract escalation provision for the rest of the DCF

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[86] *See* BNSF Reply electronic workpaper "BNSF2002 OD traffic.xls" at worksheet "CarOwner data," rows 60-61.

[87] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at "2002 SAC Moves," cells W72:X74.

[88] {

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[89] *See* BNSF Reply electronic workpapers "coal move.xls."

period,[90] even though the contract expires in 2004.[91] For the reasons discussed in greater detail below in Section III.A.3.d.(1).(c).(v), BNSF disputes the rate escalation assumption for the { } movement from 2004 to 2021 and has incorporated the same revisions to that assumption that it applies to all sole-served destinations.

c. Divisions of Revenue -- Cross-Over Traffic

(1) Principles To Govern Revenue Allocation On Cross-Over Traffic

If the Board permits Otter Tail to rely on cross-over traffic in this case, notwithstanding the economic invalidity of that approach as explained in Section III.A.1.a, it should accept an allocation procedure that results in less distortion to the outcome of a full SAC analysis than Otter's Tail's manipulated divisions data (used to allocate revenue on coal movements) and its modified mileage prorate (used to allocate revenue on most non-coal movements). In this section III.A.3.c., BNSF shows that Otter Tail has failed to make any affirmative showing as to why its revenue allocation procedures should be adopted, and has therefore failed to meet its burden of proof. Otter Tail's divisions highlight the susceptibility of cross-over traffic to manipulation. BNSF shows that the regressions Otter Tail has used to calculate divisions are illogical and statistically unreliable. BNSF also explains why its density adjusted revenue allocation procedure ("DARA") is a method for allocating revenues on cross-over traffic that is

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[90] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at "2002-2021 Tonnage," row 67.

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superior to both of the supposed market-based methodologies relied on by Otter Tail, and presents the results of its cross-over allocation method.

BNSF's DARA addresses more fully and accurately than Otter Tail's revenue allocations the need for recovery of both attributable and unattributable costs on the portions of the SARR and the residual incumbent used by cross-over traffic movements. The MMP implicitly addresses the recovery of certain costs associated with the length of haul of such movements, as well as costs of originating and terminating traffic. DARA provides a more appropriate allocation of revenue for cost recovery purposes. It does this in two ways. First, the DARA procedure separates the revenue on a cross-over movement into two components: (1) the component that would be available to cover attributable costs of the cross-over movements, and (2) the portion of the revenue representing contribution in excess of attributable costs that would be available to cover unattributable costs on the SARR and the residual incumbent. Under DARA, BNSF witness John Klick first calculates the attributable cost component according to the Ex Parte 399 variable costing procedures, and allocates sufficient revenue to each of the two carriers to cover their respective attributable costs on cross-over movements. In the second step under DARA, the contribution component of each cross-over movement (i.e. total end-to-end revenue minus the two carriers' attributable costs) is allocated to the SARR and the residual incumbent in direct proportion to relative length of haul and in inverse proportion to the traffic densities on each carrier.

The DARA procedure thus takes account of fundamental aspects of the rail industry cost structure. It is also a logical corollary of the Board's belief that cross-over traffic should be permitted because it allows the complainant in a SAC case to benefit from economies of density. DARA recognizes that the opportunities for recovery of unattributable costs vary in accordance

with traffic density and allows the residual incumbent, which typically has lower densities than the SARR, an equivalent opportunity to recover unattributable costs as the SARR.

The evidence in this section III.A.3.c. begins with a discussion sponsored by Professor Ordover of principles underlying revenue allocation, then addresses the deficiencies in Otter Tail's regression evidence and proceeds to a discussion of the implementation of the DARA procedure.

(a) The Board Should Approach Revenue Allocation from the Perspective of Cost Coverage and Eschew Any Reliance on Supposed Market-Based Divisions

In recent proceedings complainants have made increasing use of cross-over traffic, to the point that virtually *all* of the non-issue traffic included in the stand-alone traffic group has been cross-over traffic. With the exception of { } tons of traffic that BNSF interlines with a real world shortline, this is the case in this proceeding. The higher the percentage of cross-over traffic in the stand-alone traffic group, the greater the likelihood of a significant departure from the results that would obtain from a properly-constructed stand-alone cost analysis.

If the Board chooses to permit inclusion of cross-over traffic in the SAC test, it must attempt to fashion an allocation rule that, on average, will have a minimum distorting impact on the outcome of SAC cases.[92] The objective should be to fashion a rule for dealing with cross-over traffic that can feasibly be implemented using standard railroad data, that reduces the incentives of the complaining shipper to manipulate the structure of the SARR, and that tries to

[92] Since any allocation rule may perform poorly in some circumstances, the goal here is to keep the likelihood of such outcomes to a minimum.

ensure that the residual incumbent's long-run viability is not undermined by siphoning-off net revenues to the SARR.

The place to start in deriving the second-best principles for dealing with cross-over traffic is with the concept of cost recovery. The Board has recently stated that both the SARR and the residual incumbent should receive a sufficient allocation of revenue from a cross-over movement to cover the directly attributable costs of that movement and that both parties should receive some portion of the remaining contribution above attributable costs to defray unattributable joint and common costs.[93] Although the Board has not specified a preferred allocation rule, the rule adopted in a given case should not, in principle, undermine the residual incumbent's ability to recover the costs that it must defray to remain viable so that it is able to continue to interchange traffic with the SARR over the DCF period. The focus on long-run cost recovery is the proper one because the regulatory problem created by cross-over traffic is the inability to make a stand-alone comparison between revenues and forward looking costs if the requisite facilities have not been built. A cost based revenue allocation is a proxy (albeit an imperfect one) for the comparison of revenue and cost that is the essence of the SAC test.

In its treatment of revenue allocation on cross-over traffic, Otter Tail enunciates no principle or approach for allocating the contribution available to defray unattributable costs. Otter Tail instead espouses a so-called market-based rationale for allocating revenue. Its scant rationale for this approach is as follows:

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[93] *TMPA* at 37, n.74.

> The OTRR, as a replacement for BNSF, would achieve the same market place revenue division result for the cross over traffic that BNSF achieves in the real world for handling interline or overhead movements.

OTP Nar. at III-A-18 to 19. Of course there are no real world divisions on the cross-over movements on which the SARR replaces the real world BNSF. What Otter Tail presumably intends to say is that one can extrapolate from the real world experience of BNSF and its interline partners and posit that there is a sufficient similarity between that experience and the assumed relationship between the SARR and the residual incumbent to use real world divisions as a proxy for cross-over revenue allocations. In fact, the presumed similarity does not exist, either as a conceptual or practical matter.

On the conceptual level, there is no similarity between real world interline arrangements and the hypothetical arrangement between the SARR and the residual incumbent. The real world divisions negotiation occurs in the context of creating something – a new interline movement – that did not exist. In contrast, the hypothetical arrangement between the SARR and the residual incumbent represents the fragmentation of an existing through movement into two arbitrary components.[94]

Real world divisions negotiations occur in the context of creating (or enabling) a movement that would not otherwise be feasible. Real world negotiations of interline arrangements would not succeed unless both carriers were better off as a result of negotiating the arrangement than they would have been if they had not entered into it. (Hence, a real-life interline negotiation will typically lead to a Pareto superior outcome: that is, an outcome that

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[94] Arbitrary in the sense that the fictional interchange point is determined at the whim of the proponent of the SARR.

benefits *both* parties relative to the *status quo*). This is not surprising given that market divisions in the real world reflect a voluntary transaction between two consenting railroads which leaves each in an improved financial position.

In the contrived world of hypothetical cross-over movements, nothing new is being created. Instead, there is an artificial fragmentation. Since the shipper is already being served by the incumbent, there is no affirmative rationale for this fragmentation of existing through movements into unnecessary pieces and no apparent social good that flows from such fragmentation. This fragmentation is an outgrowth of the Board's prior approach that allowed the hypothetical entrant is entitled to take not only whatever traffic of the residual incumbent it chooses but also entitled to provide whatever portions of through service that it elects.

The only way this contrived arrangement could produce a mutually beneficial (Pareto superior) outcome would be if the incumbent were able to retain its contribution on the through movement and the more efficient SARR were willing to accept a division equal to the incumbent's avoided costs of handling the cross-over movement over the SARR portions of the haul. (Because of the SARR's greater efficiency, this division would include some contribution in excess of the SARR's attributable costs.) The Board, however, has determined that the incumbent is not entitled to retain its through movement contribution on cross-over movements on the theory that claiming this amount would constitute an impermissible post-entry competitive response by the incumbent.[95]

Thus, at least under current ground rules, there appears to be no conceptual similarity between the motivations for and outcomes of real world divisions negotiations – which leave

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[95] *Nevada Power II*, 10 I.C.C.2d at 266-67.

both parties in an improved financial position – and the motivations for and outcomes of assumed divisions negotiations between the SARR and the residual incumbent, which under the rationale of *Nevada Power II* preclude the incumbent from retaining its net contribution. Therefore, there is no logical basis for the extrapolation from real world divisions that Otter Tail purports to perform in this case.

Nor is Otter Tail's extrapolation grounded in the logic of the assumed negotiation between the hypothetical SARR and the residual incumbent. Consider the conditions imposed upon these hypothetical negotiations. First, the hypothetical entrant is free to enter the market without barriers and to take whatever traffic of the residual incumbent that it wishes, or in the cross-over context, whatever portions of existing through movements that it wishes. The hypothetical entrant has the option to "make" the through service by building facilities sufficient to handle traffic from end-to-end or to make only a portion of the through service and to "buy" the remaining portion from the residual incumbent by paying it a portion of the revenue on the through movement.

What are the hypothetical entrant's incentives to make or buy? If it costs less to buy the services from the residual incumbent than to build the facilities to handle the traffic end-to-end, the entrant will buy service from the residual incumbent. At what price? Potentially any price up to the cost of the alternative, *i.e.*, building the facilities.

Now consider the conditions that govern the residual incumbent's behavior in the presumed negotiations. First, it cannot refuse to deal. It must yield all or a portion of the movement to the entrant, to the extent to which the entrant wishes to replace the incumbent. As to the terms on which it must deal, if the incumbent were free to price consistent with its self-interest, it would select a price less than the cost of the entrant's "make" alternative, a price that

nevertheless allowed the entrant to profitably handle the business. This could be a price as high as the incumbent's current contribution on the through movement. But this is rational marketplace behavior that the Board has apparently forbidden. Again, the Board has said that the incumbent cannot seek to retain its net contribution on the through movement, because such action would represent an impermissible, post-entry competitive response.

The characterization of the incumbent's incentive as a predatory competitive response is incorrect. While the issue arose in *Nevada Power II* in the context of the actions of a presumed competitor, the incumbent's incentive and ability to retain its full contribution are equally applicable to a carrier that is being replaced for a portion of the movement by an entrant that has elected not to construct all the facilities needed to serve the traffic it has selected.[96] The behavior posited is not predatory. It is economically efficient. It permits an entrant that is more efficient than the incumbent for some portion of the haul to enter the market in its preferred manner – as an interline carrier rather than as a carrier that handles through movements – without inflicting economic harm on the incumbent. Permitting the SARR to earn more than the incumbent's avoided costs for its portion of the haul could permit a SARR that is less efficient than the incumbent to enter the market. This would be inconsistent with the competitive market standard.

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[96] In *Nevada Power II*, the ICC stated that the SARR is properly viewed as a replacement for and not as a competitor of the residual incumbent. 10 I.C.C.2d at 266-67. In the cross-over context, however, the designation of the SARR as replacement is not entirely accurate. The SARR would be a replacement if it handled the traffic for the full end-to-end movement, but where it replaces the residual incumbent for only a portion of the movement, the SARR must also be viewed as an interline partner of the residual incumbent. Approaches to revenue allocation on cross-over traffic that result in the SARR appropriating a disproportionate share of cross-over revenue are inconsistent with the model of partnership.

The fact is that prior rulings in SAC cases appear to preclude meaningful consideration of market-based divisions by imposing constraints on the incumbent that prevent it from pursuing rational and efficient market place objectives. This is a second reason why there is no logic in Otter Tail's claimed extrapolation from real world divisions.

(2) Otter Tail's Divisions Based on its Regressions Are Completely Unreliable and Must Be Rejected

Otter Tail's proffered revenue divisions on cross-over traffic are unreliable and must be rejected. The disproportionate revenue that Otter Tail claims for the SARR by applying regression equations to divisions data produced in discovery underscore the point made in section III.A.1.a above that the allocation of revenue on cross-over traffic is subject to manipulation and abuse. Otter Tail purports to examine "the statistical relationship between revenue divisions and miles traveled that BNSF, in fact, realizes for handling its actual interline coal movements." OTP Nar. at III-A-18. The results that Otter Tail realizes, particularly on short-haul coal movements, which comprise the majority of the traffic handled by the SARR, are grossly overreaching and in effect reward the OTRR railroad with significant revenue for doing next to nothing. Taken on its face, Otter Tail's regression on coal movements using the subset of data reflecting BNSF's share of the through movements as less than 200 miles is irrational – suggesting that the SARR should receive a minimum of 25 percent of the revenue even if it performs no line-haul service. OTP Opening Exh. III-A-6 at 5.

Otter Tail claims an average revenue per ton-mile of { } mills on coal movements of less than 200 miles, while allocating the residual BNSF an average of only { } mills per ton-mile on these movements.[97] Table III.A-13 below lists some of the more extreme examples of high revenue per ton mile moves resulting from Otter Tail's regression-based approach. Indeed, on the large number of short-haul coal movements in its traffic group, the revenue division that Otter Tail claims based on its calculated regression coefficients is almost 60 percent higher than the divisions it would obtain under the modified mileage prorate, which – as BNSF has demonstrated in prior cases – itself produces divisions that are biased in favor of the origin carrier on short-haul movements.

[97] For coal traffic that exits the SARR at Converse, Otter Tail's SARR would carry the traffic for an average of 4 percent of the through movement and claim 28 percent of the revenue. OTP Opening Exh. III-A-3, page 4 of 27. For coal traffic that exits the SARR at Donkey Creek, Otter's Tail's SARR would carry the traffic for an average of 3 percent of the distance of the movement and claim 26 percent of the revenue. *Id.* at page 7 of 27.

Table III.A-13
High Revenue Per Ton Mile for Certain Moves and SAC Interchange Points[98]

			OTRR Rev Per Tonmile (Mills)			
Destination	State	OTP 2002 Tons	SAC 2002 Revenue (Regression)	SAC Rev/TonMile Regression	SAC Rev/TonMile MMP	Residual BNSF Rev/TonMile
1{ }	{ }	{ }	{ }	{ }	{ }	{ }
2{ }	{ }	{ }	{ }	{ }	{ }	{ }
3{ }	{ }	{ }	{ }	{ }	{ }	{ }
4{ }	{ }	{ }	{ }	{ }	{ }	{ }
5{ }	{ }	{ }	{ }	{ }	{ }	{ }
6{ }	{ }	{ }	{ }	{ }	{ }	{ }
7{ }	{ }	{ }	{ }	{ }	{ }	{ }
8{ }	{ }	{ }	{ }	{ }	{ }	{ }
9{ }	{ }	{ }	{ }	{ }	{ }	{ }
10{ }	{ }	{ }	{ }	{ }	{ }	{ }
11{ }	{ }	{ }	{ }	{ }	{ }	{ }
12{ }	{ }	{ }	{ }	{ }	{ }	{ }
{ }		{ }	{ }	{ }	{ }	{ }
SAC Interchange Point						
1{ }		{ }	{ }	{ }	{ }	{ }
2{ }		{ }	{ }	{ }	{ }	{ }
{ }		{ }	{ }	{ }	{ }	{ }

The distortions produced by Otter Tail's regressions are most evident in the case of short haul coal movements, and the majority of this section addresses Otter Tail's regression for coal movements on which BNSF's share of the movement is less than 200 miles. This regression is particularly significant for Otter Tail's calculation of SARR revenues, because Otter Tail applies

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[98] *See* BNSF Reply electronic workpaper, "Summary of OTP Rev Divisions.xls" at worksheet "RTMS." In addition to highlighting the highly disproportionate revenue division that Otter Tail developed with its linear regression, this table also demonstrates that application of the modified mileage prorate would yield inflated revenue divisions for the OTRR's short haul moves, namely traffic that terminates at Donkey Creek and Converse Yard. For example, the OTRR gets 40 percent of the revenue { } for hauling the { } traffic less than 5 percent of the miles { } under the modified mileage prorate. *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast" at worksheet "2002 SAC Moves," rows 147-150.

the results of this regression to a large portion of its stand-alone traffic group consisting of PRB coal movements that the OTRR handles for relatively short distances before interchanging it to the residual BNSF. As a result, much of the revenue that Otter Tail ascribes to the OTRR is based on this below 200-mile regression. However, all three of its regressions, including regressions on coal movements in excess of 200 miles and regressions on non-coal traffic, are flawed.[99] Where applicable, BNSF identifies criticisms that apply to all three regressions.

The errors in Otter Tail's approach include: (1) unreliably small sample sizes; (2) unjustified stratification; (3) use of data points in developing the regression that are not representative of the SARR's PRB coal originations for unit coal traffic; (4) failure to test all relevant independent variables that would logically affect the value of the dependant variable; (5) reliance on the regressions to make predictions significantly outside the relevant range of the actual data points used in the regression; and (6) use of a clearly inappropriate functional form in its regression equations. The first five of these errors are errors that Otter Tail committed in formulating the regression analysis; the last error relates more to Otter Tail's interpretation of the regression results as they apply to the short-haul coal moves in the OTRR stand-alone traffic group.

(a) Errors in Otter Tail's Formulation of the Regression Analysis

A major underlying flaw in Otter Tail's revenue divisions regressions is the small number of data points upon which they are based, particularly the small number of data points for the

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[99] Otter Tail utilized a linear regression based on 8 data points to estimate revenue divisions for movements of non-coal traffic that would operate in bridge service over the OTRR.

under 200 mile regression. Otter Tail's two coal regressions are developed from the 26 data points that are shown below:

Table III.A-14
Summary of Coal Regression Data Used by Otter Tail
In Its Opening Evidence[100]

	Origin	Destination	BNSF Miles	Total Miles	BNSF Percent of Miles (Ind. Variable)	BNSF Percent of Revenues (Dep. Variable)
1	{ }	{ }	{ }	{ }	{ }	{ }
2	{ }	{ }	{ }	{ }	{ }	{ }
3	{ }	{ }	{ }	{ }	{ }	{ }
4	{ }	{ }	{ }	{ }	{ }	{ }
5	{ }	{ }	{ }	{ }	{ }	{ }
6	{ }	{ }	{ }	{ }	{ }	{ }
7	{ }	{ }	{ }	{ }	{ }	{ }
8	{ }	{ }	{ }	{ }	{ }	{ }
9	{ }	{ }	{ }	{ }	{ }	{ }
10	{ }	{ }	{ }	{ }	{ }	{ }
11	{ }	{ }	{ }	{ }	{ }	{ }
12	{ }	{ }	{ }	{ }	{ }	{ }
13	{ }	{ }	{ }	{ }	{ }	{ }
14	{ }	{ }	{ }	{ }	{ }	{ }
15	{ }	{ }	{ }	{ }	{ }	{ }
16	{ }	{ }	{ }	{ }	{ }	{ }
17	{ }	{ }	{ }	{ }	{ }	{ }
18	{ }	{ }	{ }	{ }	{ }	{ }

[100] *See* BNSF Reply electronic workpaper "Summary of OTP inter01od file.xls" at worksheet "Summary." In addition to the methodological errors described in this section, Otter Tail made mechanical errors in its calculation of BNSF's percentage share of the total distance for three moves (Movements 7, 8 and 20 on this table) that had the effect of understating BNSF's percentage of the haul. {

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	Origin	Destination	BNSF Miles	Total Miles	BNSF Percent of Miles	BNSF Percent of Revenues
					(Ind. Variable)	(Dep. Variable)
19	{ }	{ }	{ }	{ }	{ }	{ }
20	{ }	{ }	{ }	{ }	{ }	{ }
21	{ }	{ }	{ }	{ }	{ }	{ }
22	{ }	{ }	{ }	{ }	{ }	{ }
23	{ }	{ }	{ }	{ }	{ }	{ }
24	{ }	{ }	{ }	{ }	{ }	{ }
25	{ }	{ }	{ }	{ }	{ }	{ }
26	{ }	{ }	{ }	{ }	{ }	{ }

Otter Tail develops its coal regressions from two separate subsets of the 26 data points that are summarized in Table III.A-14.[101] Otter Tail "stratified" these movements into two data subsets, one for movements for which BNSF's real world length of haul is less than 200 miles (moves 1 through 5 in Table III.A-14), and a second that contains the remaining movements for moves for which BNSF's haul is greater than 200 miles. Otter Tail provides no rationale for stratification in general, and no statistical justification for the cutoff value of 200 miles.

Otter Tail's separate linear regression for the five movements in the less than 200-mile stratum predicts a Y axis intercept value that would give the OTRR 25 percent of the revenue without moving the traffic any distance.[102] The fact that Otter Tail has conveniently selected this stratum of shorter movements and generated such favorable results from this regression reflects an obvious manipulation of the outcome of the regression analysis.

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[101] *See* OTP Opening electronic workpaper "inter01od.xls" at worksheets "Coal Regression " and "Coal-BN Org&Term."

[102] *See* OTP Opening electronic workpaper "Exhibit III-A-6 p5-7.xls" at worksheet "Exhibit III-A-6 p5&6." The 25 percent revenue assumption results when the independent variable (Miles Percent) is equal to 0 within Otter Tail's linear regression. Revenue Percent = .25 +.77 * Miles Percent. Then, the dependent variable (Revenue Percent) that the regression is solving for is equal to .25 or 25 percent.

There are serious issues relating to the nature of these five data points demonstrating that the regression for the under 200 mile stratum cannot be used to predict revenue divisions for short-haul PRB unit train coal movements. Otter Tail's less than 200-mile regression uses only 5 data points (representing a total annual volume of less than 400,000 tons of traffic) to predict revenue divisions for more than 130 million tons of coal.[103] As BNSF discusses below, even if Otter Tail had identified accurately five relevant data points, such a small sample size would be likely to yield statistically unreliable results.

In fact, however, Otter Tail did not identify five relevant data points. Four of the five movements (movements 1-3 and 5 on the table above) are not unit coal train movements, and therefore do not reflect either real world BNSF or hypothetical OTRR PRB operations. Furthermore, *none* of the five data points in the under 200-mile stratum is a BNSF originated coal movement from the Powder River Basin.

In short, Otter Tail is purporting to estimate revenue divisions that the SARR would receive for originating PRB unit train coal movements, but for the less than 200-mile regression, there is simply no correspondence between the real world data that is used to develop the regression, and the hypothetical cross-over traffic movements to which these regression results are applied. This would be like predicting average precipitation in Wyoming by performing a regression analysis on the weather patterns in Alabama. In statistical terms, it is inappropriate to use a sample to extrapolate the characteristics of the universe when the sample is not drawn from

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[103] *See* OTP Opening electronic workpaper "inter01od.xls" at worksheet "Coal-BN Org&Term."

the universe.[104] Nevertheless, Otter Tail simply assumed (without any evidence) that short haul moves originating in Colorado, Illinois and Alabama -- such as {

} -- would be predictive of divisions for the hypothetical OTRR movements that originate PRB coal in Wyoming and Montana.[105] Significantly, Otter Tail's own data selection for coal movements in the greater than 200-mile stratum explicitly recognized the irrelevance of non-PRB movements, because Otter Tail limited the dataset in the

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[104] A.H. Studenmund "Using Econometrics: A Practical Guide," Third Edition, (hereafter "Studenmund Text"), p. 230-232, included in BNSF's workpapers at BNSF.RP.WP.III.A-0173 to III-A-0175.

[105] Two additional problems exist regarding movements 4 and 5. {

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greater than 200 mile coal regression to PRB originating coal movements, even though the divisions data produced in discovery included non-PRB movements.[106]

Otter Tail's data for the less than 200-mile regression also exhibits a significant outlier problem. As shown in Table III.A-14, movement 4 has values for both the independent and dependent variables that diverge significantly from the values reflected in the other four data points (*i.e.*, movements 1-3, 5). Thus, the effect of Otter Tail's stratification approach is to create an "outlier," a fact that is readily apparent by examining the graph provided in Exhibit III-A-6, page 5, of Otter Tail's opening evidence.

The problem with outliers is that they can have a disproportionate effect on the regression result – they act as a sort of lever whereby the value of a single outlying data point can significantly change the regression coefficients. The linear specification employed in Otter Tail's model is very sensitive to outliers. Largely because of the very small sample size in the less than 200-mile regression, the presence of even a single data point can dramatically change the resulting regression results or Ordinary Least Squares ("OLS") estimates. In contrast, when a robust relationship holds within a given sample of data, the estimation results will in general not be sensitive to the removal of one data point.

While movements 1, 2, 3 and 5 are all tightly grouped in the lower left-hand quarter of the plot, movement 4 is by itself in the upper right-hand corner of the plot.[107] The status of movement 4 as an outlier is apparent by looking at the graph included by Otter Tail in its opening evidence. *Id.* Moreover, Mr. Klick performed a set of standard tests of excessive

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[106] *See* OTP Opening electronic workpaper "inter01od.xls" at worksheet "Coal-BN Org&Term."

[107] OTP Opening Exh. III-A-6 at page 5.

influence, which indicate conclusively that the observation in question is an outlier.[108] The inclusion of this outlier in the less than 200 mile data set is largely responsible for the fact that the regression results derived by Otter Tail and applied to short movements on the SARR yield a minimum revenue division (*i.e.*, Y intercept) of 25 percent.[109]

A third flaw in the way Otter Tail proceeded with its less than 200-mile coal regression is that it failed to include in its analysis or to test any independent variable other than mileage, despite the fact that there are several such variables that logically would affect the revenue division for real world interline movements of unit train coal. This failure also affects the greater than 200-mile coal regression and the non-coal regression developed by Otter Tail.

Principal among the relevant independent variables that Otter Tail ignored are those related to the market power (negotiating leverage) of the carriers involved in the real world interline movement. It is well recognized by the Board that in the real world a carrier that has a bottleneck at either the origin or the destination will have negotiating leverage that substantially exceeds that of a potential interline connection that must compete with another carrier for its portion of the movement. One would expect that, other factors being equal, a bottleneck carrier's division of revenue would exceed that of a non-bottleneck carrier. In designing its regressions, Otter Tail made no effort to account for the existence/absence of bottleneck segments in the through movement. This is a significant oversight.

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[108] *See* BNSF Reply electronic workpaper "inter01od_Prediction Intervals.xls" at worksheet "DFFITS." A diagnostic test known as DFFITS was performed on each observation. DFFITS is a standardized measure of the difference of the predicted Y when that observation is omitted. The value for movement 4 of -7.2426 provides overwhelming statistical evidence that this observation is an outlier. *See* Maddala, G.S., *Introduction to Econometrics,* 2nd ed. (Englewood Cliffs: Prentice Hall, 1992) (hereafter "Maddala Text"), p. 487, at BNSF.RP.WP.III.A-0225.

[109] OTP Opening Exh. III-A-6 at page 5.

Otter Tail has also made no effort to account for other competitive factors that could influence the relative shares of real world divisions, such as the existence of geographic competition for coal movements. And Otter Tail has neglected another independent variable, in designing its regression, that would likely affect divisions on unit train coal traffic -- varying traffic densities on the line segments of real world interline carriers. In her concurring opinion in *Nevada Power II*, Chairman McDonald recognized that the existence of differing levels of density could be a relevant factor in assessing divisions of revenue on interline movements.[110]

Otter Tail should have tested these other potential independent variables to determine whether their inclusion in the regression would have yielded a regression equation that produced a better fit to the observed data. Instead, Otter Tail simply assumed that the only factor that affects the division of revenue on interline movements in the real world is length of haul, and made no effort to examine other factors that are known to influence revenue divisions. The fundamental problems with regressions that have omitted relevant variables from the specification are well recognized by statisticians. As one statistician has stated,

> Whenever you have an omitted (or left-out) variable, the interpretation and use of your estimated equation becomes suspect. Leaving out a relevant variable, like price from a demand equation, not only prevents you from getting an estimate of the coefficient of price but also usually causes bias in the estimated coefficients for the variables that are in the equation.
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> . . .

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[110] 10 I.C.C.2d at 281.

> Thus, omitting a relevant variable is usually evidence that the entire estimated equation is suspect because of the likely bias in the coefficients of the variables that remain in the equation.[111]

At bottom, Otter Tail's regression results are nothing more than a statistically manipulated mileage prorate.

The last major flaw in Otter Tail's formulation of its regressions is Otter Tail's use of a linear functional form of the regression equation. The functional form of the regression equation is a primary determinant of the *goodness of fit, i.e.*, the ability of the equation to reliably explain the variation in the data points. One would expect the divisions percentage to approach zero as the length of haul approaches zero, particularly on unit train coal shipments where the cost to originate and terminate these shipments is relatively low. The absurdity of the regression results identified earlier, *i.e.*, Otter Tail's assumption that a carrier would be entitled to a division of 25 percent even if it had a length of haul that was zero, is a direct result of Otter Tail's employing the simple linear form of regression: Revenue Percent = A + B * Miles Percent.

As discussed below, Otter Tail did not include in its under 200 mile regression any data points reflecting a BNSF percentage length of haul of less than 10.69 percent. The absence of such data points means that Otter Tail is likely to have missed the lower percent revenues to miles relationship that one would expect in the real world and that would have suggested that a non-linear equation form would be required to accurately reflect divisions at lower percentage hauls. In other words, the relevant range problem inherent in Otter Tail's regression (which BNSF discusses immediately below) is more severe than is suggested merely by looking at the

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[111] "Studenmund Text," p. 171-172, included in BNSF's workpapers at BNSF.RP.WP.III.A-0176 to III-A-0177.

size of confidence intervals. Here, the relevant range problem also is likely to mask the need for a non-linear regression equation that would have resulted in lower estimates of divisions percentages for moves with low percentage hauls. Otter Tail's evidence gives no indication that Otter Tail tested other functional forms for *any* of the three regressions it developed, including the less than 200-mile regression equation. Instead, Otter Tail chose to rely on a linear functional form for these regressions *despite* the ludicrous results it produces for the less than 200-mile coal regression. Again, the statistical literature makes clear the importance of selecting an appropriate functional form and the bias that can result if an inappropriate functional form is selected.[112]

(b) Errors in Interpreting the Regression Results

Even if the five data points that Otter Tail relied upon to develop the less than 200-mile coal regression did not suffer from the various defects described above, reliance on such a small number of data points contributes to a fundamental problem with Otter Tail's application of the

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[112] As explained in one such text,

> If an incorrect functional form is used, then the probability of mistaken inferences about the true population parameters will increase. Using an incorrect functional form is a kind of specification error that is similar to the omitted variable bias discussed in Section 6.1. Although the characteristics of any specification errors depend on the exact details of the particular situation, there is no reason to expect that coefficient estimates obtained from an incorrect functional form will necessarily be unbiased and have minimum variance. Even if an incorrect functional form provides good statistics within a sample, though large residuals almost surely will arise when the misspecified equation is used on data that were not part of the sample used to estimate regression coefficients.

"Studenmund Text," p. 230, included in BNSF's workpapers at BNSF.RP.WP.III.A-0174.

resulting regression to the short-haul coal movements in its stand-alone traffic group. Otter Tail uses the regression to predict results for cross-over traffic movements that lie well outside the relevant range of the observed data reflected in the five data points. As reflected in Table III.A-14 above, the shortest percentage length of BNSF haul for any movement considered in the analysis is 10.69 percent of the miles in the through movement.[113] Yet Otter Tail uses its regression results to predict the revenue division that the SARR will earn on numerous movements on which it would carry the traffic for only two or three percent of the total length of haul. *See* OTP Opening Exh. at III-A-3, pages 1-7 of 27 (showing percentage divisions on dozens of movements with claimed SAC revenue of { } that go off-line at Converse and Donkey Creek).

As standard statistical literature makes clear, a regression is a poor predictor of the value of the dependent variable when the independent variable has values that fall well outside the range of observed data.[114] Statisticians distinguish between interpolation, which denotes using values of X within the relevant range to make predictions, and extrapolation, which denotes using values of X outside the relevant range to make predictions. Specifically, as one statistician explained,

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[113] As discussed above, the 10.69 percent is the mileage associated with a re-routed 15-car movement and, therefore, is not representative for estimating the percentage of miles that BNSF carries the unit coal train PRB traffic selected by Otter Tail. The movement with the next lowest percentage of BNSF miles is 11.76 percent. *See* Table III.A-14. Further, as explained above, none of the five movements considered in the under 200 mile coal regression is a unit coal movement originating on BNSF in the Powder River Basin.

[114] *See* "Maddala Text," p. 85-87 included in BNSF's workpapers, at BNSF.RP.WP.III.A-0221 to III-A-0223. Greene, William H. *Econometric Analysis*, 2nd Edition (New York: MacMillan Publishing Company, 1993) (hereafter "Greene Text"), p. 164-166, included in BNSF's workpapers at BNSF.RP.WP.III.A-0216 to 0219.

> In general, the extrapolation of a regression equation to data that are outside the range over which the equation was estimated runs increased risks of large forecasting errors and incorrect conclusions about population values. This risk is heightened if the regression uses a functional form that is inappropriate for the particular variables being studied . . . .[115]

It is generally understood that even in situations where it is appropriate to interpolate, it will be inappropriate to extrapolate. Moreover, the further outside the relevant range one seeks to predict by extrapolation, the greater the uncertainty in the prediction. The Board itself has recognized that "[a]pplying regression results to circumstances outside the relevant range of data upon which the regression equations are based may not produce valid results."[116]

In the case of Otter Tail's less than 200-mile regression, this fundamental statistical error that Otter Tail has committed is exacerbated by the very small number of data points that Otter Tail used to develop the regression. This small number of data points means that the predictive value of the regression – even within the relevant range – is very poor. BNSF witness John Klick performed a series of analyses designed to test the predictive value of Otter Tail's coal regressions. His analysis confirms that the predictive quality of Otter Tail's regression is very poor, both within and outside the relevant range.

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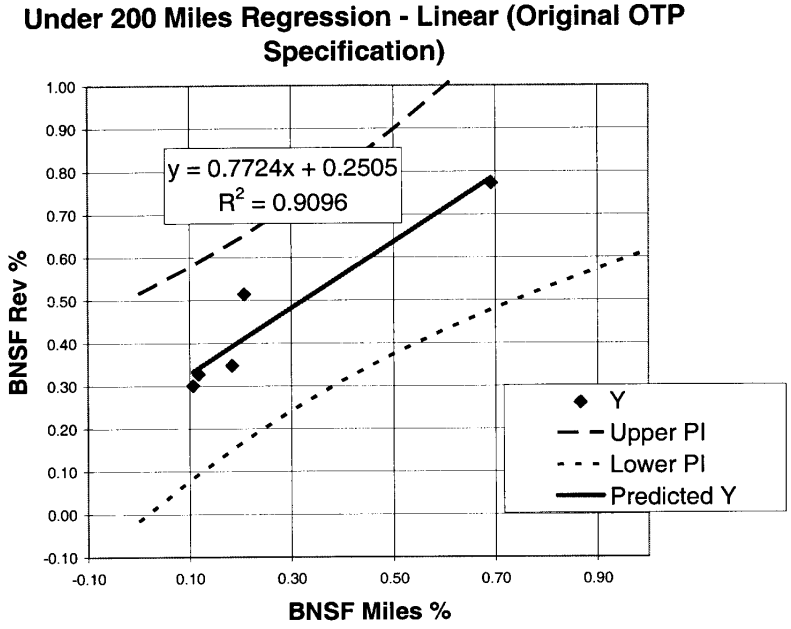
[115] *See* "Studenmund Text," p. 230-232, included in BNSF's workpapers at BNSF.RP.WP.III.A-0174 to 0175.

[116] *Conrail II*, 10 I.C.C. 2d at 877. This decision is in BNSF's workpapers at BNSF.RP.WP.III.A-0188 to III.A-0215. The referenced quote is at BNSF.RP.WP.III.A-0199.

A standard method of assessing the predictive quality of a regression is to display the prediction intervals for the regression coefficients at the 95 percent confidence level.[117] This confidence interval is shown in the graph below for Otter Tail's under 200-mile regression:[118]



This graph demonstrates two things. First, even within the relevant range of the regression (where BNSF percentage of miles range between 10 percent and 70 percent of the movement), the 95 percent confidence interval is quite large. For example, if BNSF had a percentage length of haul of 12 percent – which is within the relevant range – the width of the 95

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[117] *See* "Greene Text," p. 164-166, included in BNSF's workpapers at BNSF.RP.WP.III.A-0216 to 0219.

[118] *See* BNSF Reply electronic workpaper "inter01od_Prediction Intervals.xls" at worksheet "<200 Mile Linear PI."

percent prediction interval at that mileage is between 9.5 percent and 59.1 percent of through revenue, hardly a useful range for predicting the outcome of a revenue divisions negotiation.[119] Moving outside the relevant range of the regression – as Otter Tail has for the majority of its coal traffic – by assuming, for example, that the percentage length of haul is 3 percent, shows that one could be 95 percent confident that the percentage revenue division would be somewhere between 1.3 percent and 53.5 percent of through revenues. These results indicate that Otter Tail's under 200-mile regression would not be reliable as a predictor of revenue divisions, even if the underlying data had anything to do with PRB unit train coal movements.

(3) Otter Tail Has Not Justified its Use of the MMP to Calculate Divisions on Non-Coal Movements

For the vast majority of the non-coal movements, Otter Tail relies upon the modified mileage prorate ("MMP").[120] Otter Tail observes that MMP has been used by the Board in other SAC cases. But that does not constitute an affirmative showing that MMP should be used here,

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[119] The prediction interval for Otter Tail's greater other regressions demonstrate that these regressions also have a low probability of being correct (*i.e.*, poor predictive power). For example, the greater than 200 mile coal regression and the non-coal regression have prediction intervals equal to 30 percent and 60 percent, respectively, at the 95 percent prediction interval. *See* BNSF Reply electronic workpaper "inter01od_Prediction Intervals.xls" at worksheets ">200 Mile PI" and "Non Coal PI."

[120] Otter Tail uses a linear regression based on 8 data points to allocate revenues on a small portion of the non-coal revenue, equal to { } prior to Otter Tail's train gross up calculation. [*See* OTP Opening electronic workpaper "bnrv2002.dbf"] BNSF summarized Otter Tail's regression based non-coal revenue assumptions. *See* BNSF Reply electronic workpaper "bnrv2002 stcc regression.xls." Otter Tail's non-coal regression suffers from many of the flaws identified above for the less than 200-mile coal regression. It relies upon an extremely limited data set of 8 Origin/Destination pairs that comprise a mere 30 carloads and { } of revenue. Many of these moves (and the majority of units and revenue) are well outside of the geographic scope of the hypothesized railroad, providing little to no comparability. *See* OTP Opening electronic workpaper "inter01od.xls" at worksheet "Non Coal Regression."

particularly in light of the Board's statement that "[w]e have not adopted a single, preferred procedure for developing revenue divisions on cross-over traffic."[121]

Otter Tail suggests that it was appropriate for it to use the MMP because "actual divisions were not available for non-coal traffic." OTP Nar. at I-16. As explained above, market based divisions negotiations between real world railroads are not relevant to the estimation of revenue divisions on cross-over traffic. The Pareto superior outcome that is the linchpin of real world divisions negotiations is not available to the residual BNSF because the Board has not allowed the residual incumbent to seek its full historical contribution on the through movement in negotiations with the SARR.

Even if real world divisions were relevant to the cross-over allocation issue – and they are not – the supposed unavailability of such data does not constitute an affirmative justification for Otter Tail's use of the modified mileage prorate in estimating divisions for non-coal traffic. Otter Tail provides no such justification, and its reliance on MMP should be rejected.

(4) The Density Adjusted Revenue Allocation Procedure Recommended by BNSF Is a More Rational Basis for Allocating Revenues on Cross-Over Traffic

Otter Tail does not approach revenue allocation from the perspective of cost recovery, but the procedures it advocates speak implicitly to that subject. The MMP, which Otter Tail uses for most of its non-coal traffic, implicitly treats each mile of the SARR, including the very dense portions adjacent to the PRB, as having the same total cost per ton as the less dense portions of the residual BNSF that must terminate this traffic. Otter Tail's regressions, which use mileage as the only independent variable, similarly treat distance traveled as the only movement

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[121] *TMPA* at 31, n.74.

characteristic that speaks implicitly to cost coverage. While it is clear that some costs are directly related to length of haul, the ability to recover costs also depends on the density of traffic moving over the on-SARR and off-SARR line segments.

Railroad economics instructs that the ability to recover joint and common costs is affected by the volume of traffic moving over the relevant facilities. In the *Coal Rate Guidelines* decision, the ICC discussed the existence of and reasons for the railroad industry cost structure characterized by marginal costs less than average costs:

> In our February 1983 [interim] decision, . . . we noted that (at least in current output ranges) the railroads' long-run marginal costs are less than their long-run average costs. We attributed this to the existence of significant production economies in the industry. As we explained (at p. 525, footnote omitted):
>
> Most importantly, railroads exhibit significant economies of scope and density. Economy of *scope* refers to the fact that the rail plant is indivisible and can produce numerous services at less cost than those services could be produced by separate rail plants for each service. Economy of *density* refers to the fact that greater use of the fixed plant results in a declining average cost. Thus, the marginal cost of rail service is less than the average cost, because the fixed plant is used in a progressively more efficient manner.
>
> The differential between marginal costs and average costs cannot be assigned directly to specific movements by any conventional account methodology. Hence, we refer to it as the "unattributable costs."

Coal Rate Guidelines.[122]

The Board recently reaffirmed these principles of cost recovery in its August 20, 2002 decision in *PPL*:

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[122] 1 I.C.C. 2d at 526.

> [I]t is preferable to allocate the capital carrying charges on a level annual basis *to reflect the declining capital investment needed per unit of output as the rail system is used more intensively. This pattern of capital recovery reflects the production economies that characterize the economic structure of the rail industry.*[123]

Here, in the discussion of the railroad economics principles that are a foundation of Constrained Market Pricing, there is support for an allocation rule that improves upon mileage based allocation procedures by also accounting for *potential* differences in traffic densities on the SARR's main line (on which the putative cross-over traffic likely flows) and on the off-line portions of the residual incumbent's track. As the Board noted in the *Coal Rate Guidelines* quoted above,"[g]reater use of fixed plant results in a declining average cost." Thus, observed measurable differences in the use of fixed plant on the pertinent portions of the SARR and the residual incumbent, should enable the Board reasonably to conclude that, all else being equal, the denser route has more sources of contribution per ton mile than the less dense route and thus may be able to make a sufficient contribution to the recovery of the pertinent costs (which prior to break up were part of the same railroad) with a lower share of the cross-over traffic net revenues as compared to the sparsely traversed route. Thus, all else being equal, the more traffic there is moving over a given line segment, the lower the amount of cost that needs to be recovered on average from each individual ton-mile in order to recover the total costs of the segment.[124]

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[123] *PPL*, at 12 n.21 (emphasis added).

[124] It is important to bear in mind that Ramsey pricing principles only say that – all else being the same – the average mark up is lower the greater is the pool of demand from which the joint and common costs can be recovered. Under Ramsey principles any particular rate may be significantly above the associated variable cost. Breaking up the incumbent into differentially dense interlined parts does not allow for a straight-forward application of Ramsey pricing principles to the individual segments of an interline move.

The foregoing discussion suggests that in order for the residual incumbent not to be unduly disadvantaged in its ability to defray the full, forward-looking costs associated with the off-line portion of a cross-over movement, its share of the net revenues from cross-over traffic ought to be adjusted in some fashion to reflect the potentially lower density of traffic on the off-line facilities, as compared to the main line facilities of the SARR. On higher density segments, lower average net revenue per unit of traffic will be needed to recover total costs of the segment. On lower density segments, relatively higher average revenue per unit of traffic is needed to recover the same quantum of (prudently incurred) total costs.[125]

Taking traffic densities into account in allocating cross-over revenues is logically linked to the complaining shipper's incentive for including cross-over traffic in the first instance. The reason a shipper selects cross-over traffic rather than building additional facilities to handle that traffic is that it wants to garner increased revenues to cover the fixed costs of the SARR while avoiding paying the costs of the off-line segment. It is neither logical nor equitable to allow the complaining shipper to increase its traffic density, and thus capture the linked contribution, while denying the owner of the less dense off-line segments the contribution it requires to recover its costs.

BNSF's proposed density adjusted revenue allocation approach is an allocation procedure that attempts to account for the critical differences in densities and thus is more likely to ensure that the off-line(s) of the residual incumbent will remain economically viable after the arbitrary

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[125] For example, if the cross-over traffic is the only traffic on the off-line and if it is prudent to serve that traffic, then the contribution from cross-over traffic has to be high enough to cover the full forward looking costs of the off-line. This could be substantially more than what would be allocated using a mileage prorate rule.

split of the vertically related entities. Like any allocation rule, DARA is still arbitrary in the sense that it entails allocation of revenues that heretofore were making a contribution to the overall pool of indivisible joint and common costs. The improvement that DARA offers over the modified mileage prorate stems from the additional feature built into DARA, namely that the revenue allocation reflects differing traffic densities on the two railroads. If the off-line traffic is very sparse, its average cost per unit of traffic is high, thereby indicating that it should be allowed to keep a greater share of the contribution from cross-over traffic. Where traffic densities are the same on the pertinent portions of the SARR and the residual incumbent, DARA will produce approximately the same allocation as would the modified mileage prorate. But where the densities differ, as they likely will, the residual incumbent, who must shoulder its share of joint and common costs needed to support the cross-over traffic, will be more likely to remain viable even if the density of traffic on its off-lines is low as compared to the density on the SARR's main line.

The particular application of DARA developed by Mr. Klick and described below is consistent with the economic principles discussed above and also has the virtue of being relatively straightforward to implement.

(5) The Procedure for Implementing DARA

Any procedure accepted by the Board for allocating revenue on cross-over traffic should attempt to divide revenues so as to allow for coverage of pertinent on-SARR and off-SARR costs and to do so in an equitable manner. In the context of the hypothetical stand-alone world, "equitable" is more than a vague invocation of what seems fair under the circumstances, it refers to an approach that is even-handed in terms of providing both the SARR and the residual incumbent the same opportunity to cover costs over the long term. When it comes to cross-over traffic, the survival of the residual incumbent is in the SARR's interest, because the SARR will

lose all revenue contribution from cross-over traffic if the residual incumbent needed to handle the through movement is no longer viable as an interchange carrier.

Cost coverage, and hence revenue allocation between the SARR and the residual incumbent should take account of traffic density as well as length of haul. Average costs per unit of traffic decrease as densities increase because the fixed, joint and common costs of a given rail line can be recovered from a larger volume of traffic.[126] Otter Tail's SARR is designed to take advantage of economies of density. But relatively *lower traffic densities* on the portions of the residual BNSF used by the cross-over traffic mean that the residual BNSF needs to receive relatively *higher divisions* per unit of traffic on each cross-over traffic movement than does the SARR in order for that movement to make the same contribution to overall fixed cost coverage on each of the two carriers.

BNSF's witness John C. Klick of FTI Consulting has developed a density-adjusted revenue allocation procedure that recognizes that greater use of the railroad's fixed plant results in a declining average cost and also recognizes that the division of revenues between the SARR and the residual BNSF should permit each carrier to cover its attributable costs and to make some contribution to the recovery of its joint and common costs. Mr. Klick applied the DARA procedure using the following five steps:

1. Development of total miles on the OTRR and on the residual BNSF for each cross-over movement.

2. To estimate attributable costs for each cross-over traffic movement, Mr. Klick calculated URCS variable costs – using the 2001 URCS for BNSF – for the

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[126] *See Coal Rate Guidelines*, 1 I.C.C.2d at 526. The Board recently affirmed this fundamental principle of railroad economics in its August 20, 2002 decision in *PPL*. *See PPL*, at 12, n.21.

OTRR and residual BNSF segments of the movement. To do so, Mr. Klick used the Ex Parte No. 399 costing assumptions employed by the Board in preparing its Costed Waybill, and ignored any additional interchange costs that arguably could be attributed to the additional interchange(s) created by the cross-over traffic assumption.[127] The portion of the end-to-end revenue required to cover each carrier's variable costs are assigned to each carrier, consistent with the divisions construct referred to in *TMPA*.[128]

3. The difference between the revenues currently generated by BNSF for the end-to-end movement, and the sum of the variable costs calculated in step 2 represents the total contribution ("TC") from each movement that is available to the OTRR and the residual BNSF to defray their respective fixed, joint and common costs.[129]

4. For each cross-over traffic movement, Mr. Klick developed average density per route mile on the lines of the OTRR and the residual BNSF. Densities per *route* mile are appropriate because "fixed costs" are presumably associated with creating a single-track railroad. The additional costs associated with putting in passing sidings or multiple track, heavier rail, and enhanced signaling and communications systems would be part of what is reflected in the variable portion of URCS roadway ownership costs.

5. The contribution developed in step 3 was allocated between the OTRR and the residual BNSF in direct proportion to the length of haul and inverse proportion to

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[127] Using BNSF's variable costs for both the OTRR and the residual BNSF segments has two attributes that should be noted. First, it is more precise than the use of "mileage blocks," which are merely surrogates for the variable costs required to serve the traffic. Second, by using BNSF's variable costs for the OTRR segment, DARA permits the OTRR to retain all of the revenues associated with whatever efficiency advantage it has over the real-world BNSF.

[128] As the Board recognized recently in its *TMPA* decision, the revenue division received by each participant in a joint move must (1) provide for the recovery of each carrier's attributable costs of service, and (2) make some contribution to its unattributable costs. *TMPA* at 31, n.73. Thus, whatever contribution (difference between revenues and attributable costs) is generated by an end-to-end movement over the defendant railroad in the real world is available to defray the fixed, joint and common costs of the end-to-end route required to serve the traffic. In the stand-alone world, this contribution must be allocated to the SARR and the residual incumbent when that movement becomes cross-over traffic.

[129] If attributable costs are properly understood to be directly variable costs, as Otter Tail contends, then they should be somewhat lower than the variable costs that BNSF has calculated. As a result, BNSF's DARA procedure may understate the total contribution that should be allocated on the basis of density-adjusted mileage, which would tend to overstate the percentage of revenue that Mr. Klick has allocated to the OTRR.

the densities on each carrier, consistent with the economic realities described above.

Although FTI created a 2002 URCS for the purposes of developing BNSF's variable costs for the issue traffic in this proceeding, Mr. Klick has used the 2001 BNSF URCS to implement the DARA procedure because the STB has not yet developed the 2002 make-whole factors that would need to be added to the single and multiple-car shipments that are included in the OTRR traffic group. Thus, the 2001 BNSF URCS was used in order to maintain a consistent relationship between the variable costs and the make-whole factors.[130]

The following equations reflect the combined effect of these five steps, and were used to allocate total revenues between the OTRR and residual BNSF:

$$Rev_{OTRR} = VC_{OTRR} + TC \quad * \left[\frac{1}{\frac{Density_{OTRR}}{Density_{ResBNSF}} * \frac{Miles_{ResBNSF}}{Miles_{OTRR}} + 1} \right]$$

$$Rev_{ResBNSF} = VC_{ResBNSF} + TC \quad * \left[\frac{\frac{Density_{OTRR}}{Density_{ResBNSF}} * \frac{Miles_{ResBNSF}}{Miles_{OTRR}}}{\frac{Density_{OTRR}}{Density_{ResBNSF}} * \frac{Miles_{ResBNSF}}{Miles_{OTRR}} + 1} \right]$$

Note that, consistent with the construct set forth in *TMPA* at 31, n.73, the first term in each revenue allocation equation covers the variable (*i.e.*, attributable) costs of the OTRR and the residual BNSF, respectively. As noted earlier, because Mr. Klick relies upon BNSF's URCS

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[130] *See* BNSF Reply electronic workpaper "Assumptions used for Phase III costing.doc" for additional detail on how the cross-over traffic was costed for the purposes of performing the DARA calculations.

costs to develop the variable costs for the OTRR, the OTRR retains all revenues associated with its efficiency advantage over the real-world BNSF. The second term in each equation serves to make a density-adjusted allocation of the contribution available from the cross-over traffic movement to the OTRR and residual BNSF, respectively.

The following table provides some hypothetical examples of how DARA works under different assumptions about length of haul and relative density on the stand-alone railroad (SARR) and residual incumbent (RI) portions of a cross-over traffic movement:

Table III.A-15
Examples Comparing How DARA And The MMP
Would Divide Revenues Between the SARR and the Residual Incumbent

	Case 1	**Case 2**	**Case 3**	**Case 4**	**Case 5**	**Case 6**
Total Revenue	$2000	$2000	$2000	$2000	$2000	$2000
Miles						
SARR	500	250	750	100	500	25
RI	500	750	250	900	500	975
Density						
SARR	75 MGT	75 MGT	75 MGT	75 MGT	50 MGT	50 MGT
RI	25 MGT	25 MGT	25 MGT	25 MGT	50 MGT	50 MGT
Variable Cost						
SARR	$300	$175	$425	$100	$300	$62.50
RI	$300	$425	$175	$500	$300	$537.50
Total Contribution to Fixed Costs	$1400	$1400	$1400	$1400	$1400	$1400
SARR Division						
Mod. Mileage Prorate	$1000	$615	$1385	$333	$1000	$308
SARR Division DARA						
VC Portion	$300	$175	$425	$100	$300	$62.50
FC Portion	$350	$140	$700	$50	$700	$35
Total	*$650*	*$315*	*$1125*	*$150*	*$1000*	*$97.50*

Note that when the densities and miles are identical on both the SARR and the residual incumbent (Case 5), DARA results in the same revenue division as the modified mileage prorate methodology employed by Otter Tail. Where densities are identical, but one carrier has a very short haul (Case 6), DARA creates a more realistic division. Where densities are lower on the residual incumbent than on the SARR (cases 1 through 4), however, DARA also provides the residual incumbent with a higher division than does the modified mileage prorate – in recognition of the fact that the lighter-density residual incumbent must recover more fixed cost per unit-mile of traffic than the higher-density SARR needs to.

In summary, the DARA procedure is superior to the modified mileage prorate employed by Otter Tail because it (1) more precisely calculates attributable costs than does the use of mileage blocks, (2) explicitly provides for the recovery of each carrier's attributable costs (while permitting the SARR to retain all revenues associated with its efficiency advantage over the real-world BNSF), consistent with the Board's statements in *TMPA*, and (3) divides the contribution generated by the cross-over traffic movements in a way that provides for equi-proportional recovery of fixed, joint and common costs by the SARR and the residual incumbent, consistent with the fundamental cost characteristics of the railroad industry that formed the foundation of Constrained Market Pricing.

Although DARA produces less distortion in the outcome of the SAC test than the mileage-based allocations used by Otter Tail, the results of using cross-over traffic even with DARA will still be biased in favor of the complaining shipper. This is illustrated by referring back to the simplified example set forth in section III.A.1.a.(2)(a). The simplified example assumed away operating costs, so none of the $60 realized on the OAX movement would be needed to cover attributable costs. Thus, under DARA the $60 is contribution to be split in

direct proportion to mileage and in inverse proportion to density. The simplified example already assumes that segments OA and AX are the same distance; assume as well that the movements OAD and OAX have the same annual volume. Segment OA would thus experience a density per mile twice that of segment AX, and under DARA the revenue would be allocated $20 to segment OA and $40 to segment AX. Using DARA, the shipper would still show that revenues exceed costs, but the magnitude of the distortion from properly-developed SAC is reduced to $10 instead of $20. The residual incumbent still suffers a shortfall on the OAX movement, but the shortfall is $20 instead of $30. This demonstrates that DARA results in less distortion from the allocation of revenues on cross-over traffic than does an MMP, even though it does not produce the same results as a full SAC analysis.

Put another way, the DARA procedure would never allocate all net revenue to the residual incumbent, not even in the extreme case where the only traffic moving over residual incumbent is the cross-over traffic. It does however ensure that each cross-over movement contributes to coverage of joint and common costs on the SARR and on the residual incumbent in inverse proportion to the respective traffic densities on the two segments. This inverse proportionality feature does not favor either carrier in the sense that it does not differentially affect either carrier's ability to cover its long term economic costs.

(6) Results Of Application Of DARA To The OTRR Cross-Over Traffic

Mr. Klick applied the DARA procedure in this case and then compared the results of the cross-over revenue allocations derived using DARA with those derived by Otter Tail as described below. Mr. Klick performed the comparison separately for coal and non-coal traffic. For coal traffic, the OTRR interchanges traffic with the residual incumbent at several locations, including Donkey Creek ({ } million tons), Converse ({ } million tons), Jones Junction

({ } million tons), Fargo ({ } million tons), and Benson ({ } million tons).[131] As shown in Table III.A-16, Mr. Klick compares the parties' cross-over revenue allocations for coal traffic interchanged at Donkey Creek, Converse, and all other interchange locations (*i.e.*, Jones Junction, Fargo and Benson). Regarding non-coal traffic, the OTRR transports several types of non-coal commodities. As shown in Table III.A-16, Mr. Klick compares the parties' cross-over revenue allocations for four different types of non-coal traffic -- manifest, intermodal, automotive and grain.

[131] The tonnages are those projected by Otter Tail in base year 2002. *See* OTP Opening Exh. III-A-3 at 1 to 8.

Table III.A-16
Comparison Of Cross-Over Traffic Revenue Allocations
To OTRR And Residual BNSF Under Otter Tail Approaches And DARA[132]

			Revenue ($ in Millions)		Mills Per Ton-Mile	
	Ton-Miles (Billions)	Average Length of Haul	OTP Approach	DARA	OTP Approach	DARA
Coal						
Via Donkey Creek						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }
Via Converse						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }
Other Interchanges						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }
Non-Coal						
Manifest						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }
Intermodal						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }
Auto						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }
Grain						
OTRR	{ }	{ }	{ }	{ }	{ }	{ }
Residual BNSF	{ }	{ }	{ }	{ }	{ }	{ }

[132] *See* BNSF Reply electronic workpaper "DARA_Summary.xls." All figures in this table are based on BNSF's revised OTRR traffic group.

i) Coal Traffic

Table III.A-16 shows the gross disparity in the coal revenues allocated to the OTRR and the residual BNSF on a mills per ton-mile basis under Otter Tail's proposed methodology for coal interchanged at Donkey Creek and Converse. For example, for coal interchanged at Donkey Creek, Otter Tail proposes that the OTRR earn approximately { } mills per ton-mile for its portion of the haul and provides the residual BNSF with only { } mills per ton-mile for its portion. In other words, under Otter Tail's approach, the OTRR earns over 11 times more than the residual BNSF on a mills per ton-mile approach. Similarly, for coal interchanged at Converse, the OTRR earns about 5 times more than the residual BNSF on a mills per ton-mile basis under Otter Tail's methodology.

When the DARA procedure proposed by BNSF is substituted for Otter Tail's approach, Table III.A-16 shows that OTRR's revenue divisions on coal movements leaving the OTRR at Donkey Creek and Converse are reduced significantly while BNSF's revenue divisions are increased. Specifically, for coal exiting at Donkey Creek, the OTRR revenue division is reduced from { } mills per ton-mile to { } mills per ton-mile, while the residual BNSF's division increases from { } mills per ton-mile to { } mills per ton-mile using the DARA procedure. For coal exiting at Converse, the OTRR revenue division is reduced from { } mills per ton-mile to { } mills per ton-mile, while the residual BNSF's mills per ton-mile increases from { } mills per ton-mile. With respect to coal exiting via the other interchange points, Otter Tail's divisions approach resulted in revenue per ton-mile of { }, respectively, for the OTRR and the residual BNSF; when DARA is applied, revenues per ton-mile are { } for the OTRR and residual BNSF, respectively.

Thus, application of DARA significantly narrows the gap generated by Otter Tail's approach in the allocation of revenue between OTRR and the residual BNSF for movements

interchanged at Donkey Creek and Converse. However, DARA continues to generate higher revenue per ton-mile for OTRR than it does for the residual BNSF for coal interchanged at those two locations. Application of DARA to coal exiting the OTRR at the other locations somewhat increases the spread between the mills per ton-mile for the OTRR and the residual BNSF, with the residual BNSF continuing to have a higher mills per ton-mile. As explained below, the nature of these results is explained by the differing characteristics (*i.e.*, length of haul, density and contribution) of the cross-over traffic using the different interchanges.

In interpreting these results for coal movements, it is helpful to consider two items – (1) average densities on the OTRR and residual BNSF routes used by the cross-over coal traffic which are depicted in a map included as Exhibit III-A-11, and (2) the through revenue per ton mile. With respect to through revenue, on average, the end-to-end revenues per ton-mile are highest for movements over Converse Junction ({ }mills per ton-mile for an average end-to-end haul of { } miles)[133] and lowest for movements via the "other" interchange locations ({ } mills per ton-mile for an average end-to-end haul of { } miles).[134] Movements via Donkey Creek generate end-to-end revenues per ton-mile of { } mills for an average end-to-end haul of { } miles.[135]

The DARA results reflect the interplay of a number of factors relevant to the recovery of costs on the on-SARR and off-SARR portions of cross-over movements. As explained above,

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[133] *See* BNSF Reply electronic workpaper "DARA_Summary.xls" at worksheet "summary."

[134] *See* BNSF Reply electronic workpaper "DARA_Summary.xls" at worksheet "summary."

[135] *See* BNSF Reply electronic workpaper "DARA_Summary.xls" at worksheet "summary."

DARA first ensures that the OTRR and the residual BNSF cover their attributable (*i.e.*, variable) costs, then divides the remaining contribution in a way that is directly proportional to the average length of haul and inversely proportional to the average density. On OTRR's very short coal movements – those leaving the SARR at Donkey Creek and Converse, the OTRR's attributable costs would be significantly lower than the 28.2 percent to 33.4 percent of revenues assigned to them by Otter Tail's flawed regression-based approach.[136] Because the costs that the OTRR incurs to originate this coal traffic are recovered over substantially fewer ton-miles than are the costs the residual BNSF incurs to terminate or interchange this traffic, DARA still results in a revenue division that generates substantially higher revenues per ton-mile for the OTRR than for the residual BNSF for coal exiting the OTRR at these locations.

Coal leaving the OTRR at the other interchange locations with the residual BNSF has very different characteristics. On these movements, OTRR has the much longer average haul ({ } miles versus { } miles for the residual BNSF),[137] and the average density on the OTRR is much greater than average density on the residual BNSF segments used by these coal movements.[138] Consequently, application of DARA results in a revenue division for the residual BNSF that is { } mills per ton-mile, or 35 percent higher, than the { } mills per ton-mile generated for the OTRR portion of these moves by DARA.

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[136] *See* Table III.A-16 above, where Otter Tail's percent of revenue for the OTRR at Donkey Creek is equal to 28.2 percent = { } and Otter Tail's percent of revenue for the OTRR at Converse is equal to 33.4 percent = { }. *See* Section III.A.3.d., above.

[137] *See* Table III.A-16 above.

[138] *See* BNSF Reply electronic workpaper "OTRR and Residual BNSF Densities.xls."

ii) Non-Coal

While all of the same factors pertaining to cost recovery are in play on the non-coal movements, application of DARA to the non-coal shipments does not result in the same substantial changes from the revenue divisions generated by Otter Tail's approach. Specifically, using DARA reduces the average division for the OTRR for all non-coal traffic, combined from the 18.2 percent calculated by Otter Tail to approximately 16.3 percent.[139] Using DARA has the effect of reducing non-coal revenues earned by OTRR by { }million. *Id.* For manifest, intermodal and automobile traffic, DARA results in reductions of OTRR revenues in the range of 11 percent to 15 percent. For grain shipments, DARA actually results in an increase in the OTRR revenue division of approximately 4.4 percent.[140] Because margins above attributable costs are generally small for this traffic, the effect of considering the density-adjusted length of haul[141] – which is used to divide contribution above attributable cost – is reduced to a considerable extent. This overall result is due, in large measure, to the fact that (1) attributable costs for many of these movements comprise a much higher proportion of through revenues, leaving less contribution to be allocated on the basis of density-adjusted mileage, and (2) these

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[139] *See* BNSF Reply electronic workpaper "DARA_Summary.xls" at worksheet "summary."

[140] The slight increase to the grain revenues allocated to OTRR's overhead bridge service is a function of the significantly higher percentage of trainload shipments associated with the grain traffic as compared to manifest or intermodal traffic. As a result, the off-SARR costs developed by URCS are relatively lower, due to reduced originating and terminating expenses associated with trainload traffic. Unlike Otter Tail's generic modified mileage prorate that fails to distinguish between different traffic types, DARA recognizes the specific movement parameters that are relevant to a realistic allocation of revenues for cross-over traffic.

[141] BNSF Reply Exhibit III.A-12 is a map showing the average densities on the OTRR and residual BNSF routes used by the cross-over non-coal traffic.

movements have much longer lengths of haul than those that characterize the majority of the OTRR's coal cross-over movements.

iii) Summary

DARA is superior to the mileage-based allocations used by Otter Tail as a mechanism for allocating cross-over traffic revenues. Consistent with the Board's observations about allocations of cross-over traffic in *TMPA*, DARA distinguishes between the coverage of attributable costs for both carriers and the sharing of whatever contribution exists above the combined attributable costs of the two carriers. Significantly, DARA makes an explicit calculation of attributable costs. Neither revenue allocation approach used by Otter Tail attempts to quantify the contribution in excess of attributable costs that is available to defray unattributable costs. Moreover, Otter Tail advances no principle for dividing this contribution between the SARR and the residual incumbent. While there is an implicit allocation in MMP (by virtue of the additional mileage blocks for originating and terminating movements) of coverage of the attributable costs of originating and terminating traffic, DARA is more accurate. For example, if traffic is relatively low-rated, most of the revenues are required to cover attributable costs; if the traffic is relatively high-rated, there is more contribution to be shared by the carriers participating in the movement. DARA explicitly makes these calculations – the revenue division approaches used by Otter Tail do not.

Just as important, consistent with the underlying economic theory, the DARA procedure recognizes that both carriers need to recover unattributable (*i.e.*, fixed, joint and common) costs

if the cross-over traffic is going to move over the long run (as Otter Tail assumes).[142] It does so by explicitly examining the total amount of traffic that is available to cover the fixed, joint and common costs on the lines of the OTRR and the residual BNSF used by the cross-over traffic, and divides whatever contribution is available so that it makes an equi-proportional contribution to the fixed, joint and common costs that must be covered by each carrier. In contrast, neither of the approaches advocated by Otter Tail makes any effort to examine the relative ability of the SARR and the residual incumbent to recover the fixed, joint and common cost component of total cost and, as a result, they systematically under-allocate revenues to lighter-density segments.

d. Other -- Projected Revenues For Non-Issue Traffic

Otter Tail's methodology for projecting coal traffic revenues differs from its methodology for projecting non-coal revenues. Consequently, BNSF addresses the revenue projections for coal and non-coal traffic separately below.

(1) Coal

This section describes the flaws in Otter Tail's approach for calculating future coal revenues on the OTRR. Otter Tail contends that the coal revenues of the hypothetical OTRR will grow by more than 70 percent from over $675 million in 2002 to over $1.15 billion in 2021.[143] Future OTRR revenues reflect the combined effect of volume projections, cross-over

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[142] Thus, the DARA procedure, by creating an opportunity for cost recovery based on traffic densities, is consistent with the mutual self-interest of the SARR and the residual incumbent, and is consistent with the expected outcome of a negotiation between them regarding the division of revenues on cross-over traffic.

[143] OTP Opening Exh. III-A-5 at 1, column 6, row 101 and at 5, column 44, row 101, respectively.

traffic revenue divisions, and revenue projections. As discussed above in Sections III.A.1, III.A.2, and III.A.3.c, BNSF has restated Otter Tail's tonnage projections and cross-over revenue divisions. As explained below, BNSF also modifies Otter Tail's revenue projections. Under BNSF's revenue projection approach, and taking into account the adjusted tonnage figures and cross-over traffic revenue divisions, Otter Tail coal revenues increase from $364.3 million in 2002 to $500.7 million in 2021.

In the early part of the DCF period, Otter Tail bases its revenue projections on BNSF's internal O/D pair coal forecasts, developed by BNSF in the ordinary course of business, and on the actual terms of existing contracts for coal shippers in the Otter Tail traffic group until those contracts expire. BNSF and Otter Tail are in general agreement on the methodology for this period. However, BNSF corrects errors in Otter Tail's implementation of this methodology, including Otter Tail's use of an outdated DRI-WEFA forecast of railroad indices and its failure to use the current terms in some existing coal transportation contracts. These implementation issues are discussed in subpart (b) of this Section.

The main divergence between Otter Tail's and BNSF's revenue forecasts for the OTRR involves the lengthy period between the expiration of each existing coal transportation contract and 2021, the last year of the DCF period. Most of the revenue growth projected by Otter Tail occurs after the expiration of the existing contracts. Subpart (c) of this Section explains the fundamental flaws of Otter Tail's approach to forecasting revenues. For example, Otter Tail assumes that rates and rate escalation for sole-served shippers will remain the same after their current contracts expire, an assumption inconsistent with historic data. Otter Tail also uses a flawed study to develop rates for competitive movements upon coal transportation contract

expiration. Finally, for purposes of this litigation, Otter Tail has developed a mechanism to adjust competitive rates after coal transportation contracts expire that overstates future revenues.

As explained below, BNSF has rebased the rates for competitive coal plants after contract expiration by correcting Otter Tail's study of recently negotiated coal transportation contracts for competitive plants. BNSF rebases the rates for sole-served coal plants upon contract expiration based upon the average percentage rate reduction that BNSF has provided in recently negotiated contracts to sole-served destinations.

BNSF has modified the rate escalation methodology for competitive coal plants after contract expiration by correcting Otter Tail's analysis of the rate escalation used in recently negotiated coal transportation contracts for competitive plants. For sole-served plants, BNSF rejects Otter Tail's approach of using the rate escalation from the expired contract and substitutes an escalation factor derived from the recently negotiated contracts for sole-served destinations.

(a) 2003 Projected Coal Traffic Revenues

Otter Tail develops 2003 revenues using BNSF's 2003 O/D coal forecast. *See* OTP Nar. at III-A-24, item 2. BNSF accepts this approach. Use of the internal BNSF forecast to develop Otter Tail revenue projections in 2003 provides a conservative starting point and will tend to overstate revenues because BNSF has historically tended to forecast higher revenues than it actually receives.

(b) Revenues Through The Term Of Existing Coal Transportation Contracts

Otter Tail's projection of coal revenues through the term of existing coal transportation contracts with shippers served by the hypothetical OTRR is based on the 2003 BNSF O/D coal forecast and, after 2003, on the actual provisions of these contracts until the contract expires. *See* OTP Nar. at III-A-24, item 3. Specifically, Otter Tail adjusts coal transportation contract

rates annually from 2004 to the end of the contract by forecasting the change resulting from the application of the individual coal transportation contract adjustment mechanism. *Id.* BNSF accepts this general methodology but makes some corrections to Otter Tail's implementation of it.

i) Use Of The Current Forecast Of RCAF-U And RCAF-A Indices

Many of BNSF's coal transportation contracts adjust the rate periodically based upon either the RCAF-U index, the RCAF-A index, or some percentage of one or both of those indices. Consequently, to properly project future revenues under existing coal transportation contracts, Otter Tail must use a forecast of these RCAF indices. DRI-WEFA (now Global Insight) publishes a revised forecast of the RCAF indices each quarter. Rather than relying on a current DRI-WEFA forecast published in March 2003, Otter Tail utilizes an outdated forecast from July 2001,[144] nearly two years earlier. Seven DRI-WEFA forecasts of the RCAF indices were published subsequent to the outdated forecast used by Otter Tail.

As the following table demonstrates, use of the outdated DRI-WEFA forecast rather than the current forecast which is for the Second Quarter 2003, overestimates the forecast of RCAF indices.[145] BNSF adjusts Otter Tail's calculation of coal revenues under existing coal

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[144] The DRI-WEFA forecast used by Otter Tail is provided in Otter Tail's opening workpapers at 01805.

[145] A copy of the Second Quarter 2003 DRI-WEFA index is included in BNSF's workpapers at BNSF.RP.WP.III.A-0293 to 0296.

transportation contracts using the most current DRI-WEFA forecast.[146] Ultimately, this error overstates the rate escalation in Otter Tail's revenue forecast by more than 25 percent.[147]

Table III.A-17
Comparison Of Second Quarter 2003 DRI-WEFA Forecast Of Changes In The RCAF-U And RCAF-A With Assumptions Employed By Otter Tail[148]

	Otter Tail Forecast[149] (DRI-WEFA June 2001)		DRI-WEFA (2nd Quarter 2003 Forecast)[150]		% Difference	
Time Period	RCAF-U	RCAF-A	RCAF-U	RCAF-A	RCAF-U	RCAF-A
2003-2005	2.7%	2.3%	1.8%	-0.7%	-35.4%	-130.1%
2005-2010	2.8%	1.0%	2.4%	0.2%	-16.8%	-84.1%
2010-2015	3.0%	0.9%	2.3%	0.4%	-22.1%	-57.2%
2015-2020	3.0%	0.9%	2.3%	0.4%	-22.1%	-57.2%

ii) Corrections To Coal Transportation Contract Terms

BNSF also corrects the following errors made by Otter Tail regarding the termination dates, escalation provisions and other terms in certain of the BNSF coal transportation contracts:

- [illegible]

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[146] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Index."

[147] *See* BNSF Reply electronic workpaper "OTP Railroad Coal Traffic Forecast_Revised RCAF From Opening.xls" at worksheet "Summary."

[148] *See* BNSF Reply electronic workpaper "DRI_WEFA RCAF Forecast_OTP.xls" and BNSF.RP.WP.III.A-0280 to 0296. DRI-WEFA only publishes a 10-year forecast, *i.e.*, the Second Quarter 2003 forecast ends in 2013. BNSF adopts Otter Tail's methodology of using the last forecast year to project the change in the annual index for the remaining years in the DCF period.

[149] *See* OTP Opening workpapers at 1805.

[150] *See* BNSF Reply electronic workpaper "DRI_WEFA RCAF Forecast_OTP.xls" and BNSF.RP.WP.III.A-0293 to 0296.

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[151] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 Rev Contracts."

[152] {

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[153] {

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[154] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "coal02od," row 45.

[155] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 rev contracts."

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[156] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002 rev contracts." {

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[158] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage."

[159] {

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[160] {

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[161] {

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[162] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 rev contracts."

[163] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002 rev contracts."

[164] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheets "2002 Rev Contracts" and "index."

[165] {

(Continued ...)

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[166] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "index."

[167] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheets "2002 rev contract" and "index."

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[170] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 rev contracts."

[171] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002 rev contracts."

[172] {

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[173] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 rev contracts."

[174] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002 rev contracts."

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(c) Revenues After Expiration Of Existing Coal Transportation Contracts

i) Otter Tail's Methodology

All the existing coal transportation contracts entered by shippers in the Otter Tail traffic group expire well before 2021, the end of the DCF period.[177] To project revenues after a contract expires, Otter Tail designates each destination as either sole-served ("captive") or competitive. If Otter Tail considers the traffic to be captive, it sets the rate at the termination of the contract equal to the expired contract rate. *See* OTP Nar. at III-A-24, item 3.a. Otter Tail then adjusts the rate to the sole-served plants by the projected average annual change in the rate adjustment mechanism from the expired contract. *Id.* If Otter Tail considers the traffic to be competitive, it sets the rate at the termination of the contract based upon the lower of a "competitive marketplace" rate calculated by Otter Tail or the expired contract rate. *Id.* at III-A-24, item 3.b. Otter Tail develops the so-called competitive marketplace rate from contracts that

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[176] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002 rev contracts."

[177] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 rev contracts."

it claims were signed by BNSF in 2002 and 2003 but in fact were signed in 2001 and 2002.[178] Otter Tail adjusts the rate for competitive plants by a "competitive marketplace" rate adjustment mechanism developed from the same 2001 and 2002 BNSF contracts. *Id.*

BNSF does not accept these methodologies because they are flawed. The most significant errors in the methodologies are set forth below.

ii) Competitive vs. Sole-Served

Otter Tail has improperly categorized several movements as being "captive" even though they are competitively-served for either the entire movement or the portion of the move that BNSF currently serves. Otter Tail considers moves to be competitive if the destination is served by two or more railroads.[179] Under this definition, the { } both of which Otter Tail considers to be "captive,"[180] are clearly competitive since both plants are served by BNSF and UP. Otter Tail has also improperly characterized several other movements, {

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[178] It is apparent from a review of Otter Tail's Exhibit III-A-7 that Otter Tail did not include any 2003 contracts in its "competitive marketplace" rate sample. This exhibit shows that all included contracts were effective in January or April 2002. *See* OTP Opening Exh. III-A-7, column 3. { }

[179] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage," Column CC.

[180] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage."

}[181] However, these plants should be characterized as competitive plants because BNSF's portion of the movement -- from the PRB mine origin to the BNSF interchange point -- can be served by both UP and BNSF.[182] BNSF has reclassified these nine coal movements as competitive rather than sole-served.[183]

iii) Otter Tail's Rebased Rate For Solely-Served Plants At Contract Expiration

As support for its position that the rate to a sole-served coal plant at the termination of a contract will equal the expired contract rate, Otter Tail cites to the *WPL* case at 28 where the Board stated that "[i]n the absence of better evidence, we assume that the rate trends in existing contracts will continue." OTP Nar. at III-A-24, n.35.

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[181] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage," Column CC.

[182] It is apparent that UP as well as BNSF can serve the BNSF interchange plant for these movements. A summary of the BNSF traffic tapes lists the interchange point and the other rail carrier that is responsible for terminating the move. PCRail output confirms that UP can serve the interchange points. *See* BNSF's workpapers at BNSF.RP.WP.III.A-0297 to 0322 and BNSF Reply electronic workpaper "BNSF2002 OD traffic.xls" at worksheet "Other RR Terminating."

[183] In certain instances, these customers currently originate coal from BNSF sole-served mines. Since these customers can purchase coal from alternative PRB mines that are served by UP, these moves are competitive over the BNSF's portion of the haul. Utilities originating PRB coal typically structure their coal contracts to be relatively short in duration, averaging a few years, in order to provide flexibility in negotiating coal prices in a very price-competitive coal source market and to satisfy operational considerations. For example, from January 2002 to May 2003, approximately 10 percent of the PRB coal purchases reported in the FERC Form 423 were spot purchases (*i.e.*, with no contractual obligation). For coal volumes purchased under contract (those that specified an expiration date), nearly 55 percent and 86 percent are set to expire by 2004 and 2006, respectively. *See* BNSF Reply electronic workpaper "FERC Form 423 2002 and Jan_May 2003.xls."

In addition, many of the mine operators at mines sole-served by BNSF also operate mines accessible to UP's network and therefore provide a more immediate alternative coal source. BNSF.RP.WP.III.A-0320 to 0322.

However, Otter Tail had better evidence; namely, its own recent experience demonstrating that the rate trends in contracts for solely-served plants do not continue after the expiration of their contracts. {

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Moreover, BNSF has prepared a study, hereafter referred to as the "BNSF Contract Rate Study," {

} This study analyzes the rate changes that resulted when BNSF entered new contracts from 1998 to the present.[186] The study's methodology and results are explained in detail in Exhibit III.A-13. Overall, the study demonstrates that BNSF's rates to

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[184] *See* BNSF's Rate Offer Letter to Otter Tail (produced at OTP 005807) and included in BNSF's workpapers at BNSF.RP.WP.III.A-0002.

[185] *See* the Fourth quarter 2001 rate sheet for the Otter Tail contract BN-C-2913, included in BNSF's workpapers at BNSF.RP.WP.III.A-0005.

[186] The contract rate study includes circumstances where BNSF and the shipper did not enter into a new contract following the expiration of the old contract but rather BNSF issued a common carrier tariff for the movement. The contract study lists the common carrier tariff proposed by BNSF as the new rate. While BNSF believes it is inappropriate to include these tariffs in the contract rate study because they do not reflect actual rate changes resulting from arms-length negotiations, BNSF has included them to foreclose any criticism by Otter Tail for a failure to include them.

solely-served plants {

}

Consequently, BNSF does not accept Otter Tail's assumption that, for sole-served plants, the rate at the end of an existing contract will equal the expired contract rate. Rather BNSF assumes that those contract rates will decline by { } percent, {

}

iv) Otter Tail's Rebased Rate for Competitive Plants at Contract Expiration

For competitive movements, Otter Tail calculates a "competitive marketplace" rate of { } mills per ton-mile for the First Quarter 2003 based upon eight BNSF contracts signed in 2001 or 2002. Those contracts are identified in Exhibit III-A-7 of Otter Tail's opening evidence. Otter Tail then escalates this rate each and every year of the DCF period by { } percent of the RCAF-U index, the First Quarter 2003 contract adjustment mechanism derived by Otter Tail from the same 2001 and 2002 contracts.[187] In doing so, Otter Tail develops a "competitive marketplace" rate for every year of the DCF period.[188] Thus, if a contract for a competitive movement expires in 2005, Otter Tail assumes the 2005 "competitive marketplace" rate will replace the contract rate if the "competitive market rate" is lower than the expired contract rate. If such a contract expires in 2009, Otter Tail assumes the 2009 "competitive marketplace" rate

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[187] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "Competitive Coal Rates."

[188] *See* OTP Nar. at III-A-24, item 3.b.; OTP Opening Exh. III-A-7.

will replace the contract rate as long as the "competitive market rate" is lower than the expired contract rate. Under Otter Tail's methodology, the "competitive marketplace" rate grows from { } mills per ton-mile in First Quarter 2003[189] to { } mills per ton mile in 2021,[190] resulting in an average annual escalation in the "competitive marketplace" rate of 2.2 percent.[191]

While BNSF believes that use of rate comparisons alone to establish "market rates" can be problematic because many factors influence the rate level established in a contract, it accepts Otter Tail's general approach of replacing the rate to a competitive plant at the contract's expiration with a "competitive marketplace" rate. However, as explained below, BNSF has adjusted Otter Tail's "competitive marketplace" rate, to correct flaws in Otter Tail's approach. Those flaws result in the overstatement of the so-called "competitive marketplace" rate. Under BNSF's corrected approach, BNSF develops two "competitive marketplace" rates as of First Quarter 2003 – one for movements in shipper-owned equipment and the other for movements in railroad-owned equipment. BNSF's corrected "competitive marketplace" rates are { } mills per ton-mile for shipper-owned and railroad-owned equipment respectively, as of First Quarter 2003.[192]

BNSF also revises the forecast used by Otter Tail to adjust the "competitive marketplace" rate from year to year and, as a result, BNSF projects that the "competitive marketplace" rate will increase from { } mills per ton-mile effective First Quarter 2003 to {

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[189] *See* OTP Opening Exh. III-A-7, column 8, line 9.

[190] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage," row 120.

[191] 2.2 percent = (13.4 / 9.3)^(1/(2021-2004))-1

[192] *See* BNSF Reply electronic workpaper "BNSF Revised Competitive Mill Table.xls."

} mills per ton-mile as of 2021, for shipper-owned and railroad-owned equipment, respectively.[193] The flaws corrected by BNSF are described below.

a) Otter Tail's Failure to Apply "Competitive Marketplace" Analysis to Contracts Expiring After 2009

Otter Tail improperly failed to apply its own "competitive marketplace" rate methodology to coal transportation contracts that expired after 2009 apparently due to an error in a formula in Otter Tail's workpapers.[194] As a result of this error, Otter Tail failed to adjust the rate of the following competitive contracts when they expired: {

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[193] *See* BNSF Reply electronic workpaper "BNSF Revised Competitive Mill Table.xls." The revised competitive mill rate also incorporates BNSF's use of the most current DRI-WEFA RCAF forecasts as described in Section III.A.3.d.(1).(b).(i) above.

[194] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage."

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} BNSF has corrected

Otter Tail's error. Upon the expiration of an existing coal transportation contract, BNSF has applied the "competitive marketplace" rate analysis or "sole-served" rate analysis (*see* section III.A.3.d.(1).(c).(iv).(b), below and section III.A.3.d.(1).(c).(iii) above), depending upon BNSF's classification of the movement as competitive or sole-served.[199]

b) Otter Tail's Failure to Use Correct Contract Rates in "Competitive Marketplace Rate" Analysis

Otter Tail failed to use the correct contract rate for three of the eight contracts used in its "competitive rate" analysis and failed to use the correct contract rate adjustment mechanism for one of the contracts. As a result, it overstated the rates and rate adjustment mechanisms in these contracts. Specifically, Otter Tail used the wrong rate and/or adjustment mechanism for the following contracts:

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[198] {

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[199] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002-2021 Tonnage."

[200] *See* OTP Opening Exh. III-A-7, column 6, row 2. {

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[201] {

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[202] *See* BNSF Reply electronic workpaper "Car Type.xls."

[203] *See* OTP Opening Exh. III-A-7, column 6, row 5; OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "Competitive Coal Rates."

[204] {

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[205] *See* OTP Opening Exh. III-A-7, column 9, row 5.

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[206] {

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[207] *See* OTP Opening Exh. III-A-7, column 6, rows 6, 7.

[208] {

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[209] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage," cells Q23:Q26. {

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BNSF has corrected these contract rate and rate adjustment mechanism errors in Otter Tail's "competitive marketplace" analysis. Correction of these errors alone reduces Otter Tail's First Quarter 2003 "competitive rate" from { } mills per ton-mile to { } mills per ton-mile.[210]

c) Otter Tail's Improper Reliance on Railroad-Car Rates

Pursuant to the common carrier rate authority at issue in this proceeding, Otter Tail provides the rail cars used to transport the issue traffic.[211] Similarly, the competitively-served coal plants included in Otter Tail's traffic group rely almost exclusively on shipper-owned cars. Specifically, in 2002, { } percent of the tons transported to the competitively-served destinations in the OTRR were delivered in shipper-owned cars.[212]

Rates in shipper-supplied cars are lower than those in railroad-supplied cars. This is apparent from a review of the coal transportation contracts produced by BNSF in this proceeding which demonstrate that higher rates will apply if the service is provided in railroad-owned cars rather than shipper-owned cars.[213] It makes sense that rates for service in shipper-owned cars

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[210] *See* BNSF Reply electronic workpaper "BNSF Revised Competitive Mill Table.xls."

[211] *See* CCPA-BNSF 90062 at 1; CCPA-BNSF 90062-A. This common carrier pricing authority is produced in BNSF's opening workpapers at BNSF.OP.WP.II.A-0007 to 0017.

[212] *See* BNSF Reply electronic workpaper "Car Type.xls." This calculation assumes that all movements that were erroneously classified as sole-served by Otter Tail were reclassified as competitive as described in Section III.A.1.d.(1).(c).(ii) above.

[213] {

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would be lower than those for service in railroad-owned cars. If the railroad does not incur the expense of supplying the rail cars, all else being equal, it will be willing to offer a lower rate.

Otter Tail's subset of movements used to calculate the "competitive marketplace" rate dramatically overstates a competitive rate for shipper-owned equipment because it includes numerous rates associated with railroad-owned equipment. Specifically, three out of the eight customers in Otter Tail's sample—{

} -- have transportation contracts that specify BNSF equipment. Furthermore, these customers rely on railroad equipment for the majority of their traffic. {

}

BNSF has modified Otter Tail's "competitive marketplace" rate analysis to separately calculate the "competitive marketplace" rate for shipper and railroad-owned cars. *See* BNSF Reply Exhibit III.A-15. BNSF then develops a weighted-average mill for each competitively-served OTRR destination based on (a) the percentage of shipper and railroad cars utilized to deliver coal to that destination in 2002 and (b) BNSF's revised "competitive marketplace" rates that correct the errors identified above and separately report rates for shipper and railroad cars.[215] For example, if a particular destination relies exclusively on railroad equipment, then its "competitive marketplace" rate will equal 100 percent of the competitive mill for railroad equipment in any given year. Alternatively, if a destination relies equally on shipper and railroad equipment than the weighted-average competitive mill for this destination in 2003, for example,

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[214] *See* BNSF Reply electronic workpaper "Car Type.xls."

[215] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "2002-2021 Tonnage."

will equal the weighted-average of the shipper and railroad equipment rates, or {

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d) Summary

After correcting for the flaws in Otter Tail's "competitive marketplace" analysis described above, BNSF obtains a "competitive marketplace" rate of { } mills per ton mile as of First Quarter 2003 for shipper and railroad equipment, respectively, rather than the { } mills per ton mile rate calculated by Otter Tail.[216] *See* BNSF Exhibit III.A-15. Under BNSF's revised approach, the weighted-average reduction in the rate at the expiration of a contract to a competitive plant is approximately { } percent.[217]

BNSF also revises the contract adjustment mechanism used to adjust the "competitive marketplace" rate each year to reflect the rate adjustment mechanisms in the same set of contracts used by BNSF to calculate the "competitive marketplace" rate. *See* BNSF Exhibit III.A-15. In doing so, BNSF, like Otter Tail, derives a "competitive marketplace" rate for every year of the DCF period. This revised contract adjustment mechanism equals { } percent of the RCAF-U in First Quarter 2003 for shipper and railroad equipment, respectively,

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[216] *See* BNSF Reply electronic workpaper "BNSF Revised Competitive Mill Table.xls." Since Otter Tail uses the BNSF forecast to escalate rates in 2003, the competitive marketplace rate is used beginning in 2004. For this reason BNSF escalated the competitive marketplace rate from the First Quarter 2003 to the First Quarter 2004 rate by BNSF's revised contract adjustment mechanism and the RCAF forecast (described below). BNSF's assumption is conservative because Otter Tail set the 2004 "competitive marketplace" rate equal to the First Quarter 2003 "competitive marketplace" rate that it developed.

[217] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised.xls" at worksheet "summary." {

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rather than the { } percent RCAF-U adjustment mechanism calculated by Otter Tail. *Id.* This revised rate adjustment mechanism (along with updating the DRI-WEFA RCAF forecast) results in an average { } percent per year increase in the "competitive marketplace" rate.[218]

The reasonableness of BNSF's revised "competitive marketplace" analysis is confirmed by expanding the subset of contracts considered to all newly-signed contracts to competitive plants with shipper-owned car rates that became effective in 2001 to 2003. Such an expanded analysis would include {

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[221] {

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[222] {

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} Using this more comprehensive set of newly-signed contracts to competitively-served plants results in a First Quarter 2003 rate of { } mills per ton mile and { } mills per ton mile for shipper-owned and railroad-owned equipment, respectively.[224] These figures are comparable to those generated by BNSF's revised "competitive marketplace" rate analysis.

v) Otter Tail's Rate Adjustment Mechanism After Expiration of Existing Coal Transportation Contracts

After an existing coal transportation contract expires, Otter Tail escalates the new rate for the coal movement based upon (1) the rate adjustment mechanism in the expired contract for solely-served movements or (2) the "composite competitive market rate adjustment mechanism" developed from BNSF contracts for competitive movements. *See* OTP Nar. at III-A-24, item 3.a and 3.b, respectively.

Between 2004 and 2021, Otter Tail's rate adjustment methodology causes rates for coal traffic to grow at an average annual rate of 2.31 percent.[225] Otter Tail's projected future rate growth is inconsistent with BNSF's recent contract experience with existing customers. {

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[223] {

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[224] *See* BNSF Reply electronic workpaper "BNSF Revised Competitive Mill Table.xls."

[225] OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage."

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BNSF does not accept Otter Tail's methodologies for calculating revenues after contracts expire because they overstate the future revenues that BNSF is likely to achieve. Moreover, as explained below, Otter Tail's methodologies have a serious flaw – they use an outdated forecast of railroad cost indices. Otter Tail also fails to accurately implement its methodology for several sole-served plants. BNSF's modified rate adjustment forecasts for both sole-served and competitive coal plants are described below.

a) Otter Tail Erred By Using An Outdated Forecast of Railroad Cost Indices

Otter Tail erred by using an outdated forecast of the RCAF-U and RCAF-A indices. Many of the BNSF coal transportation contracts used by Otter Tail to adjust rates to sole-served coal plants after existing contracts expire contain the RCAF-U index, the RCAF-A index, or some percentage of one or both of those indices.[226] Further, with respect to competitively-served coal plants, Otter Tail adjusts the rates based upon a percentage of the RCAF-U index.[227]

To properly implement its forecast methodology for both sole-served and competitively-served plants, Otter Tail must utilize a current forecast of the RCAF-U and RCAF-A indices. However, as explained above in Section III.A.3.d.(1).(b).(i), Otter Tail did not utilize the most current forecast of those indices. It used an outdated July 2001 forecast rather than the Second Quarter 2003 forecast prepared by DRI-WEFA.

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[226] *See, e.g.*, OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 rev contracts," Rows 26 and 91.

[227] *See* OTP Opening Exh. III-A-7, column 9, row 9.

When BNSF corrects Otter Tail's forecast calculations to incorporate the Second Quarter 2003 RCAF-U and RCAF-A index forecasts, it reduces the cumulative rate escalation for the Otter Tail traffic group from 2004 to 2021. Simply using the current index forecasts reduces the annual average rate increase under Otter Tail's methodology by more than 26 percent from { } percent annually.[228]

b) Rate Adjustment Mechanism for Sole-Served Plants

While Otter Tail claims to use the rate adjustment mechanism in the existing contract to adjust the rate to a particular sole-served coal plant after the contract expires, Otter Tail fails to use that rate adjustment mechanism in several instances. In some cases, Otter Tail simply applies the wrong rate adjustment mechanism. In other cases, Otter Tail converts all existing sole-served contract rate adjustment mechanisms into a percentage of the RCAF-U and, as a result, distorts the rate escalation. The post-contract rate escalation for the following sole-served coal plants was improperly calculated by Otter Tail:

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[228] *See* BNSF Reply electronic workpaper "OTP Railroad Coal Traffic Forecast_Revised RCAF From Opening.xls."

[229] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 Rev contracts."

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[230] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet 2002 "Rev contracts."

[231] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002 Rev contracts."

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[233] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 Rev contracts."

[234] *See* BNSF Reply electronic workpaper "Otter Tail Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Index."

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[236] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "Index."

[237] *See* BNSF Reply electronic workpaper "Otter Tail Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Index."

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[239] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "Index." *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021," cells AJ76-BZ76.

[240] *See* BNSF Reply electronic workpaper "Otter Tail Coal Traffic Forecast_BNSF Revised.xls" at worksheet "Index."

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[242] *See* OTP Opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "Index." *See* OTP opening electronic workpaper "Otter Tail Coal Traffic Forecast.xls" at worksheet "2002-2021," cells AJ39-BZ39.

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BNSF rejects Otter Tail's general methodology of adjusting the contract rate for sole-served coal plants using the rate adjustment methodology in the expired contract for the movement. Instead, BNSF uses the more probative evidence based upon the escalation derived from recently signed BNSF coal contracts to sole-served destinations.[244]

c) Rate Adjustment Mechanism for Competitive Plants

As explained above, after an existing contract to a competitive coal plant expires, Otter Tail adjusts the new rate annually using the "composite competitive market rate adjustment mechanism" developed by Otter Tail from a subset of BNSF contracts. *See* OTP Nar. at III-A-24, n.3.b. BNSF revises this "composite competitive market rate adjustment mechanism" to develop separate escalators associated with coal transported in shipper-owned and railroad-owned equipment, respectively. *See* BNSF Exhibit III.A-15. Specifically, BNSF develops a weighted-average rate escalation for each competitively-served OTRR destination based on (a) the percentage of shipper and railroad cars utilized to deliver coal to that destination in 2002 and (b) BNSF's revised contract adjustment mechanism that correct the errors identified above and separately report rates for shipper and railroad cars.[245] BNSF's revised contract adjustment

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[243] *See* BNSF Reply electronic workpaper at "Otter Tail Coal Traffic Forecast_BNSF Revised.xls" at worksheets "Index" and "2002 rev contracts."

[244] {

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[245] *See* BNSF Reply electronic workpaper "BNSF Revised Competitive Mill Table.xls."

mechanism equals { } percent of the RCAF-U in First Quarter 2003 for shipper and railroad equipment, respectively, rather than the { } percent RCAF-U adjustment mechanism calculated by Otter Tail.[246] BNSF's revised rate adjustment mechanism for competitively-served plants (along with the substitution of the current DRI-WEFA RCAF forecast) results in an average { } percent per year increase in the "competitive marketplace" rate.[247]

(d) Revenues for Common Carrier Movements

Three movements included in Otter Tail's traffic group, other than the issue traffic, were governed by common carrier rates rather than by contracts in 2002, the base year. Those common carrier movements include movements to {

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[246] *Compare* BNSF Reply Exh. III.A-15 to OTP Opening Exh. III-A-7, row 9, column 9.

[247] This calculation was separately computed for shipper and railroad cars. {

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[248] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 rev contracts."

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[249] *See* OTP Opening electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 rev contracts." {

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[250] *See* BNSF Reply electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002-2021 Tonnage."

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(2) Non-Coal Traffic

Otter Tail projects non-coal traffic revenues "using the rate of change forecast in BNSF's Long Range Plan for relevant Commodity or Business Group over the 1998-2007 time period." *See* OTP Nar. at III-A-25, section f, item 2. BNSF does not object to this methodology for projecting non-coal revenues.

(3) Total Traffic Summary

The following table presents a summary of the differences in the OTRR railroad coal revenues assumed by Otter Tail and the coal revenues assumed by BNSF.

Table III.A-18
OTRR Total Traffic Revenues
Comparison of Otter Tail and BNSF Estimates

	Otter Tail Estimate	BNSF Estimate	Difference
2002	$876,779,708	$ 364,345,961	$310,961,299
2003	$873,443,952	$ 362,512,748	$308,530,725
2004	$890,232,543	$ 363,936,253	$322,957,704
2005	$910,717,371	$ 363,761,415	$342,669,035
2006	$943,961,335	$ 377,825,193	$360,890,502
2007	$980,174,010	$ 373,296,744	$400,662,363
2008	$1,012,210,181	$ 387,542,269	$417,473,041
2009	$1,042,466,250	$ 399,894,965	$434,385,578
2010	$1,077,004,465	$ 415,704,996	$452,111,889
2011	$1,106,639,010	$ 426,183,291	$470,255,060
2012	$1,134,197,096	$ 430,488,004	$492,483,978
2013	$1,160,131,096	$ 438,212,977	$509,656,995
2014	$1,184,473,573	$ 441,679,478	$529,485,231
2015	$1,209,240,748	$ 449,768,446	$545,103,784
2016	$1,235,516,001	$ 458,193,547	$561,882,186
2017	$1,262,747,319	$ 466,732,584	$579,490,435
2018	$1,289,234,198	$ 475,177,106	$596,436,287
2019	$1,316,713,562	$ 483,862,242	$614,121,343
2020	$1,344,905,279	$ 492,778,461	$632,274,806
2021	$1,371,931,977	$ 500,738,750	$650,206,120

The differences shown in the table result from three basic factors: First, BNSF's adjustments to the coal and non-coal volumes transported by the OTRR railroad as described in Section III.A.1 and III.A.2; second, BNSF's modification of the method for allocating cross-over traffic revenues between the OTRR and the residual BNSF, as explained in Section III.A.3.c above; and third, BNSF's use of a rebased rate subsequent to the expiration of a coal transportation contract and a more realistic forecast prepared in the ordinary course of business to project rates for expired coal transportation contracts from 2004 to 2021, as explained in Section III.A.3.d above. BNSF compares its modified coal revenues with Otter Tail's coal revenues by year in Exhibit III.A-16. BNSF compares its revised non-coal revenues to Otter Tail's non-coal revenues by year in Exhibit III.A-17.

With respect to total volumes and revenues for the OTRR, BNSF Reply Exhibit III.A-18 compares BNSF's modified tonnages and revenues for the OTRR with those presented by Otter Tail. BNSF Reply Exhibit III.A-19 shows BNSF's revised traffic and revenue forecast for all Otter Tail customers by year from 2002 through 2021.

4. Other

a. PPL Cross-Subsidy Analysis

In its *PPL* decision, the Board dismissed the complaint because it found that the western portion of the complainant's SARR would not be self-sustaining but instead depended upon an improper cross subsidy from the north-south portion of the SARR, which included the highly dense lines in the PRB. After restating complainant's costs of constructing the lines on the western portion of the SARR, the Board compared the collective attributable costs (construction costs and operating expenses) of the traffic moving over the western portion of the SARR with the through revenues of that traffic as sponsored by the complainant. The Board found that

> The revenues that would be generated by all the movements using the WMCRR's western part would be less than the directly attributable cost of the western part of the WMCRR in each year from 2000 through 2008, and moreover, cumulatively for the entire 20-year SAC analysis period. . . . Thus, we conclude that PPL's SAC evidence relies upon an improper cross-subsidization of the traffic on the western part of the WMCRR, which includes PPL's traffic.[253]

In its opening evidence in this case, Otter Tail claims that it performed a threshold cross-subsidy analysis of the sort called for in *PPL*:

> Otter Tail interpreted the Board's segmented stand-alone cost test to also exclude the highest density portion of Otter Tail's stand-

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[253] *PPL* at 12.

> alone railroad, i.e. the PRB. Therefore, Otter Tail performed a *PPL* cross subsidy test on that portion of the OTRR west of Campbell, Wyoming which excludes the PRB. The Western Part of the OTRR, therefore consists of the rail segments from Campbell to Moran Junction, then to Glendive, Fargo and Benson, including the Decker, Kuehn, Big Sky, Snowden and Big Stone Branches.[254]

Otter Tail asserts that its analysis shows that "the revenues attributable to the traffic moving on the Western Part of the OTRR exceed the attributable cost as defined by the Board in *PPL* on a cumulative basis," and that no impermissible cross-subsidy exists.[255] Otter Tail's claimed showing does not, in fact, rule out a possible finding of cross-subsidy by the Board. Otter Tail's cross-subsidy analysis relies on its own revenue and cost evidence. It is quite possible that after revenues and costs have been adjusted by the Board as a result of its assessment of the parties' evidence (as was done with construction costs in *PPL*), the traffic on the Western Part of the OTRR would be found to generate insufficient revenues to cover the costs of the Western Part of the OTRR attributable to that traffic group.

It should also be noted that a subsequent *PPL*-type cross-subsidy analysis would not necessarily be limited to what Otter Tail calls the "Western Part" of its SARR. There are other discrete segments of the OTRR that are logical candidates for a cross-subsidy analysis, such as the portion of the OTRR east of Glendive, Montana that runs through Mandan, Fargo and Benson to Big Stone. If a hypothetical SARR projected that the costs of constructing and operating the portions of the OTRR east of Glendive would exceed the through revenues that

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[254] OTP Nar. at III-A-27.

[255] *Id.* at III-A-28.

could be generated by traffic moving over those lines, then it would not build the portions of the OTRR east of Glendive, *i.e.*, those portions would not be self-sustaining.

BNSF's witness John Klick has re-done Otter Tail's analysis using BNSF's own revenue and cost assumptions set forth in this Reply evidence. That analysis demonstrates that under BNSF's assumptions, the west-of-Campbell portion of the OTRR fails to generate revenues in excess of attributable costs. Mr. Klick also performed a similar analysis for the portion of the OTRR east of Glendive, with similar results. In performing these studies, BNSF has compared the costs of constructing and operating the relevant segment to the total revenues generated by all movements that use the segment minus only the avoidable operating costs that the OTRR would incur to move these shipments to or from the segment. BNSF's results are summarized in the following table:

Table III.A-19
Summary of PPL Cross-Subsidy Analysis[256]

	East of Glendive			West of Campbell		
Year	Stand-Alone Revenue	Stand-Alone Cost	Difference	Stand-Alone Revenue	Stand-Alone Cost	Difference
2002	$388.6	$555.2	-$166.6	$455.3	$852.6	-$397.3
2003	$377.7	$533.2	-$155.6	$441.9	$836.8	-$395.0
2004	$381.1	$545.6	-$164.4	$443.2	$856.4	-$413.2
2005	$380.3	$557.7	-$177.5	$442.5	$877.8	-$435.3
2006	$391.2	$577.3	-$186.1	$454.7	$906.2	-$451.6
2007	$384.7	$589.6	-$204.9	$449.5	$926.2	-$476.7
2008	$397.2	$604.6	-$207.4	$463.2	$944.7	-$481.5
2009	$407.7	$617.8	-$210.2	$475.0	$961.8	-$486.7
2010	$421.7	$634.4	-$212.7	$490.5	$981.9	-$491.3
2011	$430.4	$647.3	-$216.9	$503.0	$1,000.4	-$497.5
2012	$433.4	$658.7	-$225.3	$510.5	$1,018.4	-$507.9
2013	$439.7	$670.6	-$230.9	$518.0	$1,035.2	-$517.2
2014	$446.2	$682.8	-$236.7	$521.3	$1,052.7	-$531.4
2015	$452.7	$695.4	-$242.7	$529.0	$1,070.5	-$541.5
2016	$459.4	$708.3	-$248.9	$537.0	$1,088.9	-$551.9
2017	$466.2	$721.5	-$255.3	$545.1	$1,107.9	-$562.8
2018	$472.9	$734.9	-$262.0	$553.1	$1,127.0	-$573.9
2019	$479.8	$748.7	-$268.9	$561.3	$1,146.7	-$585.4
2020	$486.9	$762.8	-$275.9	$569.8	$1,167.0	-$597.2
2021	$493.8	$777.2	-$283.4	$577.5	$1,187.1	-$609.7

[256] The PPL cross-subsidy analysis is contained in BNSF's electronic workpapers. *See* BNSF Reply electronic workpapers "Otter Tail Railroad Coal Traffic Forecast_BNSF Revised_substainablity East of Glendive.xls" and "Otter Tail Railroad Coal traffic Forecast_BNSF Revised_sustainablity West of Campbell.xls" for the revised revenue forecasts. *See also* folders III-H\Campbell West and III-H\Glendive East for the DCF runs and underlying workpapers associated with the development of the cost.

Because the parties' cross-subsidy analyses yield conflicting results, it cannot be known at this stage of the case whether a cross subsidy will be found to exist. The relevant inquiry would logically take place once the Board has made all of its determinations on the myriad of construction cost, operating cost and revenue issues presented in the record in this proceeding. Even if the Board were to find that revenues of the SARR as a whole exceed SAC – a finding that would not be supported by the record – it could well be the case that a discrete segment of the OTRR serving the issue traffic would be found to be non-self-sustaining and the beneficiary of an impermissible cross-subsidy.

b. The Revenue Allocated To The Residual Incumbent Must Exceed The Attributable Costs Of Cross-Over Movements

In the current case, Otter Tail appears to have taken the position that the Board's statement regarding coverage of attributable costs in *PPL* would entitle the stand-alone railroad to all net revenues (contribution) after the residual incumbent's directly attributable (*i.e.*, variable costs) for the cross-over traffic movements. Otter Tail seems to base this conclusion on the Board's statement that "[a] residual carrier would agree to move the traffic so long as the revenue division would allow it to cover its attributable costs associated with handling the traffic." *PPL* at 10 n.20. The Board's more recent formulation in *TMPA* indicates that Otter Tail's aggressive interpretation is wrong, because the Board recognized in this decision that "[t]he revenue each carrier receives should . . . make some contribution to its unattributable costs." *TMPA*, at 31, n.73.

Otter Tail purports to show that its mileage-based revenue allocation procedures give the residual incumbent sufficient revenue to cover the costs directly attributable to the off-line portion of cross-over movements. Because it says nothing about the critical question of how contribution in excess of attributable costs should be allocated between the OTRR and residual

BNSF, Otter Tail's purported showing that directly attributable off-line costs are covered by its revenue allocation methodologies does not meet its burden of establishing an economically defensible division of revenue between the OTRR and the residual incumbent.

Contrary to Otter Tail's assertion, however, *it has not even calculated attributable costs correctly*. At pages III-A-28 through III-A-29 of its opening narrative, Otter Tail describes an analysis that it allegedly undertook to determine whether the revenues that would be allocated to the residual BNSF by Otter Tail exceeded "attributable costs," which Otter Tail says is clearly defined "in economic literature and in prior STB/ICC decisions" as "directly variable cost." Even if one were to accept Otter Tail's premise that attributable costs can be equated to directly variable costs, Otter Tail's showing must be rejected because it has not properly calculated directly variable costs.

Otter Tail calculated "directly variable costs" as "the line haul cost of lading, applicable switching cost and station clerical cost for the residual BNSF portion of each of the cross-over moves." *Id.* at III-A-29, n.49. But this is not the ICC's definition of directly variable costs. These three URCS cost elements comprise what the Board has defined as the "presumptive cost floor." *Cost Standards*, 364 I.C.C. at 905. The Board recognizes that directly variable costs are comprised of the presumptive cost floor "*and any other costs that are proven . . . to vary directly with the particular movement to which a challenged rate is applicable*." *Id.* (emphasis added) In virtually every instance, directly variable costs would exceed the presumptive cost floor calculations that Otter Tail relied upon in its opening evidence. The ICC makes clear that revenues would have to exceed directly variable costs to be presumed to contribute to going concern value. *Id.*

Because Otter Tail has not even sought to investigate what costs in addition to line haul coast of lading, applicable switching cost and station clerical cost might vary directly with each of the crossover traffic movements it has included in its OTRR traffic group, its evidence offers no probative support for the proposition that the revenues allocated to the residual BNSF under its regression based and modified mileage prorate revenue division approach exceed attributable costs.

B. STAND-ALONE RAILROAD SYSTEM

BNSF accepts the basic configuration of the OTRR physical network. However, Otter Tail used flawed methodologies and incorrect assumptions to estimate the amount of mainline and yard capacity required by the OTRR. Those errors are described below. In addition, Otter Tail overstated the amount of traffic that would be available to the OTRR on certain segments of the network, as described in Section III.A.1. Correction of Otter Tail's traffic assumptions requires a reevaluation of the capacity required to handle the traffic properly grouped in the stand-alone network. BNSF carried out this reevaluation of OTRR capacity using a rail capacity model that is widely used in the rail industry. BNSF also corrected certain errors in Otter Tail's development of yard capacity and configuration of yard facilities. BNSF's conclusions are described below.

1. Route And Mileage

The OTRR network configuration posited by Otter Tail consists of 1,284 route miles traversing parts of Wyoming, Montana, North Dakota, South Dakota and Minnesota. OTP Errata electronic workpaper "Miles.xls." BNSF's witnesses Messrs. Plum and Prewitt reviewed Otter Tail's mileage calculations and identified instances in which Otter Tail miscalculated the OTRR's route miles. The net difference of these adjustments results in Otter Tail understating the route miles by 1.84 miles. There are six principal causes for Otter Tail's understatement of route miles. First, Otter Tail omitted the mileages for wye track legs at Donkey Creek and Moran Junction (0.44 and 0.50 miles respectively), despite the fact that both of the wye tracks appear in Otter Tail's Exhibit III-B-1.[1] Second, Otter Tail omitted the east leg of the wye track

[1] OTP Errata electronic workpaper "Miles.xls."

at Snowden (0.46 miles).[2] This track is required for the direct movement of eastbound Brandon coal trains, which BNSF interchanges to the Canadian Pacific at Minot, ND.[3] Third, Otter Tail misidentified the location of the Energy coal mine on the track charts produced by BNSF in discovery, leading to the omission of 0.57 route miles.[4] Fourth, Otter Tail understated the OTRR's ownership of mine spur miles for a number of mines on the Orin and Campbell Subdivisions (2.17 miles).[5] Fifth, Otter Tail mistakenly included in the OTRR route miles 1.54 miles of track at the Absaloka Mine (Kuehn) that are owned by the mine.[6] Finally, Otter Tail's route miles included construction of southbound spur tracks for certain mines (0.76 miles), which BNSF determined are no longer necessary based on the OTRR's revised traffic discussed in Section III.A.1.[7]

Table III.B-1 identifies the corrections Messrs. Plum and Prewitt made to the route miles developed by Otter Tail, which are incorporated into BNSF's construction and operating cost calculations.

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[2] *Id.*

[3] OTP Errata electronic workpaper "Otter Tail Railroad Coal Traffic Forecast.xls" at worksheet "2002 SAC Moves" identifies the Brandon traffic with "SAC Dest Station" as Snowden, "BNSF Practical Dest Station" as Minot and "BNSF Dest Station" as Minot. *See also* BNSF Reply electronic workpaper "Snowden.ppt."

[4] OTP.OP.WP.2447, OTP Errata electronic workpaper "Miles.xls," and BNSF Reply electronic workpaper "Colstrip.ppt."

[5] OTP.OP.WP.2443-2460, OTP Errata electronic workpaper "Miles.xls" and BNSF Reply electronic workpaper "III B Mine Schematic drawing.pdf."

[6] OTP Errata electronic workpaper "Miles.xls" and BNSF Reply electronic workpaper "III B Mine Schematic drawing.pdf."

[7] OTP Opening Exh. III-B-1 at 1, BNSF Reply Exhibit III.B-1 at 1 and BNSF Reply electronic workpaper "III B Mine Schematic drawing.pdf."

Table III.B-1
Reconciliation Of Route Miles

Otter Tail Opening Route Miles 1/	1284.00
Route Mile Additions:	
Donkey Creek and Moran Jct. Wye Tracks	0.94
East Leg of Snowden Wye	0.46
Energy Mine Spur	0.57
Ownership of Mine Spur Leads	2.17
Route Mile Reductions:	
Absaloka Mine Spur	(1.54)
Mine Spur South Exit Leads	(0.76)
BNSF Reply Route Miles	1285.84

1/ Source: OTP Errata electronic workpaper "Miles.xls"

After making the above corrections, the OTRR network consists of 1,285.84 route miles.[8]

2. Track Miles And Weight Of Track

In its opening evidence, Otter Tail stated that the OTRR required 1,560.4 miles of track for mainlines, passing sidings and branch lines and an additional 88.5 miles of yard, interchange and setout/storage tracks. OTP Nar. at III-B-5. Otter Tail later filed an errata to its opening evidence in which it identified the need for an additional 122.2 miles of passing sidings as a result of "corrections" that it made to its string program submitted on opening. OTP Errata at 9. As described in more detail below, Otter Tail's approach to assessing the capacity required for the OTRR it designed was based on erroneous methodologies and factual assumptions. BNSF therefore carried out an independent analysis. BNSF accepted Otter Tail's network and capacity assumptions where appropriate and revised these assumptions as needed to develop the minimum facilities required by an efficient, least-cost railroad that handles traffic properly grouped in a

[8] BNSF Reply electronic workpaper "III F Miles.xls."

stand-alone network. BNSF's revised capacity assumptions are based on revisions to the OTRR traffic that are described in Section III.A.1 of this Narrative.

BNSF's revised track configuration for the OTRR is shown in Exhibit III.B-1. This Exhibit also shows the OTRR track configuration posited by Otter Tail in its errata filing to facilitate a side-by-side comparison of the parties' proposed configurations.

Table III.B-2 below contains a summary comparison of the miles of track recommended by Otter Tail with the miles recommended by BNSF's witnesses.

Table III.B-2
Comparison Of Otter Tail's Calculation Of Miles
With BNSF's Calculation Of Miles Of OTRR Track

Type of Track	OTP[9]	BNSF[10]	Difference
Mainline Track	1,676.6	1,655.9	-20.7
Mine Spurs	4.8	6.9	2.1
Set-Out Track	10.5	24.5	14.1
Yards[11]	79.5	82.9	3.4
Total	**1,771.3**	**1,770.2**	**-1.1**

A detailed explanation of how BNSF's witnesses arrived at their recommendations for the OTRR's track miles is provided below in Section III.B.2.a on mainline track, Section III.B.2.b on branch lines, Section III.B.3 on yards, and Section III.F.3.e.ii.(b) on set-out track.[12]

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[9] OTP Errata electronic workpaper "OTRR CONSTRUCTION.xls" at worksheet "Quantities." The miles for each type of track do not sum to the total miles due to rounding.

[10] BNSF Reply electronic workpaper "III F OTRR Construction.xls" at worksheet "Quantities." The miles for each type of track do not sum to the total miles due to rounding.

[11] BNSF categorized all of the track in the Terry Yard, which is made up of an 8,000-foot track and two 600-foot set-out tracks, as yard miles. Otter Tail included the 8,000-foot yard track in its mainline track miles, and the two 600-foot set-out tracks in its set-out track miles. To facilitate an apples-to-apples comparison, BNSF moved Otter Tail's total miles for the Terry Yard (9,200 feet) to yard track miles.

[12] Mine spurs are discussed above in Section III.B.1.

Otter Tail proposed to construct the OTRR using new 136-pound continuous welded rail (CWR) for sections of the OTRR with the highest traffic volumes, and using either new or relay 132-pound CWR for sections of the OTRR with lower traffic volumes. BNSF's witness Mr. Zimmerman accepts Otter Tail's assumptions for the weight of track on the OTRR and BNSF uses these assumptions in its cost calculations in Section III.F. Table III.B-3 contains a comparison of the total track miles by weight of rail recommended by Otter Tail with the total track miles by weight of rail recommended by BNSF witnesses.

Table III.B-3
Comparison Of Total Track Miles By Weight Of Rail

Type of Rail	OTP[13]	BNSF[14]	Difference
136# Premium	71.6	70.8	-0.8
132# Premium	68.3	66.5	-1.8
136# New	646.3	624.9	-21.5
132# New	661.2	660.8	-0.4
132# Second Hand	323.9	347.3	23.3
Total	**1,771.3**	**1,770.2**	**-1.1**

These conclusions are described in detail below.

a. Mainline

In order to evaluate the mainline capacity of the OTRR, BNSF first compared the OTRR's proposed capacity and projected traffic with BNSF's existing capacity and traffic over the SARR route. Exhibit III.B-2 is a map of the OTRR route. BNSF found that two segments of the OTRR (Gillette, WY to Glendive, MT, and Fargo, ND to Big Stone, SD) had capacity comparable to what BNSF currently has over these segments. BNSF also determined that the

[13] OTP Errata electronic workpaper "OTRR CONSTRUCTION.xls" at worksheet "Quantities."

[14] BNSF Reply electronic workpaper "III F OTRR Construction.xls" at worksheet "Quantities." The miles for each type of track do not sum to the total miles due to rounding.

track configuration posited by Otter Tail for these segments should be capable of accommodating the OTRR traffic as revised by BNSF in Section III.A. BNSF therefore accepts Otter Tail's proposed capacity for these sections of the OTRR. (See the discussion in subsection (1) below.) For those segments on which capacity and traffic volumes differed substantially (*i.e.*, Converse, WY to Gillette, WY, and Snowden, MT to Glendive, MT to Fargo, ND), BNSF conducted additional analyses to determine the appropriate mainline configuration for the OTRR.

To carry out these analyses, BNSF's witnesses first examined the two methods purportedly used by Otter Tail's witnesses to develop the OTRR capacity to determine if they could use those methods as reliable predictors of capacity. Otter Tail claims to have used both a formula and a string program to develop the OTRR mainline configuration. BNSF's witnesses determined that both of these methods were unreliable and could not be used to determine the OTRR's capacity needs. BNSF's critique of Otter Tail's methodology is further described in subsections (2) and (3) below.

Since BNSF could not rely on the methods used by Otter Tail and could not justify the capacity proposed by Otter Tail based on a comparison to BNSF's existing operations over those line segments, BNSF was forced to conduct an independent capacity analysis of certain sections of the OTRR. BNSF's witness Mr. Wheeler used the Rail Traffic Controller Model (RTC Model) to evaluate the capacity of the OTRR between Converse and Gillette and between Snowden, Glendive and Fargo. The RTC Model is widely used in the railroad industry for capacity planning. Both the Board and Otter Tail's consultants are familiar with the RTC Model

from previous SAC cases.[15] Mr. Wheeler's analysis and conclusions are described in subsection (4) below.

(1) Comparison Of BNSF's Existing Capacity And Traffic With The OTRR's Capacity And Traffic

BNSF accepts Otter Tail's track configuration for two segments of the OTRR. BNSF's witness Mr. Plum compared BNSF's existing track miles with the OTRR's track miles posited by Otter Tail for these segments and determined that the differences between the two are minimal. The results of this comparison are shown in Table III.B-4.

Table III.B-4
Comparison Of BNSF's Existing Track Miles
With Otter Tail's Proposed Track Miles For The OTRR

		Track Miles[16]	
From	**To**	**OTRR**	**BNSF**
Glendive	Nichols	147.00	148.80
Nichols	Sarpy	18.31	20.11
Sarpy	Jones Jct	69.98	73.08
Jones Jct	Gillette	266.70	268.23
Total (Glendive-Gillette)		501.99	510.22
Fargo	Benson	133.12	143.27
Benson	Big Stone	45.70	50.20
Total (Fargo-Big Stone)		178.82	193.47

Source: BNSF Reply electronic workpaper "Track Counts vl.xls."

The Table shows that the OTRR has somewhat less track capacity than the real-world BNSF on both segments. BNSF handles a mix of coal, grain and general freight traffic on its Fargo-to-Big Stone line, but Otter Tail selected only coal traffic moving over this line for inclusion in its stand-alone traffic group. Since Otter Tail intends to carry less traffic over this

[15] *See, e.g., Public Service Co. of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Railway Co.*, STB Docket No. 42057 ("*Xcel*").

[16] Track miles were calculated by counting all mainline track, double track, and passing sidings that have the capacity to hold a full train.

line than BNSF currently carries, BNSF's witnesses Messrs. Wheeler and Mueller concluded that the track configuration posited by Otter Tail for this line should be sufficient.

For the Glendive-to-Gillette line segment, Otter Tail expects to handle more traffic than BNSF currently handles over this line even though the OTRR's track capacity is very close to BNSF's.[17] Nevertheless, BNSF's witness Mr. Mueller determined that BNSF is not currently operating at capacity over that line. He therefore concluded that the OTRR's track configuration should be capable of accommodating some expansion of existing traffic. To simplify its presentation of reply evidence, BNSF chose to accept Otter Tail's capacity assumptions on this line segment since they are very close to BNSF's actual capacity, even though it is possible that the OTRR's capacity would not be adequate to handle future, peak year volumes. BNSF's capacity evidence is therefore conservative.

As shown in Exhibit III.B-3, the differences between the BNSF and OTRR traffic on the remaining line segments (Gillette, WY to Converse, WY, and Snowden, MT to Glendive, MT to Fargo, ND) are so great that it would not be meaningful to base an assessment of OTRR capacity for these two segments on a comparison with BNSF's existing lines. Therefore, an independent assessment of those lines had to be carried out.

(2) Otter Tail's Capacity Formula Is Unreliable

First, BNSF's capacity witnesses determined that Otter Tail's approach could not be used to develop capacity requirements. Otter Tail claims that it used a capacity formula to develop the track configuration for the OTRR and then tested that configuration using its string program.

[17] Although Otter Tail excluded from its traffic group certain traffic that BNSF currently handles over that line, Otter Tail added rerouted traffic to the line. The net effect was to increase traffic by less than three trains per day in the base year. BNSF Reply electronic workpaper "Rerouted Traffic Analysis.xls" at worksheet "Summary."

OTP Nar. at III-C-19. Otter Tail's formula is described at pages III-C-18 to 19 of its opening evidence. The formula generally relies on transit times to develop the number of trains per day that can traverse a particular single-track section of the OTRR.

It is unclear, however, whether Otter Tail actually used its capacity formula to develop the OTRR track configuration. Despite two workpaper requests by BNSF, Otter Tail failed to present *any* workpapers showing how its formula relates to the track configuration presented in its opening evidence.[18] Without supporting workpapers, neither BNSF nor the Board can determine whether the track configuration proposed by Otter Tail is in fact supported by the formula that Otter Tail purportedly used.[19]

Moreover, even if Otter Tail used the formula as it claims, the formula is not a reliable method for determining the capacity needs of the OTRR. There are several problems with Otter Tail's formula-based approach. First, formula-based approaches typically understate the actual capacity needs of a railroad. Formula-based approaches are static and do not account for complex interactions among trains or among different parts of the network. While capacity planners may rely on a formula-based analysis to develop a rough preliminary assessment of capacity needs, they generally do not make final capacity recommendations without also running a detailed simulation using a reliable simulation model.[20] Only a simulation will provide

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[18] BNSF.RP.WP.III.B-0001 to 0008.

[19] It would be improper for Otter Tail to submit workpapers in its rebuttal filing showing how the formula was used. Such workpapers could have and should have been submitted in support of Otter Tail's opening evidence or in response to BNSF's requests for workpapers relating to the formula.

[20] Otter Tail seems to recognize this practice as it used its flawed string program in an effort to confirm the configuration purportedly developed using the formula.

sufficient information to determine not only that the network configuration has enough capacity to prevent gridlock but also to allow the railroad to meet cycle time commitments.

Second, Otter Tail made certain simplifying assumptions regarding the formula which further understate the actual capacity needed by the OTRR. Instead of calculating the actual transit time across each single-track section of the OTRR, Otter Tail apparently assumed that trains would travel at an average speed of 25-30 mph over each single-track segment.[21] Otter Tail's simplifying assumption does not account for the fact that trains will be unable to achieve average speeds of 25-30 mph over certain sections of the OTRR that contain significant grades, curves, or speed restrictions. Trains will traverse these types of sections at much lower speeds, resulting in higher transit times and increased capacity requirements.

Finally, assuming the formula was used to develop the track configuration posited by Otter Tail on opening, it is obvious that the formula understated capacity requirements as Otter Tail filed its errata evidence adding some 122 miles of passing sidings to the OTRR. In response to a workpaper request, Otter Tail essentially admitted that the additional sidings in its errata evidence were not based on the formula cited in its opening evidence.[22]

(3) Otter Tail's String Program Is Fundamentally Flawed

The string program used by Otter Tail in this case is the latest version of a program developed by L.E. Peabody & Associates (LEPA) for purposes of SAC litigation. The string

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[21] BNSF.RP.WP.III.B-0007. The fact that Otter Tail disclosed its average speed assumption is not sufficient to show whether or how the formula was used to develop the OTRR track configuration.

[22] In response to a request for workpapers supporting the need for the sidings described in the errata, Otter Tail directed BNSF to its errata string program and transit time comparison and made no reference to its opening formula as the basis for its revised track configuration. BNSF.RP.WP.III.B-0007.

program is a rudimentary computer program that attempts to model the operations of a specified set of loaded and empty trains across railroad lines with a specified configuration and operations. The string program includes "rules" for the operation of the trains, such as speed limits, acceleration and deceleration formulae, and time for various activities (*e.g.*, crew changes). The output of the string program is the foundation for Otter Tail's evaluation of line capacity and for the operating statistics that are used to calculate operating costs.

Otter Tail purported to model the operations of the OTRR in the year 2021, which is the year in which the largest volume of traffic is assumed to be handled by the OTRR. To generate data for the year 2021, Otter Tail chose a day that it asserts is the peak day for traffic on the OTRR, October 18.[23] Otter Tail identified the specific train movements it claims would occur on that peak day and ran those train movements through the string program.

To evaluate the proposed capacity of the OTRR configuration, the string program flows the specified trains over the system posited by Otter Tail. The string program then generates operating statistics for the modeled trains, including the amount of time that trains are on the OTRR. These operating statistics are then used to produce specific operating costs. For example, time-on-line becomes the basis for the number of locomotives and cars that the OTRR is assumed to need. Finally, after the string program has identified the specific movements of the modeled trains, crew requirements are determined by counting up the supposed train starts in the various crew districts on the OTRR during the peak day.

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[23] BNSF explains in Section III.B.2.a.(4)(b)i) below that there are several problems with Otter Tail's methodology for selecting a peak period, which is based on the total number of loaded coal and general freight trains originating on the OTRR on a single day. It is more appropriate to identify a peak period based on a high sustained level of traffic over a longer period of time, such as a week. This is the approach that BNSF used to determine an appropriate peak period for modeling purposes.

In its recent decision in the TMPA case, the Board found that it was unable to determine the reliability of a previous version of the LEPA string program and therefore did not accept its output as the basis for either the capacity requirements or the operating plan for the hypothetical railroad in that case.[24] In the Xcel case, BNSF argued that the version of the string program used in that case contained similar flaws and could not be relied on by the Board.[25] For this case, BNSF's witnesses Karl M. Leopold, Senior Consultant at FTI Consulting, Terence J. Monks, a software consultant, and Andrew J. Cebula, Director of Planning & Engineering at CANAC, Inc., analyzed the errata string program submitted by Otter Tail and concluded that this version of the string program also suffers from fundamental defects that render it unreliable.[26] As in TMPA and Xcel, the string program cannot be used as the basis for any analysis of the OTRR's capacity requirements or the operations that could be expected over the OTRR.

The string program defects include:[27]

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[24] *TMPA*, slip op. at 68 n.112 and 73-74.

[25] *See, e.g.*, Final Brief of BNSF, *Public Service Co. of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Rwy. Co.*, STB Docket No. 42057, at 25-28 (filed Sept. 8, 2003). *See also* Reply Evidence of BNSF (Public Version), *Arizona Electric Power Coop. v. The Burlington Northern and Santa Fe Rwy. Co. and Union Pacific R.R. Co.*, STB Docket No. 42058, at III.C-1 (filed May 27, 2003); Letter from G. Paul Moates to Hon. Vernon A. Williams, *Carolina Power & Light Co. v. Norfolk Southern Ry Co.*, STB Docket No. 42072, at 3 (filed March 14, 2003).

[26] In its errata filing, Otter Tail attempted to identify and correct certain errors in its opening string program before BNSF even filed its reply evidence. The "corrections" to Otter Tail's opening string program caused Otter Tail to add 122 miles of passing sidings and submit revised operating statistics and DCF results. OTP Errata at 8-9. BNSF's critique is based on the "corrected" string program submitted as part of Otter Tail's errata filing.

[27] BNSF identifies additional defects in the string program in Section III.C.2.a on cycle times. Although the defects identified in that section relate to the string program's ability to calculate accurate transit times, those defects provide further proof that the string program is unreliable for capacity testing.

1. Overloading of Sidings: The string program output shows that the model regularly allowed OTRR trains to enter sidings when other trains already fully occupied that space. One example of this problem occurs on the OTRR's supposed peak day at the siding between E. Parkman and W. Parkman on the Big Horn Subdivision. Between 3:36 AM and 4:08 AM, the string program allowed three empty trains (each of which is at least one mile in length) to occupy a 1.7-mile siding while a loaded train passed on the OTRR's mainline.[28] This is not an isolated occurrence. BNSF found 142 examples in the week surrounding Otter Tail's peak day.[29] One overloading demonstrates that the string program is flawed; a multiplicity of overloadings demonstrates that it is a worthless tool for testing the OTRR's capacity.

2. Inability to Detect T-Bone Train Collisions: Otter Tail claimed that its string program resolved conflicting train events on the OTRR, *i.e.*, that no train collisions occur. OTP Opening Exh. III-C-2 at 5-6. However, the string program output shows that this statement simply is not true. Seventeen train collisions occur on the OTRR's peak day, October 18.[30] To take an example, the string program output shows a loaded coal train arriving at 1:33:19 PM at E. Kiewit and an empty coal train departing E. Kiewit at 1:33:27 PM.[31] As shown in Exhibit III.B-4, the loaded train has insufficient time to clear the interlock at E. Kiewit before the empty train reaches the interlock, resulting in a "T-Bone" train collision.

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[28] BNSF Reply electronic workpaper "Overloading on Sidings Analysis (Errata) v2.xls," worksheet "Results," at cells B49-L52.

[29] *Id.* at worksheet "Summary."

[30] BNSF Reply electronic workpaper "T Bone Collisions.xls" at worksheet "Final Summary."

[31] *Id.*, worksheet "Analysis" at row 9.

In response to this criticism, the Board may see an argument by Otter Tail that the times shown in the string program are arrival times instead of departure times, *i.e.*, that the trains essentially stop when they enter a siding with the nose of the head engine at the arrival point and wait for other trains to pass on the mainline. But this argument is belied by what the string program reveals is happening to the supposedly stopped trains. BNSF's electronic workpapers demonstrate that when the empty train in the above example arrives at the milepost just short of the T-Bone train collision, the train is traveling at a speed in excess of 45 mph.[32] In order to avoid a collision, this train would be required to instantaneously decelerate, an obvious impossibility.

This example is not an isolated occurrence. Mr. Leopold analyzed the string program output during the period October 11 through October 19 and found 53 examples of T-Bone train collisions.[33] These numerous collisions undermine any claim that the output of the string program shows that Otter Tail has provided enough capacity for the OTRR.

3. Failure to Link Empty and Loaded Coal Trains: Otter Tail failed to make any connection between empty trains returning from destinations and loaded trains departing from the mines for those destinations. This failure marks a significant departure from the real world unit coal train service that Otter Tail purports to provide, in which equipment owned by

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[32] BNSF Reply electronic workpaper "cdkmsud159_speeder run for t bone example.dbf" at record 861-1746. The string program makes numerous calculations concerning second-by-second movements of trains on the OTRR but does not generate an output file that allows the user to see such data. BNSF's witness Mr. Monks captured the program's calculations in this workpaper so that BNSF could analyze the nature of the train movements produced by Otter Tail's string program. The workpaper shows that the station name and milepost number remain constant and then suddenly change, despite the fact that time is passing and the train is obviously moving from one station to another. This occurs because the string program is not designed to identify the exact location (*i.e.*, milepost) of the train whenever the train is between stations.

[33] BNSF Reply electronic workpaper "T-Bone Collisions.xls" at worksheet "Final Summary."

individual shippers is employed continuously in the service of that shipper. The failure to link returning empty trains with departing loads means that the string program fails to account for congestion and delays occurring at the PRB mines that should be included in Otter Tail's capacity assessment and cycle time calculations.[34]

Exhibit III.B-5 illustrates this problem with a simple example taken directly from the output of Otter Tail's string program. The first page of the Exhibit shows that train CDMKCC1, an empty Grand River Dam Authority train, arrives at Cordero mine on October 15 at 2:47 PM. The next loaded train assumed to depart from Cordero - another Grand River Dam Authority train - does not leave the mine until October 16 at 12:17 PM, 21.5 hours later. Otter Tail's model, however, is programmed to assume that only six hours are spent by OTRR trains loading at the mines, thus understating the cycle time for this particular train by 15.5 hours. The second page of the Exhibit shows that train CDMKCC273 experiences the same sort of extended delay at the mine and the same sort of understatement of cycle times.[35]

Otter Tail may argue that the modeling of connected empty and loaded trains is too complicated for use in a SAC case. But any model of unit train operations that assumes that the congested PRB mines have unlimited capacity to stage trains cannot produce reliable results. Otter Tail's string program does not take into account one of the most basic characteristics of unit coal trains, namely that an empty unit coal train enters a mine and departs loaded. In the real world, empty trains do not disappear for days when they arrive at the mine. Railroads providing service in the PRB must be certain that they have adequate capacity to stage trains near

[34] The string program does not even model the OTRR operations on congested subdivisions leading to the mines (*e.g.*, Campbell and Reno Subdivisions) or on mine spur tracks.

[35] BNSF's analysis of the OTRR trains at the mines is shown in electronic workpaper "Trains at Mines Analysis.xls." BNSF's analysis shows that some of the OTRR's empty trains disappear at the mines altogether, *i.e.*, they never emerge from the mines as loaded trains.

the mines.[36] The inability of the string program to model real world unit coal train operations makes it unreliable as a test for the adequacy of such a railroad's requirements.

4. Missing Empty Coal Trains: The string program failed to account for all of the empty coal trains expected to move on the OTRR. There are 207 loaded coal trains interchanged to the BNSF at either Converse or Donkey Creek that should return to the OTRR network as empty coal trains during the modeled period, but do not. Approximately 23 of these trains are expected to return to the OTRR on or around October 18, the OTRR's supposed peak day.[37] As a result, Otter Tail has not shown that the network configuration it posited can accommodate these trains. In addition, the equipment and crew requirements posited in Otter Tail's evidence do not include equipment and crew to service these missing trains.

5. Other Flaws: In addition to the defects listed above, BNSF has identified two defects that are related to the complicated traffic group and network configuration that Otter Tail has attempted to model. First, certain trains experience delays of more than 16 hours at Glendive yard.[38] Otter Tail was aware of this problem and claimed to have fixed it in its errata filing. OTP Errata at 4. However, the problem persists in the errata string program. Second, the string

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[36] This was an issue that the Board asked Xcel to address in its final brief. *Public Service Co. of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Rwy. Co.*, STB Docket No. 42057, at 2 (served Aug. 8, 2003).

[37] BNSF Reply electronic workpaper "Add Back Empty Trains to Locomotive Analysis.xls," worksheet "Missing Empty Trains," at column F. Missing trains can be easily identified by matching the coal trains in Otter Tail's errata workpapers "timese.dbf" and "timesl.dbf."

[38] OTP Errata electronic workpaper "timese.dbf," record 1, at columns S94 and S95.

program prioritizes all trains moving in the prevailing direction (the direction in which the issue traffic moves).[39] A railroad with both coal and non-coal trains should prioritize based on traffic type and characteristics rather than a simplistic directional priority.[40]

(4) Capacity Recommendations Using The RTC Model

Using a simulation model that is widely used in the railroad industry, BNSF's witness Mr. Wheeler performed a detailed alternative assessment of the capacity that would be required on two segments of the OTRR: (1) Snowden to Glendive to Fargo and (2) Gillette to Converse.[41] As explained above, BNSF was unable to rely on Otter Tail's capacity assessment or a comparison to actual operations to confirm the capacity required on these segments and therefore was forced to perform an independent capacity analysis of these segments.

Mr. Wheeler's capacity analysis is based on (1) revised traffic levels discussed above in Section III.A and (2) operating parameters provided by BNSF's witness Mr. Mueller. For this

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[39] The program's rudimentary logic is only capable of dispatching trains in one direction and then separately dispatching trains in another direction. To start the flow of trains, the string program first dispatches all loaded coal and general freight trains moving in the prevailing direction. OTP Errata electronic workpaper "otter_tail_string.prg" at lines 993-1655. These trains traverse the network easily, experiencing no delays from oncoming trains since there are no trains moving in the non-prevailing direction at this point in the program. The string program next dispatches all trains moving in the non-prevailing direction. *Id.* at lines 1660-3316. Finally, the program dispatches all of the empty trains moving in the prevailing direction. *Id.* at lines 3319-4396. The movement of the first set of trains is fixed, *i.e.*, the string program does not adjust the positions of those trains once it starts flowing trains moving in the non-prevailing direction. By contrast, the RTC Model has advanced dispatching logic that flows trains in different directions simultaneously and determines the priority that should be given to each train based on the needs of each train and the impact on the network as a whole. BNSF Reply Exhibit III.B-5 at 13.

[40] See, for example, BNSF's train priorities, which were produced to Otter Tail in discovery. BNSF.RP.WP.III.B-0009.

[41] Mr. Wheeler's simulation of the OTRR operations between Gillette and Converse includes the Campbell and Reno Subdivisions and all of the relevant Wyoming PRB mines.

analysis, Mr. Wheeler used the Rail Traffic Controller Model (RTC Model), which was developed by Berkeley Simulation Software (Berkeley Simulation).[42]

The RTC Model and Mr. Wheeler's capacity analysis using that model are described in detail below.

(a) The RTC Model Is Widely Used And Produces Reliable Capacity Assessments

The RTC Model has been thoroughly tested, and it has gained widespread acceptance among railroads, transit authorities and government agencies due to the sophistication of its underlying programs and structure, its powerful processing capacity and iterative capabilities, and its high level of functionality. It is widely considered to be one of the best models of its kind available today. The RTC Model has been utilized in connection with several high profile freight and passenger projects. It is the preferred network simulation model for organizations including the Alaska Railroad, Amtrak, Association of American Railroads (AAR), BNSF, CSX Transportation (CSXT), Norfolk Southern (NS), Grupo Transportacion Ferroviaria Mexicana (TFM), and Union Pacific (UP). The following are just a few of the projects that have been driven by capacity recommendations based upon RTC Model simulations:

- $1.5 billion Chicago terminal project involving the BNSF, CN, CP, CSX, NS, UP and the many independent terminal organizations within the Chicago complex, a network consisting of 122 route miles, over 900 track miles, and significant switching yards.[43]
- Southern California's Alameda Corridor project which consolidated more than 90 route miles into a 20-mile corridor. The RTC Model was used to model

[42] BNSF intends to provide a copy of the RTC Model to Otter Tail for its use in the rebuttal phase of this proceeding.

[43] BNSF.RP.WP.III.B-0010 to 0012.

multiple track configurations and volume levels proposed by the Alameda Corridor Transportation Authority.

- Studies to determine where additional triple track and Centralized Traffic Control were required to accommodate traffic growth on Union Pacific's east-west mainline extending from North Platte to Chicago, which handles more than 100 freight trains per day on double, triple and quadruple track.

- Seattle Sound Transit passenger service expansion between Black River and Argo, Washington.

- "Amtrak West" project encompassing California, Oregon and Washington Amtrak routes.

- Amtrak's Shreveport – Dallas/Ft Worth initiative on Union Pacific, in which the RTC Model was used to analyze the potential service capability of Amtrak, quantify the impact on UP's freight service and identify required capital improvements to mitigate such impacts.

- Union Pacific's Tucumcari and Sunset route improvement plan, which involved more than 1,000 miles of mainline and seven intermediate terminals.

- BNSF's Chicago to West Coast Intermodal Route capacity initiative, in which BNSF will construct approximately 105 miles of additional double track to accommodate projected intermodal growth of 6-8 percent. The RTC Model was the key tool used to identify the amount and location of required capacity improvements.[44]

- Union Pacific and BNSF line consolidation/road closure project between Spokane, WA and Sandpoint, ID.

As these representative projects illustrate, the RTC Model is relied upon in the normal course of business by both railroads and planning agencies to provide reliable rail capacity analysis in a variety of real world applications.[45]

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[44] BNSF.RP.WP.III.B-0013 to 0015.

[45] The list of projects and organizations using the RTC Model was developed by Mr. Wheeler based on his knowledge and experience in the capacity planning industry, both as President of Rail Network Analytics and as General Director, Capacity & Operations Analysis at UP. In addition, when Mr. Mueller was Vice President and Chief Operating Officer of the Alaska Railroad, he personally observed the use of the RTC Model by the Alaska Railroad.

BNSF began using the RTC Model when it was developed by Berkeley Simulation approximately three years ago.[46] BNSF employees use the RTC Model on a daily basis. Mr. Gary Agnew, General Director of BNSF's Resource Planning Department, has four full-time employees who spend 100 percent of their time preparing, running and analyzing simulations using the RTC Model. Mr. Agnew has another two full-time employees who use the RTC Model 50 to 75 percent of the time. With input from others at BNSF, the Resource Planning Department analyzes the capacity and operational needs of the railroad and recommends capacity improvements and scheduling changes based on simulation results using the RTC Model. The RTC Model is the principal simulation tool used by BNSF in support of BNSF's line capital expansion budget, which ranges from $100 to $225 million each year.

The true test of a rail capacity analysis model is its ability to perform complex iterative processes to keep track of the many events occurring on a railroad at each moment in time. The model must be able to dispatch and track the movement of trains, and to adjust for the ripple effect that individual dispatching decisions will have on other trains using the network. Railroad traffic patterns can be influenced by many factors, including events occurring far beyond the geographic boundaries of a line segment under study. The RTC Model can process complex train movements and incorporate upstream and downstream events and activities. Moreover, as described in more detail below, the RTC Model generates clear detailed data about the movement of each train across the network which can be used to confirm the reliability of the

[46] BNSF has used simulation models developed by Berkeley Simulation for more than a decade. In the early 1990s, BNSF began using a predecessor model to the RTC Model known as the Dispatch Planning Model (DPM). The primary differences between the two models is that the RTC Model is windows based and therefore more user friendly, and the RTC Model is capable of simulating larger territories and longer modeling periods than the DPM.

model's logic and the model's assumptions about train operations relating to speed limits, curves, grades, train meets and other operating conditions.

The RTC Model produces detailed simulation output that essentially replicates the daily workings of the railroad. The RTC Model accurately reproduces train operations at a highly detailed level. One can observe the authorized speed, actual velocity achieved, line grade, throttle notch, dynamic brake level, airbrake level, elevation, location and elapsed time for the entire movement. From this model, a detailed variance analysis can be performed to assist capacity and transportation planners in understanding how and why actual results differed from planned results. Capacity shortfalls and operational deficiencies can be accurately pinpointed. The RTC Model also produces accurate transit times that account for time lost in acceleration and deceleration as trains enter and leave sidings, yards, and mine sites.[47]

The sections that follow contain a discussion of the inputs to the RTC Model and the simulation results for each segment.[48]

(b) Modeling The Snowden-Glendive-Fargo Section Of The OTRR

[47] Exhibit III.B-6 is a brochure from Berkeley Simulation describing the capabilities of the RTC Model in more detail. General acceptance and use of the RTC Model in the industry, combined with its detailed output and overall accessibility through a sophisticated user-interface, places the RTC Model on a completely different footing from the string program. The RTC Model produces reliable results that are, in fact, used to run real-world railroad operations, and the flexibility of its interface permits confirmation that its outputs are both sensible and valid. By contrast, the string program produces results that are immediately suspect based on even a cursory review of the output. As described below in Section III.C.2.a, inspection of the code underlying the string program demonstrates that its results are based on flawed underlying calculations and assumptions.

[48] Exhibit III.B-7 is a user's manual created by Mr. Wheeler to assist the Board in its analysis of the RTC Model simulations. The manual is also provided electronically in a set of three files: "RTC & Report Wizard Exhibit Part 1.ppt," "RTC & Report Wizard Exhibit Part 2.ppt" and "RTC & Report Wizard Exhibit Part 3.ppt."

i) Inputs To The RTC Model

The first step in using the RTC Model is to input the track characteristics and operating parameters of the relevant lines. These include grades, curvature, signal systems, maximum allowable mainline speed limits, location and length of sidings, allowable turnout and siding speeds, train priorities, driver aggression, etc. Mr. Wheeler relied on the stick charts that Otter Tail provided with its errata evidence to input certain track characteristics into the simulation.[49] He relied on materials that BNSF produced in discovery to input track characteristics that were not specified in Otter Tail's stick charts, such as grades and curvature.[50]

Consistent with Otter Tail's operating plan for the OTRR, Mr. Wheeler assumed that loaded coal trains are restricted to a maximum speed of 50 mph and empty trains and general freight trains are restricted to 60 mph. Unlike Otter Tail, Mr. Wheeler assumed that loaded grain trains would also be limited to 50 mph for operating reasons.[51] Mr. Wheeler also consulted BNSF's track charts and timetables for special instructions or restrictions that would limit the

[49] Otter Tail's stick charts include specifications for the type and weight of rail, type and location of signals, and locations of mainline track, passing sidings, yards and set-out track. Otter Tail omitted from its stick charts two of the double-track sections that it specified for the OTRR in its errata filing. *Compare* OTP Errata at 8-9 and OTP Opening Exh. III-B-1 at 20 (as revised and filed at the Board on July 25, 2003). Pursuant to Otter Tail's errata filing, Mr. Wheeler included these double-track sections in the RTC Model.

[50] BNSF Reply electronic workpaper "Timetables and Track Charts.zip."

[51] Trains that exceed 100 tons per operative brake (TOB) require long stopping distances and are therefore subject to more restrictive speed limits than lighter trains. BNSF Reply electronic workpaper "BNSF System Special Instructions.pdf" (contained in workpaper "Timetables and Track Charts.zip") at 4-5. Both loaded coal trains and grain trains typically exceed the 100 TOB limit.

speed or movement of the OTRR trains on specific sections of track.[52] The speed limits used in the RTC Model are identified in electronic workpaper "Speed limits.xls."

Mr. Wheeler also relied on materials produced in discovery to prioritize trains on the OTRR.[53] The setting of train priorities enables a real world dispatcher (or dispatch simulation logic) to determine which train has priority when two trains meet, or whether a faster train should overtake and pass a slower train when two trains are traveling in the same direction. Train priorities are designed to ensure that the railroad meets its customer delivery requirements, while also minimizing operating costs. The order of train priorities used by Mr. Wheeler in the RTC Model simulation is shown in Table III.B-5.

Table III.B-5
Train Priorities

Train Priority	Train Category[54]
1	(Z) UPS/LTL guaranteed intermodal
2	(Q) Guaranteed intermodal
3	(P) Premium intermodal, (S) Intermodal stack, (V) Vehicle
4	(B) Baretable (empty) intermodal, (H) Priority merchandise
5	(C) Loaded unit coal, (E) Empty unit coal, (G) Loaded unit grain, (M) Merchandise, (U) Unit trains, (X) Empty unit grain

[52] BNSF Reply electronic workpaper "Timetables and Track Charts.zip." In Section III.C.2.a.(2), BNSF identifies several problems with the specific speed limits assumed by Otter Tail. To avoid the errors made by Otter Tail, Mr. Wheeler relied on the speed limits shown in BNSF's track charts and timetables with a few exceptions. First, Mr. Wheeler accepted Otter Tail's higher speed limits for the Snowden to Glendive section because Otter Tail provided for upgraded track construction and signaling on this line in order to accommodate higher traffic volumes associated with the OTRR's rerouted traffic. Second, Mr. Wheeler did not rely on special restrictions in BNSF's timetables unless he determined that those restrictions should be applied to the OTRR (*e.g.*, municipal speed limits).

[53] BNSF.RP.WP.III.B-0009.

[54] The Table includes only those train categories that moved on the OTRR during the modeled period.

The RTC Model also allows the user to choose a setting for driver aggression from zero to ten. The driver aggression variable drives the rate of throttle adjustments as the train accelerates to achieve its allowable speed limit. A level of ten indicates that the engineer aggressively adjusts the throttle to maintain the highest allowable speed. A level of zero indicates that the engineer moves the throttle less frequently to smooth out the operation of the train. The user should select a driver aggression rating based on the train characteristics of the railroad being simulated. Railroads with a significant volume of heavy haul trains, such as loaded unit coal trains, require a low driver aggression rating. Coal trains have long braking distances and tend to consume large amounts of fuel with frequent throttle changes -- factors that lead railroad engineers to drive heavy trains less aggressively. On the other hand, lighter non-coal trains could be operated with a higher driver aggression rating. Since the OTRR operates both heavy unit coal trains and generally lighter non-coal trains, Mr. Wheeler conservatively selected a moderate driver aggression rating of five for the OTRR simulation.[55]

The next step in running the model was to identify the trains that would operate during the period to be modeled. BNSF's witness Mr. Leopold provided Mr. Wheeler with information about the specific trains to be modeled. The methodology used by Mr. Leopold to identify the relevant trains is described below.

Mr. Leopold first examined the modeling period selected by Otter Tail to determine if it was an appropriate period to model. In previous stand-alone cost cases, complainants typically

[55] By adjusting the driver aggression rating in the RTC Model, the user will see that changes to the setting have a relatively minor impact on total transit times. A higher rating generally causes a slight reduction in transit times, while a lower rating generally causes a slight increase in transit times.

selected a peak week or peak two weeks for modeling purposes.[56] In this case, Otter Tail selected its modeling period for the string program based on the projected peak *day* in the year 2021, as defined by the number of loaded train starts on that day. Reliable capacity requirements, however, cannot be determined by identifying and modeling a peak day. For purposes of determining capacity, it is important to simulate a sustained peak period such as a week or weeks to ensure that the proposed network can sustain peak traffic volumes that last longer than a day.[57]

In addition, the methodology Otter Tail used to select its peak day does not account for all of the traffic on the OTRR or for peak traffic volumes that can be expected in the geographic areas where the OTRR is likely to experience its most significant capacity constraints. Otter Tail choose the peak day by projecting the total of (1) the number of loaded coal trains originating from the PRB mines each day in the year 2021 and (2) the number of general freight trains entering the SARR each day in the year 2021.[58] This methodology ignored the OTRR's empty coal trains. The peak number of empty coal trains on the system is critical to determining capacity since Otter Tail's string program gives priority to loaded coal trains, forcing empty coal trains to wait in sidings while loaded coal trains are allowed to continue unimpeded on the

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[56] *See, e.g.*, Rebuttal Evidence of Xcel (Public Version), *Public Service Co. of Colorado d/b/a Xcel Energy v. The Burlington Northern and Santa Fe Rwy. Co.*, STB Docket No. 42057, at III-B-14 (filed May 19, 2003).

[57] Although Otter Tail modeled a one-week period prior to its supposed peak day, the modeled week actually consists of average traffic volumes. OTP Opening electronic workpaper "Peak Coal Trains.xls" at worksheet "Train Count Summary."

[58] *Id.* It is significant that Otter Tail's peak day for the combination of traffic is not the peak day for either the coal traffic or non-coal traffic individually. (BNSF discusses this issue in more detail in Section III.C.2.d.) Thus, under Otter Tail's approach, the capacity on the sections of the OTRR devoted mostly to coal traffic (Converse to Donkey Creek to Glendive, and Fargo to Big Stone) is not in fact based on the peak day for coal movements on those track segments.

mainline. The more empty trains on the OTRR, the more capacity that is needed. Otter Tail's methodology also failed to consider the congestion that will occur on the line segment from Glendive to Fargo. This is because Otter Tail's supposed peak day is driven largely by coal originations in the PRB, not on the day when the largest number of coal trains are moving over the Glendive to Fargo line, where the OTRR's coal and general freight traffic will compete for capacity and priority.

Since Otter Tail failed to identify a sustained peak period to develop the OTRR track configuration, Mr. Leopold performed an analysis to identify such a period. Mr. Leopold reviewed two sets of BNSF train data to identify the subset of traffic that would be handled by the OTRR for the year 2002.[59] Using those datasets, he calculated the number of trains on the SARR system between Snowden, Glendive, and Fargo for each day of the year, and identified the OTRR's peak period as November 14 through November 27.[60] Based on Mr. Leopold's calculations, Mr. Wheeler modeled the period from November 15 through November 25, which includes a two-day warm-up period, a one-week peak modeling period on which to base capacity recommendations and transit times, and a two-day cool-down period.

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[59] The first dataset was BNSF's 2002 traffic data for the traffic selected by Otter Tail, which Mr. Leopold used to identify relevant coal trains. BNSF Reply electronic workpaper "SLOTMB1.Y02." The second dataset was a list of non-coal trains that Otter Tail developed from BNSF's train movement data provided in discovery, which Mr. Leopold used to identify relevant non-coal trains. BNSF Reply electronic workpaper "General Frt Average Trains Per Day Analysis v1.xls" at worksheet "BNGFSACTRN02." Mr. Leopold merged and summarized these datasets in a single workpaper. BNSF Reply electronic workpaper "SMHI7JC Modified.xls."

[60] BNSF Reply electronic workpaper "SMHI7JC Modified.xls" at cells AA8 through AC13. BNSF's traffic data do not contain information about empty coal trains. Mr. Leopold accounted for these trains in his calculations by creating an empty train to match each loaded coal train and assuming that each empty train returned to the SARR system after a specified amount of time offline. Mr. Leopold calculated daily train counts using five different offline times (3, 4, 5, 6, and 7 days). Mr. Leopold identified the same peak period, regardless of the number of days he assumed that each of the loaded coal trains would be offline.

Mr. Leopold made several adjustments to the two datasets described above to develop a list of trains and relevant characteristics for Mr. Wheeler's use in the RTC Model. He removed traffic that BNSF determined would not be included in the stand-alone traffic group in the year 2021, as explained in Section III.A.1. He adjusted the number of coal trains traveling to or from each destination to account for changes in traffic volumes between the base year and the OTRR's peak year.[61] He also developed on-SARR times (*i.e.*, when trains enter the portion of the SARR that Mr. Wheeler modeled) for individual trains based on BNSF's train movement data.[62]

Mr. Wheeler input information about each train into the RTC Model, including the train type, weight, locomotive type, on-SARR junction and time, and other operating parameters.[63] The RTC Model simulates the movement of trains across the system based on these train-specific characteristics and operating parameters. For example, when the RTC Model calculates a train's acceleration rate and speed, it uses tractive effort data for the specific locomotives on the train and air drag resistance data for the specific train type.[64]

Mr. Wheeler also incorporated several operating assumptions into the RTC Model that would allow the model to approximate the operating conditions that OTRR trains would experience. These operating assumptions are described in detail in Section III.C.2.b of this

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[61] No escalation adjustments to non-coal traffic were necessary since Otter Tail assumed that non-coal traffic volumes would not change over the life of the OTRR. OTP Nar. at III-A-11.

[62] For new trains that did not exist in the base year, Mr. Leopold used a random-number generator to develop on-SARR dates and times. If Mr. Wheeler found that the on-SARR date and time selected by the random-number generator led to congestion on the OTRR, he chose a new on-SARR date and/or time in order to reduce the congestion caused by new trains.

[63] This process is explained in Exhibit III.B-7 at 11-13.

[64] Exhibit III.B-8 contains data from the RTC Model showing unique tractive effort data for the OTRR locomotives and unique air-drag resistance data for various cars. Mr. Wheeler confirmed with Berkeley Simulation that it validated this data with manufacturers' information.

Narrative, where BNSF's witness Mr. Mueller describes the real world operating conditions that any railroad would experience in operating both coal and non-coal traffic over this section of track. Specifically, Mr. Wheeler instructed the RTC Model to take account of the following:

- Each train spends one hour at Snowden Yard for interchange.
- Each loaded coal train spends 2 hours at Glendive Yard to exchange power and crew, receive 1,000- or 1,500-mile inspection and add a helper locomotive.[65]
- Each empty coal train spends 6 hours at Glendive Yard for inspection, locomotive servicing and crew change.
- Each eastbound and westbound non-coal train requiring intra-/inter-train switching spends 6 hours at Glendive Yard for switching activities, initial terminal inspection and crew change.
- Each eastbound and westbound non-coal train not requiring intra-/inter-train switching spends 30 minutes at Glendive Yard for crew change.
- Each eastbound loaded coal train stops at Fryburg, located at milepost 136.0 on the Dickinson Subdivision, for 15 minutes to remove its helper locomotive.
- Each coal train interchanged to or from BNSF at Mandan spends 1 hour at Mandan Yard for interchange.
- Each loaded and empty thru coal train spends 1 hour at Mandan Yard for crew change and fueling.
- Each eastbound and westbound non-coal train spends 15 minutes at Mandan Yard for crew change.
- Each loaded and empty coal train traveling to or from Cohasset, Colby or Grand Forks spends 1 hour at the JY Connector in West Fargo for interchange.
- Each train interchanged to or from BNSF spends 1 hour at Fargo Yard for interchange.

[65] Helper locomotives are added to each loaded train at Glendive when power is exchanged. Otter Tail did not provide for helper locomotives between Glendive and Fryburg. However, as discussed in Section III.C.1.b.(3)(b) below, trains operating in this area require helpers.

- Each train traveling to or from Benson spends 15 minutes at Fargo Yard for crew change.
- The OTRR would experience the same random failures that BNSF experienced during the modeled period. During the peak week modeled by Mr. Wheeler, the OTRR was assumed to experience no track outages and six slow orders ranging from approximately two to seven hours.[66]

ii) Modeling Iterations And Results

To determine proper capacity for a modeled network, it is necessary to run successive iterations of the RTC Model until the model's results indicate that the network has sufficient capacity to meet its operating needs. If the system has too little capacity, the model will gridlock or produce slow transit times that do not meet the operating needs of the railroad or its customers.

Before running the first iteration, Mr. Wheeler carefully examined the OTRR track and yard configuration posited by Otter Tail. Mr. Wheeler determined that two adjustments were needed before he simulated the OTRR's operations. First, it was apparent to Mr. Wheeler that the track surrounding the Snowden Yard was poorly designed. As shown in Exhibit III.B-9, Otter Tail did not provide a crossover that would allow trains entering or exiting the Snowden Yard to utilize the second mainline. Since the Snowden Yard is the terminus of the OTRR, all trains stop at the yard for interchange to or from the BNSF. Mr. Wheeler added a crossover at milepost 76.5 to allow the OTRR trains to utilize both mainlines posited by Otter Tail. Second,

[66] BNSF Reply electronic workpaper "Glen-Fargo Random Failure.xls." Mr. Mueller explains the basis for the random failures in Section III.C.2.b.(4). When a failure causing an impassable track outage fell on a milepost within a single-track section, no traffic was allowed to travel along that section until the restriction was lifted. When a failure causing an impassable track outage fell on a milepost within a double-track section, Mr. Wheeler assumed conservatively that only one track would be taken out of service and traffic would flow without restriction on the other track. For the duration of a signal failure, Mr. Wheeler imposed a slow order allowing affected trains to operate at a restricted speed until reaching the next signal.

Mr. Wheeler added one yard track at Mandan to accommodate fueling and interchanges that need to occur at that location. Otter Tail did not provide a yard track at this location.[67]

Once Mr. Wheeler added these facilities to the OTRR track configuration in the RTC Model, he started the first simulation. This simulation was able to run to completion.[68] Mr. Wheeler examined the simulation results to determine if he had achieved an efficient balance between the OTRR's capacity requirements and operating needs. The simulation showed that each of the OTRR yards was filled to capacity at various times during the modeled period,[69] and therefore he was unable to remove any of the yard tracks without causing delays and congestion at the yards. To confirm the efficiency of the OTRR's mainline capacity, Mr. Wheeler compared the transit time results from the RTC Model simulation with the transit times posited by Otter Tail in its string program.[70] Since the transit times from the RTC Model simulation were generally slower than the transit times produced by the string program, Mr. Wheeler determined that the network configuration he modeled was appropriately sized and that the efficiency of the OTRR would be adversely affected by any reductions in capacity.

It is also important to note that Mr. Wheeler's simulation results are conservative. A proper simulation model attempts to produce a picture of real operations through the use of simplifying assumptions based on the average time for particular activities. But in the real

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[67] Otter Tail did not provide for fueling facilities at Mandan. Mr. Mueller explains in Section III.B.3.a.(7) below that fueling facilities are necessary because certain OTRR trains will not have sufficient fuel to make the round-trip from Glendive to the utility and return to Glendive without refueling.

[68] The program files for this simulation are located in electronic workpaper "final snowden-fargo RTC files.zip."

[69] *Id.*; *see also* BNSF Reply electronic workpaper "RTC animation snapshots.ppt."

[70] The OTRR's transit times are discussed in more detail in Section III.C.2.c.

world, the time it takes for trains to carry out the same function varies, at times substantially. Thus, while loading operations at the mines take on average six hours, one train might take four hours and the next train eight hours. The use of a standard or average time for these activities necessarily produces results that are better than any real world railroad operator could expect to sustain. It has been Mr. Wheeler's experience that the results of computer simulations are therefore optimistic when compared, after the fact, with the results of actual operations. Nevertheless, Mr. Wheeler's model produces a reasonable estimate of the capacity required by the OTRR.

(c) Modeling The Converse-Gillette Section Of The OTRR

i) Inputs To The RTC Model

Mr. Wheeler used the same inputs to model this section of the OTRR with the exceptions described below.

As described in Section III.A.1, BNSF eliminated a large portion of the southbound coal traffic originating at the Cordero mine and at the mines located south of Cordero. Given the reduction in traffic over this line, Mr. Wheeler determined that the amount of track capacity posited by Otter Tail between the Cordero mine and Converse Yard exceeded the amount needed for the smaller traffic group developed by BNSF. He therefore made several adjustments to Otter Tail's proposed mainline track configuration between Cordero and Converse for use in the RTC Model. As shown in Exhibit III.B-10, Mr. Wheeler removed track in four locations between Cordero and Converse on the Orin Subdivision. He eliminated the second mainline (or passing siding) between mileposts 32.0 and 33.6, between 49.3 and 60.1, and between 65.16 and 67.7. Mr. Wheeler also eliminated track at Converse Yard, leaving the yard with a single mainline and one interchange track.

Mr. Wheeler then ran the RTC Model for the revised Converse-to-Gillette segment of the OTRR. Using the same peak period BNSF used to model the Snowden-Glendive-Fargo line, Mr. Wheeler started each coal train cycle with an empty train, followed that train up to the mines where the trains were loaded, and then followed the same train out of the mines and onto the OTRR mainlines to Gillette, Donkey Creek or Converse Junction.[71] This methodology allowed BNSF to avoid the error in Otter Tail's approach where empty trains were disconnected from loaded trains at the mines and as a result disappeared for days at a time while supposedly on the OTRR system. While this approach did not model the off-line operations of the trains, which would have substantially complicated the modeling exercise, it did produce a reliable model of operations for the portion of the OTRR train operations that are relevant here.

Mr. Wheeler also incorporated the following operating assumptions developed by Mr. Mueller for this section of the OTRR:

- Each empty train spends 6 hours at the mine before returning to the OTRR system as a loaded train.
- Each loaded coal train originating at the Eagle Butte, Buckskin, Rawhide, and Dry Fork mines and interchanged to BNSF at Converse stops at milepost 8.2 on the Orin Subdivision for 15 minutes to remove its helper locomotive.[72]
- Each northbound loaded coal train stops at milepost 16.4 on the Orin Subdivision for 15 minutes to add a helper locomotive and stops at milepost 6.0 on the Orin Subdivision to remove its helper locomotive.[73]

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[71] Unlike Otter Tail, Mr. Wheeler modeled a full cycle of operations of the OTRR unit coal trains while they were on this portion of the OTRR system. This approach was not necessary on the Snowden-Glendive-Fargo section of the OTRR, because that section of the OTRR does not contain any originating mines where empty and loaded trains should be linked.

[72] Helper locomotives are added to each train at the mine during the loading process.

[73] Trains originating at the Caballo and Belle Ayr mines do not stop to add a helper, as the helper is assumed to have been added at the mine.

- Each loaded coal train interchanged to BNSF spends 1 hour at Donkey Creek Yard for interchange.
- Each empty coal train spends 6 hours at Donkey Creek Yard for interchange, inspection, locomotive servicing and crew change.
- Each eastbound and westbound non-coal train spends 1 hour at Donkey Creek Yard for interchange.
- Each loaded coal train spends 1 hour at Converse Yard for interchange.
- Each empty coal train spends 3 hours at Converse Yard for inspection, interchange and crew change.
- During the peak week modeled by Mr. Wheeler, the OTRR was assumed to experience one track outage and five slow orders ranging from one to four hours.[74]

ii) Modeling Iterations And Results

Mr. Wheeler ran the first simulation of the Converse-Gillette section of the OTRR using the inputs described above. The simulation ran smoothly.[75] Mr. Wheeler then examined the results of the simulation and determined that he might be able to remove additional track capacity from the Orin Subdivision. As shown in Exhibit III.B-10, Mr. Wheeler eliminated the second mainline between mileposts 8.2 and 12.0 and between mileposts 45.0 and 49.3.

Mr. Wheeler ran a second simulation, which was able to run to completion without gridlock. Mr. Wheeler examined the results of the simulation and determined that he could not remove additional capacity from the OTRR network. As shown in Exhibit III.B-10, the few remaining double-track sections on this portion of the OTRR are necessary to allow trains to flow into and out of the PRB mines without experiencing significant delays and to allow

[74] BNSF Reply electronic workpaper "Orin Random Failures.xls." Random failures are described in more detail in footnote 66 above and in Section III.C.2.b.(4) below.

[75] The program files for this simulation are located in electronic workpaper "final orin rtc files.zip."

northbound and southbound trains to pass one another. Mr. Wheeler also examined the yard capacity and found that the yards were filled to capacity at various times during the modeled period.[76]

(d) RTC Model Output And Reports

The RTC Model allows the user to access detailed movement data for each of the simulated trains.[77] The RTC Model also allows the user to generate reports using several different tools. As explained in Exhibit III.B-7, the user can produce reports directly from the RTC Model in either text or spreadsheet format. Reports can also be produced using a report generator developed by Mr. Wheeler for use with the RTC Model.[78] Using the report generator, Mr. Wheeler generated transit time reports for each of the modeled sections.[79] Mr. Leopold used the transit time data in these reports to develop cycle times and operating statistics for the OTRR as described in Sections III.C.2.c, III.C.2.d and III.C.2.e.

b. Branch Line

The capacity needs for the Snowden Branch are discussed above in connection with the Glendive to Fargo section of the OTRR's mainline. The capacity needs for the Eagle Butte Branch are discussed above in connection with the Gillette to Converse section of the OTRR's mainline. BNSF accepts the track configuration and specifications posited by Otter Tail for the remaining branch lines.

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[76] *Id.*; *see also* BNSF Reply electronic workpaper "RTC animation snapshots.ppt."

[77] *See, e.g.*, BNSF Reply electronic workpaper "RTC dispatch detail.xls."

[78] BNSF Reply Exhibit III.B-7 at 20-32.

[79] BNSF Reply electronic workpaper "Final transit times.zip."

c. Sidings

Passing sidings are considered part of the OTRR's mainline capacity and are discussed above in Section III.B.2.a.

d. Other Tracks

BNSF discusses the OTRR yards and related trackage in the next section. BNSF discusses the OTRR's set-out/rip tracks in Section III.F.3.e.ii.(b).

Otter Tail provided for crossovers between the OTRR's double mainline track on the Orin Subdivision. Since Mr. Wheeler reduced the amount of double track on this section of the OTRR, as described above, he retained only those crossovers that were needed to support the OTRR's revised track configuration.

3. Yards

a. Location And Purpose

Otter Tail proposes 11 yard/interchange locations for the OTRR -- Converse, Donkey Creek, Campbell and Dutch, Wyoming; Moran Junction, Terry, Glendive, and Snowden, Montana; Mandan and Fargo, North Dakota; and Benson, Minnesota. BNSF's conclusions with respect to the OTRR's proposed yard/interchange locations may be summarized as follows:

- Campbell, Moran Junction, Terry, Fargo and Benson Yards -- BNSF accepts the facilities proposed by Otter Tail as adequate for the level of traffic that BNSF shows would be available to the OTRR.
- Donkey Creek Yard -- BNSF accepts the basic yard capacity proposed by Otter Tail except for the locomotive shop and servicing facilities and car repair facilities.
- Glendive Yard -- Eight tracks need to be added to perform intra-/inter-train switching on overhead freight traffic rerouted by Otter Tail; BNSF accepts the remainder of the basic yard capacity proposed by Otter Tail except for the locomotive servicing facility and car repair facility.

- Converse Yard -- All but one of the interchange tracks can be eliminated from Otter Tail's proposed Converse Yard because of the reduced level of traffic that will be interchanged at this location, but a rip track, spare car track and locomotive fueling facility need to be added for processing the remaining empty trains returning to Converse Yard for loading at the PRB mines.

- Snowden Yard -- An eastbound connector track that would require two turnouts needs to be added to accommodate movement of coal trains to and from the Brandon plant in Brandon, Manitoba.

- Dutch and Mandan Yards -- Need to add facilities for fueling locomotives, including an additional track at Mandan.

- Casselton, North Dakota and the JY Connector near West Fargo, North Dakota -- An interchange connection needs to be added at each of these locations.

BNSF discusses the yards below.

(1) Campbell, Moran Junction, Terry, Fargo And Benson Yards

BNSF accepts the functions that Otter Tail proposes be performed at the Campbell, Moran Junction, Terry, Fargo and Benson Yards and the facilities proposed by Otter Tail at these yards, as adequate for the level of traffic that BNSF shows would be available to the OTRR. The Campbell, Moran Junction and Terry Yards are located on the segment of the OTRR between Gillette and Glendive, for which BNSF has accepted mainline track facilities proposed by Otter Tail. Similarly, Benson is on the segment of the OTRR between Fargo and Big Stone, for which BNSF has also accepted most of the facilities and traffic proposed by Otter Tail.

Mr. Wheeler included Fargo Yard with the size assumed by Otter Tail in his modeling of OTRR operations from Snowden via Glendive to Fargo. That analysis has been described previously. His modeling confirmed that these facilities were adequate for the reduced level of traffic at this yard.[80] Mr. Wheeler sought to determine whether any reductions in capacity at

[80] BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip."

Fargo Yard were possible. However, he found that the tracks at Fargo Yard filled up at various times during the modeling and therefore concluded that the number of tracks could not be reduced. Exhibit III.B-11 is a snapshot that shows all tracks in OTRR's Fargo Yard occupied by trains at one point during the simulation. The program files for the simulation can be found in BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip."

(2) Donkey Creek Yard[81]

The OTRR's main yard and headquarters are located at Donkey Creek. Otter Tail proposes to perform the following functions at the OTRR's Donkey Creek Yard:

- Fueling, servicing and maintenance of locomotives; for all empty coal trains the lead locomotive consist and distributed power ("DP") locomotive will be exchanged at Donkey Creek. In addition, the OTRR-owned locomotives on non-coal trains will have to be moved from Glendive to Donkey Creek for periodic inspections, maintenance and repair.[82]
- Repair of locomotive fleet by contractor.
- FRA-certified 1,000-mile inspection for all empty coal trains and westbound overhead trains moving through Donkey Creek that are destined for interchange with BNSF; bad-order cars will be removed from empty coal trains.
- Repair of all bad-order cars by contractor.

[81] Otter Tail sometimes refers to Donkey Creek Yard as East Donkey Creek Yard. Otter Tail Opening Exh. III-B-1 at 4.

[82] The need to perform periodic maintenance on locomotives on non-coal trains is discussed below in Section III.C.2.d(1). As discussed in that section, the OTRR assumes that required locomotive maintenance is performed on OTRR locomotives at Donkey Creek. Since most of the non-coal OTRR trains do not pass through Donkey Creek, locomotives from these trains must be moved out of route to Donkey Creek. Mr. Mueller determined that the most efficient place to perform the switching operation on these trains to remove the locomotive for movement to Donkey Creek was Glendive.

- Location of spare coal railcar pool; utility- and railroad-owned or compatible coal cars will be inserted into the empty coal trains as needed to fill them out to ideal tender following the removal of bad-order coal cars.

- Crew-change point for all empty and loaded coal trains and all eastbound and westbound overhead non-coal trains.

- Interchange point between the OTRR and the residual BNSF. At Donkey Creek, OTRR delivers loaded trains that originate at PRB mines to BNSF for ultimate termination at power stations in Arizona, Arkansas, Colorado, Iowa, Illinois, Indiana, Kansas, Michigan, Missouri, Nebraska, Ohio, Oklahoma, and Texas. The OTRR also receives empty trains from the residual BNSF at Donkey Creek that are destined for mines in the PRB for loading. The OTRR also receives overhead general freight traffic from BNSF at Donkey Creek, and, in turn, forwards overhead general freight traffic to BNSF at Donkey Creek that OTRR receives at other locations on its system.

- Wye track for turning locomotives and cars as necessary.

OTP Nar. at III-B-9, III-C-12, 13 and 25, and III-D-14.

As noted previously, BNSF has accepted Otter Tail's basic capacity assumptions for the Donkey Creek Yard, although Mr. Mueller determined that the locomotive maintenance shop should be designed to handle 12 locomotives at a time, one fueling platform should be added to the locomotive service tracks, and the car repair tracks should be designed to handle 16 bad-order cars at a time. As discussed below, BNSF's engineering witness, Mr. Primm, added track and other facilities in implementing these design requirements.

The facilities required to perform each of the functions listed above are discussed below.

(a) Inspection/Interchange Tracks

Otter Tail proposed 6 tracks (8,000 feet through 8,600 feet long) and 2 additional tracks (16,368 feet and 17,424 feet long, including lead tracks at each end) at Donkey Creek Yard that can be used for inspection of empty coal trains and interchange of trains to and from BNSF. OTP Opening Exh. III-B-1 at 4.

There is no real-world BNSF reference point against which the Board can judge the adequacy of Otter Tail's assumptions on inspection and interchange tracks at Donkey Creek. BNSF, of course, does not interchange coal trains with other railroads at Donkey Creek and it performs train inspections at other yards prior to where BNSF's trains access the line leading to the PRB mines. Moreover, BNSF has revised the level of traffic that moves through the Donkey Creek yard from the traffic volumes that Otter Tail assumed. The bases for those traffic changes and the volume of traffic affected by those changes are discussed above in Section III.A. Since there are no valid real-world capacity references and the OTRR's traffic volumes are different from those assumed by Otter Tail on opening, BNSF assessed the necessary capacity of the Donkey Creek Yard using the RTC model described previously.

Mr. Wheeler used the inspection/interchange tracks proposed by Otter Tail for Donkey Creek Yard as the starting point for modeling the operation of the yard. He included a yard of the size assumed by Otter Tail in his analysis of operations of OTRR trains over the portion of the OTRR from Converse to Gillette, WY (including the Campbell and Reno Subdivisions). That analysis has been described previously. His modeling confirmed that these interchange/inspection tracks were adequate for the reduced level of coal traffic and non-coal traffic at this yard.[83] Mr. Wheeler also sought to determine whether any reductions in capacity at the yard were possible. However, he found that these tracks filled up at various times during the modeling and therefore concluded that the number of tracks could not be reduced. Exhibit III.B-12 is a snapshot that shows all tracks in OTRR's Donkey Creek Yard occupied by trains at one point during the simulation. The program files for the simulation can be found in BNSF Reply electronic workpaper "final orin rtc files.zip."

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[83] BNSF Reply electronic workpaper "final orin rtc files.zip."

(b) Locomotive Fueling, Servicing And Maintenance Facilities

Otter Tail included a locomotive shop with 5 stub-ended tracks (200 feet to 400 feet long) at Donkey Creek Yard. OTP Opening Exh. III-B-1 at 4. Mr Mueller determined that the OTRR could expect approximately { } percent of its locomotive fleet, or approximately 23 locomotives, to be in the shop for repair or scheduled maintenance every day.[84] To accommodate this number of locomotives, Mr. Mueller advised BNSF's engineering witness, Mr. Primm, to design the locomotive maintenance shop to handle 12 locomotives at a time (allowing for two or three shifts a day in the locomotive maintenance shop to process locomotives as necessary). Mr. Mueller reviewed the final design of the locomotive maintenance shop prepared by Mr. Primm and agrees that it is appropriate.

(c) Car Repair Facility

Otter Tail included 5 tracks for car repairs (400, 550, 700, 850 and 1,000 feet long) at Donkey Creek Yard. OTP Opening Exh. III-B-1 at 4. Otter Tail does not provide any evidentiary support for the size of its car repair tracks.

Mr. Mueller determined that during the first six months of 2003, BNSF experienced a total of { } bad-order cars from { } empty coal trains at its Alliance Yard, an average of { } bad-order cars per empty coal train inspected that required the car to be switched out

[84] BNSF Reply electronic workpaper "Combined Bad Order Margin Analysis.xls" worksheet "Summary." Mr. Mueller based the approximately { } percent figure on historical BNSF data for SD70MAC and Dash 9 locomotives, as discussed in Section III.C.2.d. below, and applied to the OTRR's mix of the SD70MAC and Dash 9 locomotives. This is a conservative figure because an occasional locomotive owned by other railroads will experience failure while operating on the OTRR in run-through service and need to be repaired at the OTRR's Donkey Creek locomotive facility.

of the train and moved to the repair track.[85] Many cars are repaired in the trains by the inspectors and carmen using a truck equipped with a welder to avoid removing the car from the train. Based on the level of traffic that will actually be available to the OTRR, an average of 11 empty coal trains per day is expected at the OTRR's Donkey Creek Yard during the peak year (2021).[86] With an average of { } bad-order car per empty train, an average of 16 bad-order cars per day can be expected to be switched out of the average of 11 trains per day at Donkey Creek Yard. Mr. Mueller advised BNSF's engineering witness Mr. Primm to design a car repair facility at Donkey Creek Yard with the capacity to handle an average of 16 bad-order cars at a time (including both cars in the shop and cars waiting to enter the shop). Mr. Mueller reviewed the car repair facility designed by Mr. Primm and agrees that it is appropriate.[87]

(d) Spare Rail Car Storage Tracks

Otter Tail included 12 spare coal railcar storage tracks (1,200 feet to 2,850 feet long) at Donkey Creek Yard. OTP Opening Exh. III-B-1 at 4. BNSF accepts these spare tracks as adequate for the level of traffic available to the OTRR.

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[85] BNSF Reply electronic workpaper "Bad Order Calculation.xls" at worksheet "Bad Order Ratio." BNSF's existing Alliance Yard handles coal traffic that would be handled at OTRR's Donkey Creek Yard. Therefore, BNSF's experience in handling this traffic at the Alliance Yard is an appropriate reference point. As discussed in Section III.C.3.a of the Narrative, it is not necessary to inspect overhead non-coal trains at Donkey Creek Yard. Therefore, there should be very few bad-order cars removed from these trains at this yard and Mr. Mueller did not include bad-order, non-coal cars in his analysis.

[86] BNSF Reply electronic workpaper "Trains Per Day Per Segment Separated vl.xls" at worksheet "All Trains."

[87] Otter Tail included a wye track (for turning cars and locomotives, as needed) surrounding the car repair tracks at Donkey Creek Yard. Mr. Primm redesigned and relocated this wye track as part of his redesign of the car repair tracks.

(3) Glendive Yard

The Glendive Yard is the other principal yard on the OTRR. Otter Tail proposes to perform the following functions at the OTRR's Glendive Yard:

- Fueling and servicing of locomotives; for all westbound empty coal trains and eastbound loaded coal trains, the lead locomotive consist and distributed power ("DP") locomotive located on the rear of the coal trains will be exchanged at Glendive Yard and will be fueled as necessary using the three fueling platforms provided at Glendive Yard.

- FRA-certified 1,500-mile inspections for all empty coal trains, and 1,000-mile inspections for all loaded coal trains moving to interchange at Benson, loaded coal trains that originate at mines south of Donkey Creek moving to interchange with BNSF at Fargo, and all westbound overhead trains destined for interchange with BNSF; bad-order cars will be removed from all trains.

- Repair of bad-order cars by contractor.

- Location of spare coal rail car pool; spare cars will be inserted into the empty coal trains as needed to fill them out to ideal tender following the removal of bad-order cars.

OTP Nar. at III-B-9, III-C-25.

As discussed below, the main problem with Otter Tail's assumptions as to the Glendive Yard is that it failed to include yard capacity sufficient to perform certain switching activity that must be performed on rerouted non-coal trains that Otter Tail assumes will be handled by the OTRR. The details of Mr. Mueller's analysis of specific Glendive Yard facilities is set out below.

(a) Inspection/Receiving Tracks

Otter Tail included 10 tracks (8,000 feet to 8,900 feet long) for inspection of all empty coal trains, certain loaded coal trains (as summarized above), and westbound overhead trains; and crew changes on trains. OTP Opening Exh. III-B-1 at 16. As a preliminary matter, BNSF

concluded that Otter Tail had not provided sufficient Glendive Yard capacity to handle the traffic that Otter Tail assumed on opening would be served in this yard.

Data from Otter Tail's own string analysis shows that the trackage proposed by Otter Tail for the OTRR's Glendive Yard was not sufficient to handle the trains that Otter Tail expected to handle in the yard. Exhibit III.B-13 quantifies the number of instances during the period modeled by Otter Tail when the string program shows the number of trains located at Glendive Yard exceeds the track space available. The 10 yard tracks, and two mainline tracks, at Glendive Yard can accommodate a total of 14 trains at any given time. Exhibit III.B-13 shows that the string program has from 15 to 18 trains located at the Glendive Yard for a total of 11 hours during this period (or approximately 6.75% of the time). Otter Tail's string program shows up to 28% more trains at Glendive at a single time than the yard capacity provided by Otter Tail can handle. The failure of the string program proffered by complainants in *TMPA* to model yard capacity was one reason the Board rejected use of that program, and the same flaw exists in the string diagram analysis offered here. *TMPA*, slip op. at 68 n.112.

A second and more fundamental problem with Otter Tail's design of the Glendive Yard is that Otter Tail failed to account for certain switching operations that must be performed at that yard on intermodal and vehicle trains that have been rerouted from BNSF's northern Minot line to the OTRR's Glendive line. As discussed in Section III.A.1. above, Otter Tail assumes that a substantial volume of BNSF's traffic that is now moved over BNSF's northern line through Minot would be diverted to the OTRR, which would handle that traffic in overhead service through Glendive.[88] However, BNSF identified seven regularly scheduled trains that are

[88] BNSF excluded some of that traffic from the OTRR traffic group because the rerouting would not allow the OTRR to provide the same level of service as the incumbent. *See* Section III.A.1.c. of this Narrative.

included in the rerouted traffic that require intra- and inter-train switching at Minot.[89] These trains regularly pass through Minot today where the switching is performed on them, and they would in the stand-alone world pass regularly through Glendive where the same switching would need to be performed.[90] The specific switching operations on these rerouted trains that the OTRR would need to carry out are described in Section III.C.1.a.2.(d) of this Narrative below.

The train schedules (TSP) of the trains designated for intra-/inter-train switching at Minot show the destination of each block of cars and the sequence that the blocks are placed on each train when departing Minot. Mr. Mueller ascertained from the TSPs that a total of 24 blocks of cars are required to be switched out of or into the five westbound trains to classify these trains for deliveries to locations at Spokane and further west.[91] He further ascertained from the TSPs that a total of 13 blocks of cars are required to be switched out of or into the two eastbound trains to classify these trains for deliveries to locations at Fargo and as far east as Chicago. Although the number of cars within the blocks shown in the TSPs for these trains vary daily, no train is designed to have more than 10 blocks of cars when departing Minot. Mr. Mueller, therefore,

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[89] The seven movements identified by train symbol are SBPATAC (stack train Bedford Park, IL, to Tacoma, WA), SCHCTAC (stack train Cicero, IL, to Tacoma), VCHCTAC (vehicle train Cicero to Tacoma), PMEMSSE (premium train Memphis, TN, to South Seattle, WA), STACCHI (stack train Tacoma to Chicago), SCHCSEA (stack train Cicero to Seattle), and SSEACHC (stack train Seattle to Cicero). This switching is performed at Gavin Yard, which is located approximately five miles east of Minot.

[90] BNSF has permanently scheduled the SBPATAC, SCHCTAC, PMEMSSE, STACCHI and VCHCTAC movements for intra-inter-train switching at Minot on a regular or daily basis. Intra-/inter-inter-train switching is frequently performed on the SSEACHC movement, and occasionally performed on the SCHCSEA movement, at Minot as an alternative location.

[91] BNSF Reply electronic workpaper "tsp minot.doc."

determined that eight tracks, 5,600 feet to 7,700 feet in length, would be adequate to handle this level of switching.[92]

Mr. Mueller advised BNSF engineering witnesses to design eight tracks at the Glendive Yard in the most efficient and economical location to perform this switching. As discussed in Section III.F.3, BNSF's engineering witnesses designed these tracks to be constructed on an extension of the leads from the ten inspection/receiving tracks proposed by Otter Tail. Mr. Mueller reviewed this design and agreed that it is appropriate for the intra-/inter-train switching. The eight tracks added by Mr. Mueller for intra-/inter-train switching at the OTRR's Glendive Yard, combined with three inspection/receiving tracks used for arrival and departure of these trains in the yard (as discussed below), provide less capacity than BNSF currently has available for this purpose at Minot (18 receiving, departure and switching tracks ranging in length from 1,400 feet to 7,800 feet). Exhibit III.B-14 is a schematic diagram of BNSF's existing Minot (Gavin) Yard which shows these 18 tracks (track numbers 6300-6307 and 6401-6410).

For the other operations to be performed at Glendive, Mr. Wheeler assessed the adequacy of the yard capacity using the RTC Model described previously. He started with the yard capacity assumed by Otter Tail (10 yard tracks and two mainline tracks) and revised Otter Tail's dwell time assumptions to conform with the more realistic assumptions sponsored by Mr. Mueller (and discussed below in Section III.C.2.b). Mr. Wheeler also revised the traffic volume to be handled in the Glendive Yard to conform with changes made by BNSF's traffic witnesses. As the starting point for his modeling, Mr. Wheeler estimated that (a) up to six of the inspection/receiving tracks would be used for processing empty and loaded coal trains; (b) up to three of the inspection/receiving tracks would be used for arrival and departure of the non-coal

[92] These tracks are required for classification of cars (*i.e.*, grouping of cars by destination).

trains requiring intra-/inter-train switching and movement of these trains to and from the intra-/inter-train switchyard; and (c) one of the inspection/receiving tracks and the two mainline tracks would be available for crew changes on non-coal trains that do not require inspection or switching.[93]

Mr. Wheeler's modeling showed that Otter Tail's assumption of 10 yard tracks and two mainline tracks was adequate for the reduced traffic volumes BNSF assumes will be handled by the OTRR.[94] Mr. Wheeler's modeling also found, however, that the 10 tracks provided by Otter Tail and modeled by him, filled up with trains during the modeling. Exhibit III.B-15 is a snapshot that shows all tracks in OTRR's Glendive Yard occupied by trains at one point during the simulation. The program files for the simulation can be found in BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip." Therefore, Mr. Wheeler determined that it was not possible to reduce this trackage despite the reduced level of traffic. Mr. Mueller reviewed these conclusions and agreed with Mr. Wheeler's determinations.

(b) Locomotive Fueling And Servicing Facilities

BNSF accepts the locomotive fueling and servicing tracks and platforms proposed by Otter Tail for the Glendive Yard as adequate for the trains that would pass through this yard

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[93] The ten inspection/receiving tracks are fungible and specific tracks would not be assigned to each function. Rather, any of the tracks would be available, as necessary, for each of the uses described.

[94] BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip." Mr. Wheeler did not model operation of the eight classification tracks required for the intra-/inter-train switching of the seven movements of rerouted traffic discussed above. The tracks where the switching will be performed are located on an extension of the leads to the 10 inspection/receiving tracks. Accordingly, classification and switching operations at this location within the Glendive Yard would not affect capacity or operation of the 10 inspection/receiving tracks or the results of Mr. Wheeler's modeling of the operation of the 10 inspection/receiving tracks.

based on the level of traffic BNSF has determined the OTRR could expect to attract in the stand-alone world.[95]

(c) Car Repair Facility

Otter Tail has included 5 tracks (300 feet to 900 feet long) in Glendive Yard for repair of railcars. OTP Opening Exh. III-B-1 at 16. To establish the size of the car repair facility, Mr. Mueller determined that the number of bad-order cars to be processed at Glendive was approximately the same as the number of bad-order cars to be processed at Donkey Creek. This conclusion was based on the following:

Based on the level of traffic BNSF has determined would actually be available to the OTRR, an average of 10 empty coal trains per day is expected at OTRR's Glendive Yard during the peak year (2021).[96] With an average of { } bad-order cars per empty train, an average of 15 bad-order cars per day can be expected to be switched out of the 10 average trains per day at Glendive Yard.[97] This approximates the number of bad-order cars expected at Donkey Creek

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[95] BNSF has replicated the locomotive service facility to match the facility it has provided at Donkey Creek as discussed in Section III.F.7 below.

[96] BNSF Reply electronic workpaper "Trains Per Day Per Segment Separated vl.xls" at worksheet "All Trains."

[97] Mr. Mueller determined that BNSF's car inspection and repair procedures at its Alliance Yard more closely replicated OTRR's proposed operations at Glendive Yard than BNSF's procedures at Mandan. Mr. Mueller determined that during the first six months of 2003, BNSF experienced a total of { } bad-order coal cars out of { } empty coal trains at its Mandan Yard, for an average of { } bad-order cars per empty coal train inspected that required the car to be switched out of the train and moved to the repair track. BNSF Reply electronic workpaper "Bad Order Calculation.xls," worksheet "Bad Order Ratio." The number of bad-order cars at BNSF's Mandan Yard is higher than at BNSF's Alliance Yard, in part, because BNSF does not make as many in-train repairs on cars at Mandan. This results in a greater number of bad-order cars being removed from trains at Mandan Yard. As discussed above, Mr. Mueller provided for OTRR to make in-train repairs of cars at Glendive Yard whenever possible. Therefore, he determined that it would be more appropriate to use the bad-

Yard (16 bad order cars per day). Therefore, Mr. Mueller advised BNSF's engineering witness Mr. Primm to provide the same car repair facilities at Glendive Yard as he provided at Donkey Creek Yard, as discussed in Section III.B.3.a.(2)(c) above.[98]

(d) Spare Rail Car Storage Tracks

Otter Tail included nine tracks for spare coal railcar storage at Glendive Yard (1,200 feet to 2,550 feet long). OTP Opening Exh. III-B-1 at 16. BNSF accepts the spare car tracks proposed by Otter Tail at OTRR's Glendive Yard as adequate for the level of traffic that would actually be available to the OTRR.

(4) Converse Yard

Otter Tail assumes that the Converse Yard is primarily a point of interchange of coal trains with BNSF. At Converse Yard, the OTRR is assumed to deliver southbound loaded coal trains to BNSF for destinations in Colorado, Kansas, Louisiana, Michigan, Missouri, Nebraska, Texas and Wyoming. Otter Tail explains that these loaded southbound trains will generally stay on the mainline tracks with OTRR crews stopping at Converse to effect the run-through interchange with BNSF. Returning empty coal trains will enter the Converse Yard and be relayed to the PRB mines for loading. OTP Nar. at III-B-9 to 10. To accommodate this interchange, Otter Tail included 5 tracks at Converse Yard (8,000 feet to 8,500 feet long). OTP Opening Exh. III-B-1 at 2.

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order car to empty coal train ratio at Alliance Yard ({ } cars/train) than at Mandan Yard to determine the car repair facilities required at the OTRR's Glendive Yard.

[98] Otter Tail included a wye track (for turning cars and locomotives as needed) surrounding the car repair tracks at Glendive Yard. BNSF redesigned and relocated this wye track as part of its redesign of the car repair tracks.

Two factors must be considered in assessing the capacity of Converse Yard. First, as discussed in Section III.C.3.a. of this Narrative, the OTRR proposes to perform only a cursory inspection on returning empty coal trains on the basis that a full inspection will have been performed by BNSF at Guernsey Yard just slightly over 100 miles prior to Converse Yard. However, a full inspection is a necessary part of the origination of coal trains in the PRB. Otter Tail appears to acknowledge this since it provides for a full inspection of empty coal trains at Donkey Creek, even though BNSF's Alliance Yard is located a relatively short distance away, and at Glendive, even though BNSF's Mandan Yard is located a relatively short distance away. If the OTRR originates any traffic moving out of the PRB at Converse, it must provide the full origination service on that traffic and cannot assume that those services will be performed by the residual incumbent.

The second important factor in assessing Converse Yard capacity is that BNSF has substantially reduced the traffic moving over the OTRR from Cordero south to Converse. BNSF determined that only four empty trains per day will move through Converse, therefore a substantially smaller yard would be required than that assumed by Otter Tail.[99] With an average of four empty trains per day requiring inspections and a dwell time of three hours required for each in the yard, as explained in Section III.C.2.b below, Mr. Mueller determined that a single interchange track, 8,500 feet long, would be adequate at Converse Yard. Thus, Mr. Mueller eliminated four of the interchange tracks, and one of the mainline tracks, proposed by Otter Tail for this yard. To facilitate the inspections, Mr. Mueller added a 1,000-foot-long track for bad-order cars removed from the empty trains during inspections, and a 1,000-foot-long spare track to hold spare cars for insertion into the empty trains to replace bad-order cars. Mr. Mueller

[99] BNSF Reply electronic workpaper "Trains Per Day Per Segment Separated vl.xls," worksheet "All Trains."

specified these relatively short tracks because he would expect a small number of bad-order cars and spare cars in light of the limited number of trains at Converse Yard (an average of four empty trains per day).

Mr. Wheeler then used Mr. Mueller's configuration for Converse Yard in modeling the operations of the yard as part of his modeling of the operations of the OTRR between Donkey Creek and Converse. Mr. Wheeler's modeling confirmed that these facilities were appropriate for the reduced level of traffic at the Converse Yard.[100]

Mr. Mueller also advised BNSF engineering witness Mr. Primm to provide a facility for the fueling of locomotives by truck on this interchange track while the train is being inspected.

(5) Dutch Yard

Otter Tail included a 3.2-mile section of passing track and one 8,000-foot relay track at Dutch to accommodate service to the mines on the Decker Branch. OTP Nar. at III-B-10; OTP Opening Exh. III-B-1 at 8. Dutch Yard also will be a crew-change point. OTP Nar. at III-D-14. Four helper locomotive consists (eight SD70MAC locomotives) will be working out of the crew change location at Dutch to assist trains originating on the Decker Branch moving west toward Moran Junction from Nerco Junction to Parkman, trains originating on the Decker Branch moving east toward Donkey Creek from Nerco Junction to Ulm, loaded coal trains originating on the Campbell and Orin Subdivisions from Clearmont to Parkman, and loaded westbound grain trains from Clearmont to Parkman.[101] However, Otter Tail has made no provision at Dutch Yard for fueling these eight helper locomotives. Mr. Mueller advised BNSF engineering witness Mr.

[100] BNSF Reply electronic workpaper "final orin rtc files.zip."

[101] Otter Tail stationed three helper consists (two SD70MACs each) at Dutch. OTP Nar. at III-C-15. BNSF added a fourth helper consist at Dutch, for a total of four helper consists and eight helper locomotives at this location. *See* Section III.C.1.b.(3)(b) of this Narrative.

Primm to make provision at Dutch for fueling of helper locomotives by truck. Mr. Mueller determined there was not a sufficient amount of fueling at this yard to justify construction of a fueling station platform. Mr. Mueller reviewed the fueling facilities added by Mr. Primm at Dutch and agrees they are appropriate.

(6) Snowden Yard

Snowden Yard will be an interchange point between OTRR and BNSF. At Snowden Yard, OTRR will deliver westbound overhead traffic to BNSF that it has received from BNSF at Fargo and Casselton, and will receive eastbound overhead traffic that it will deliver to BNSF at Fargo and Casselton. OTRR also will deliver loaded coal trains to BNSF at Snowden that BNSF moves to Minot, North Dakota for interchange with the Canadian Pacific Railway, which, in turn, will deliver the coal to Brandon, Manitoba. OTP Nar. at III-B-10, 11. To effect these interchanges, Otter Tail included two relay tracks (8,000 and 8,300 feet long) at Snowden Yard. OTP Opening Exh. III-B-1 at 18. Additionally, Otter Tail has provided 21.5 miles of double track extending south from the Snowden Yard. OTP Errata Exh. III-B-1 at 17.

Otter Tail included only a westbound connecting track and turnout to BNSF at Snowden Yard. In order to accommodate movement of the Brandon coal trains between OTRR and BNSF, an eastbound connecting track and two turnouts (one on OTRR and one on BNSF) need to be added to permit the straightaway movement of these loaded and empty trains. Exhibit III.B-16 shows where the eastbound connecting track and two turnouts need to be added.

With the addition of this connecting track, Mr. Mueller determined that the Snowden Yard as proposed by OTRR would be appropriate as a starting point for Mr. Wheeler's modeling of the segment of the OTRR between Snowden and Fargo. Mr. Wheeler's modeling, in turn,

confirmed that this configuration was appropriate for the Snowden Yard.[102] Exhibit III.B-17 is a snapshot that shows all tracks in Snowden Yard occupied by trains at a point during the simulation. The program files for the simulation can be found in BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip." Thus, Mr. Wheeler found that the number of tracks at Snowden Yard could not be reduced.

(7) Mandan Yard

Otter Tail included trackage at Mandan Yard to effect interchange between BNSF and OTRR. Specifically, the OTRR would forward loaded PRB coal trains to BNSF at Mandan that are destined for Stanton, North Dakota. OTRR would also receive returning empty coal trains from BNSF at Mandan. OTP Nar. at III-B-10, 11. Mr. Mueller determined that fueling facilities would also be required at Mandan.

Otter Tail did not provide any fueling on the OTRR east of Glendive Yard for coal trains. On average, 10 loaded coal trains per day that travel east from Glendive Yard for interchange to BNSF follow routes on the OTRR and BNSF that do not include any fueling facilities at locations that are designed to perform, or capable of performing, locomotive servicing on unit coal trains prior to the return to Glendive Yard. Thus, under Otter Tail's proposal, these trains would have to travel from Glendive Yard east to their destinations and return to Glendive Yard without fueling.

In the base year (2002), an average of 18 of these loaded and empty trains per day would travel a distance in excess of 1,000 miles round trip between Glendive and the destination

[102] BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip."

utility.[103] Mr. Mueller determined that it would not be operationally prudent to schedule these trains to travel these distances without refueling. A railroad would not want to take the risk that a train could run out of fuel due to distance traveled, compounded by the effect of adverse weather conditions (wind, rain, snow and ice) or delays and slowdowns en route. For these reasons, BNSF has determined that these same trains cannot travel from Glendive to the destination utility and back to Mandan, or from Mandan to the destination utility and back to Glendive (in each case, a shorter overall distance than the round trips from Glendive to the destination utilities proposed by Otter Tail), without additional fuel. Therefore, BNSF fuels these trains on both the loaded and empty movement at Mandan to ensure there is no possibility of them running out of fuel.

Mr. Mueller added fueling facilities at Mandan Yard where these trains can refuel, and an additional track (8,000 feet long) to be used for refueling. Specifically, he provided one fuel rack at the east end of the yard between the two mainlines and one fuel rack at the west end of the yard between the north mainline and the 8,000 foot track he added.[104] Mr. Wheeler's modeling of the segment of the OTRR between Snowden and Fargo confirms that these additional facilities are adequate to perform the necessary fueling.[105] Exhibit III.B-18 is a snapshot that shows all tracks in Mandan Yard occupied by trains at a point during the simulation. The program files for the simulation can be found in BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip."

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[103] BNSF Reply electronic workpaper "Northern Tier Train Miles From Glendive.xls" at worksheet "By Mileage From Glendive."

[104] The head-end locomotives will be fueled at the fuel rack. The rear-end locomotive will be fueled by truck at the same time.

[105] BNSF Reply electronic workpaper "final snowden-fargo RTC files.zip."

b. Miles And Weight Of Yard Track

Otter Tail's proposed yards for the OTRR contain a total of 77.8 track miles. OTP Nar. at III-B-12. With the revisions to Otter Tail's proposed yards discussed above, the OTRR yards contain a total of 82.95 track miles.[106]

Otter Tail states that the yard tracks generally will consist of relay 132 lb. CWR and the turnouts will be new 132 lb. material. OTP Nar. at III-B-12. As discussed in Section III.F.3. below, BNSF agrees with Otter Tail's proposed specifications for the yard tracks.

4. Other

a. Track Parameters And Topography

BNSF accepts Otter Tail's specifications that the OTRR mainline track should be constructed to allow maximum trains speeds of 60 mph for empty coal trains and non-coal trains and 50 mph for loaded coal trains.[107] BNSF agrees with Otter Tail that lower maximum speeds will prevail in areas where grades and curves do not permit trains to achieve these maximums. As described in Section III.B.2.a.(4)(b) above, BNSF has corrected the speed limits for sections of the OTRR where Otter Tail ignored municipal speed restrictions.

Crosstie and other track and grading specifications are discussed in Sections III.F.2. and III.F.3.

b. Signal/Communications System

BNSF accepts Otter Tail's assumption that the OTRR will be equipped with a centralized traffic control (CTC) system that includes power switches controlled by centralized dispatchers,

[106] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Segment Data."

[107] OTP Opening Exh. III-C-2 at 3. As discussed in Section III.B.2.a.(4)(b) above, the speed limit for loaded grain trains should also be 50 mph.

except for the Kuehn, Big Sky and Big Stone Branches, which are operated under track warrants. BNSF also accepts Otter Tail's assumption that the OTRR will be equipped with defective equipment detectors (DEDs) and AEI scanners. The number, location and costs of the equipment required by the OTRR are discussed in Section III.F.6.

c. Use Of RRVW Tracks Between Brushvale And East Breckenridge, Minnesota

BNSF accepts Otter Tail's assumption that the OTRR would use BNSF's trackage rights over the Red River Valley & Western Railroad (RRVW) between Brushvale and East Breckenridge, Minnesota. However, Otter Tail understated the costs to the OTRR to use these trackage rights. BNSF addresses this issue in Section III.D.5.

C. OPERATING PLAN

The OTRR is primarily a coal hauling railroad, operating unit coal trains that originate in the PRB. BNSF accepts the basic operating parameters for these unit coal trains as posited by Otter Tail, *i.e.*, the locomotive consists, use of run-through power on all but one of the cross-over movements, and the locations where crew changes occur. However, for reasons discussed above in Section III.A., BNSF has eliminated several short-haul coal movements from the OTRR traffic group. In addition, BNSF corrects several other assumptions relating to the use of helpers and fueling, among other things.

The OTRR also handles general freight traffic (including intermodal, automotive, and grain trains), primarily over the northern portion of the system. According to Otter Tail, the OTRR would receive this traffic from the residual incumbent at the eastern (Fargo) or western (Snowden) end of the OTRR, move it in overhead service across the OTRR and return it to the residual incumbent at the other end of the OTRR. As discussed above in Section III.A of this Narrative, some of this rerouted traffic -- BNSF's Z Trains -- could not be handled as Otter Tail posits and BNSF has excluded that traffic from the OTRR shipper group. BNSF accepts most of the general operating parameters for the remaining merchandise traffic as posited by Otter Tail, including locomotive types, locomotive consist, crew change and fueling locations. One notable exception is that Otter Tail failed to account for certain switching operations that BNSF performs today on several of the trains that Otter Tail diverts to the OTRR. The additional yard capacity needed to handle these operations was discussed in the prior section of this Narrative. The operations on these trains are discussed below in this section of the Narrative.

An important part of the operating plan for a stand-alone railroad is an assessment of its equipment required (locomotives and cars). OTRR equipment requirements are based in the first place on the amount of time that OTRR trains are on the lines of the OTRR. Cycle times for

OTRR trains are discussed below in this section. As BNSF explains, Otter Tail based its cycle time assumptions on the flawed and unreliable string program analysis addressed in Section III.B of this Narrative. In addition, Otter Tail understated the amount of time that OTRR trains could expect to spend in yards. BNSF presents a more realistic estimate of OTRR cycle times and explains in detail the bases for its calculations. BNSF then uses these cycle time estimates to calculate the locomotive and car requirements for the OTRR and describes the numerous flaws in Otter Tail's equipment estimates.

1. General Parameters

a. Traffic Flow And Interchange Points

(1) Traffic Flow

(a) Coal Traffic

Otter Tail assumes that the annual coal traffic to be transported by the OTRR in the 2002 base year is approximately 180.4 million tons. OTP Nar. at III-C-2. As discussed in Section III.A.1 of this Narrative, Otter Tail has overstated the amount of coal traffic that would be available to the OTRR. For purposes of creating an operating plan for the OTRR, BNSF has modified the annual coal traffic volume for the base year 2002 to be approximately 112.32 million net tons and in the peak year 2021 to be approximately 125.51 million net tons.[1]

Otter Tail proposes that the OTRR will directly serve the following twenty-one mines located in the PRB:

- Mines located on the Eagle Butte Branch
  - Eagle Butte
  - Fort Union

[1] BNSF Reply Exh. III.A-9.

- Clovis Point
- Buckskin
- Rawhide
- Dry Fork

- Mines located on the Decker Branch
  - Decker (East and West)
  - Spring Creek
- Mines located south of Donkey Creek on the Orin Line
  - Caballo
  - Belle Ayr
  - Caballo Rojo
  - Cordero
  - Coal Creek
  - Jacobs Ranch
  - Black Thunder
  - North Rochelle
  - Rochelle/North Antelope
  - Antelope
- Mine located on the Kuehn Branch
  - Absaloka (Kuehn)
- Mines located on the Big Sky Branch
  - Big Sky
  - Rosebud (Energy)[2]

[2] The locations of these mines in relation to the OTRR are shown on Otter Tail Opening Exh. III-A-1.

OTP Nar. at III-C-2.

The OTRR would deliver coal directly to one power plant -- Otter Tail's Big Stone Station. Otter Tail assumes that the balance of the OTRR's coal traffic would be interchanged to BNSF for movement to BNSF-served plants not located on the OTRR's lines, to power plants served by other railroads, or for delivery to water transportation facilities. OTP Nar. at III-C-2.

(b) Non-Coal Traffic

Otter Tail also assumes that the OTRR will handle 25.2 million net tons in each year of various commodities in trainload shipments operating in overhead, run-through service. As discussed in Section III.A.1 of this Narrative, Otter Tail has overstated the amount of overhead traffic that could feasibly be diverted to the OTRR. BNSF modified the annual traffic volume for all non-coal commodities to be approximately 21.17 million net tons.[3] BNSF assumes, as does Otter Tail, that the volume of all non-coal commodities will remain constant throughout the 20-year DCF period. OTP Nar. at III-C-3.

Otter Tail's operating plan assumes that the OTRR will not handle any local traffic, e.g., coal or non-coal traffic that is switched into or out of trains destined to or originated on the OTRR. Thus, Otter Tail assumes that the residual BNSF will handle all such local traffic.

(2) Rerouted Traffic

(a) Issue Traffic

Otter Tail uses a different route for the issue traffic than BNSF. BNSF routes the issue traffic from PRB mine origins to Moran Junction, then northeast to Miles City and Terry, MT, and southeast from Terry through Hettinger, ND, Mobridge and Aberdeen, SD to Otter Tail's

[3] BNSF Reply Exh. III.A-10.

Big Stone Plant. Otter Tail modified the route this traffic takes from Terry, moving it northeast to Glendive, MT, then east through Mandan, ND to Fargo, then southeast to Benson, MN and then back west to the Big Stone Plant. The OTRR's route is approximately 143.4 miles longer than the BNSF route.

(b) Non-Issue Coal Traffic

Otter Tail also rerouted at least two movements of non-issue coal traffic. First, it has rerouted the coal traffic destined for the Brandon power plant in Brandon, Manitoba. BNSF routes this traffic through Glendive, MT east to the JY Connector near West Fargo, ND, then north to Minot, ND, where it is interchanged to the CP, which delivers the traffic to the plant. Otter Tail rerouted this traffic by moving it north from Glendive to Snowden, MT, where it is interchanged to the BNSF for movement east to Minot for interchange to CP.

Second, Otter Tail also rerouted coal traffic destined for certain sugar refiners. BNSF currently routes this traffic south out of the PRB to Lincoln, NE, then east to Sioux City, IA and north to Willmar, MN and then to the sugar refineries. Otter Tail rerouted this traffic by taking it north out of the PRB to Moran Junction, then northeast to Glendive, and east to Fargo, ND.

Otter Tail also rerouted part of the coal traffic destined for the Midwest Energy docks at Superior, WI. BNSF currently routes that traffic via Alliance and Lincoln, NE; Sioux City, IA; Minneapolis, MN to Superior. Otter Tail has rerouted this traffic through Donkey Creek, Moran Junction, Glendive and Fargo, where it is interchanged to the residual BNSF.

Additionally, Otter Tail rerouted coal destined for Northern States Power's Riverside and High Bridge plants. BNSF currently routes this traffic via Alliance and Lincoln, NE; and Sioux City, IA to Minneapolis. Otter Tail reroutes this traffic through Donkey Creek, Moran Junction, Glendive, and Fargo to Benson where it is interchanged to the residual BNSF.

Finally, Otter Tail has rerouted coal traffic to certain sugar refiners in the Grand Forks, MN area and to Minnesota Power and Light Company's Boswell and Laskin Plants. BNSF currently routes this traffic via the JY Connector in West Fargo. Otter Tail routes this traffic through Fargo, where it interchanges to the residual BNSF.

(c) Non-Issue, Non-Coal Traffic

Otter Tail also rerouted a substantial portion of the non-coal overhead traffic that it assumed will be transported by the OTRR.[4] BNSF currently moves its northern tier intermodal traffic between Fargo and Snowden, MT via New Rockford, Minot, Stanley and Williston, ND. Otter Tail rerouted this traffic via Fargo, Jamestown and Mandan, ND and Glendive and Snowden, where it is interchanged to BNSF to continue east or west on the existing BNSF route. BNSF's current route for this overhead traffic is approximately 382.8 miles between Fargo and Snowden. The OTRR's route between Fargo and Snowden is approximately 483.9 miles, or 101.1 miles longer than the current BNSF route.

Otter Tail has rerouted grain trains that BNSF currently interchanges with the RRVW at Casselton, ND. Otter Tail has erroneously moved the interchange for this traffic to Fargo. The RRVW does not extend to Fargo.

(d) Additional Costs And Time Attributable To Its Reroutings

Otter Tail asserts that it "has accounted for the additional cost incurred by the rerouted traffic and the OTRR provides approximately the same level of service for the rerouted Fargo-

[4] OTP Nar. at III-C-6; OTP Errata electronic workpaper "Exhibit III-A-3.xls," OTP Opening Exh. III.A-3.

Snowden traffic that BNSF currently provides." OTP Nar. at III-C-7. Otter Tail is in error on both points.

Otter Tail's rerouting has increased the time required for movement of certain traffic. As discussed in Section III.A.1.c. of this Narrative, the high-priority Z train overhead traffic that Otter Tail assumed requires a significantly longer period of time to transit between Fargo and Snowden on the OTRR than on BNSF's existing route. Because of the extreme time sensitivity of this traffic, the rerouting of this traffic is improper and BNSF excludes it from the OTRR traffic base.

Second, BNSF performs significant intra-/inter-train switching of cars at its Gavin Yard, located five miles east of Minot, North Dakota on seven regular movements of overhead traffic (both eastbound and westbound) that the OTRR has assumed.[5] During the seven-day period from August 10-16, 2003, a representative week, BNSF performed intra-/inter-train switching at Minot on an average of 5 trains per day of the traffic assumed by Otter Tail.[6] The BNSF intra-train switching rearranges cars in each train so that they are in the proper order for drop off at destinations beyond Minot. Additionally, some cars are switched between trains (inter-train switching). To effect this intra-/inter-train switching, cars are switched out of the train organized by destination and moved to different tracks. The original train is then reassembled from the rearranged cars and from cars switched from other trains. Some cars are also switched into a different train than they arrived on based on their destination. This intra-/inter-train switching process is described in detail below.

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[5] As discussed above in Section III.B.3.a.(3)(a), the seven movements have the following train symbols: SBPATAC, SCHCTAC, VCHCTAC, PMEMSSE, STACCHI, SCHCSEA, and SSEACHC. References in this Narrative to intra-/inter-train switching at Minot are to switching at Gavin Yard.

[6] BNSF Reply electronic workpaper "Minot sort dep.doc."

Otter Tail has not included facilities in any of its yards to perform this intra-/inter-train switching and it has not accounted for the time it would take to perform these activities. The necessary facilities must be added to the OTRR and the additional time must be included in cycle time calculations.

Thirty-three (33) trains from the seven movements identified above assumed by Otter Tail as part of the traffic for the OTRR that left Minot Yard during the period between August 10 through 16, 2003 underwent intra-/inter-train switching at the yard. The scope of intra-/inter-train switching performed on an individual train is demonstrated by review of the activity of train PMEMSSE1 07A that departed Minot with 33 cars at 8:05 P.M. on August 10.[7] The cars departing in this train arrived at Minot on five different trains: six on train PMEMSSE 07, 18 on PMEMSSE 06, five on train SBPATAC 08, three on VCHCTAC 09 and one on train VCHITAC 08. Another example would be train SBPATAC 11 that departed Minot at 10:53 A.M. on August 12 with 32 cars. Of these 32 cars, 23 arrived on train SBPATAC 11 (the same train), five cars arrived on train PMEMSSE 08, two cars on train PMEMSSE 09 and two cars on train SCHCTAC 10.[8]

BNSF has organized its operations to regularly perform this intra-/inter-train switching on a daily basis for five of these seven movements at Minot.[9] In the case of the PMEMSSE train which originates at Memphis, TN and then picks up cars en route at Harvard, AR and St. Louis,

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[7] *Id.* at p. 1, lines 1-55 (highlighted in yellow).

[8] *Id.* at p. 5, lines 42-72 and p. 6, lines 1-12 (highlighted in yellow).

[9] These five movements have the train symbols SBPATAC, SCHCTAC, VCHCTAC, PMEMSSE and STACCHI. BNSF began using Minot in January, 2003 as an alternative location for the intra-/inter-train switching for the two other movements (SCHCSEA and SSEACHC) when congestion at either the Chicago or Seattle terminal prevents the switching from being performed there.

MO, Minot is the only location with the capacity necessary to perform this work at its yard facility between the last point where cars are picked up and the final destination. It is much more efficient to pick up all cars without regard to grouping at the yards prior to Minot and then switch the cars into their proper destination groups at one time. On the route for the PMEMSSE, Minot is the best location for the efficient handling of this switching and forwarding of these cars. For the four remaining movements between Chicago and the Pacific Northwest, congestion and lack of capacity at these facilities and at other yards along the route of the train preclude switching at such yards in an efficient and timely manner. The BNSF yards at Seattle and Chicago are very congested and BNSF has found that it is unable to perform this level of switching on a regular basis.[10] BNSF's other major yards on this route located at Dilworth, MN; Northtown (Minneapolis), MN; Havre, MT; and Spokane, WA do not have excess capacity that would be necessary to perform the intra-/inter-train switching. Therefore, BNSF has scheduled such switching to be performed at Minot Yard. Because the OTRR would replace BNSF for this portion of the through movement, it must also replace BNSF for the work performed on these trains at Minot.

(3) Interchanges

Coal traffic originated on the OTRR is assumed to be interchanged to BNSF at Converse, Donkey Creek, Moran Junction, Mandan, Snowden, Fargo, and Benson. OTP Nar. at III-C-7. While BNSF objects to the use of cross-over traffic for reasons discussed in Section III.A above, BNSF nevertheless accepts most of Otter Tail's interchange assumptions for purposes of assessing the operating costs of the OTRR. However, the interchange point proposed by Otter

[10] An article discussing the congestion at Chicago from the July 2003 issue of Railway Age magazine is included in BNSF's workpapers. BN.RP.WP.III.C-0002-0004.

Tail for coal shipments to certain customers' needs to be changed. Otter Tail proposes to interchange coal trains destined for Minnesota Power's Boswell and Laskins Plants, and American Crystal at Grand Forks, ND and beyond, with BNSF at Fargo. In fact, the interchange point for these trains should be the JY Connector near West Fargo, the route by which BNSF moves this traffic.[11] Making the interchange at the JY Connector is necessary to accommodate the straight away movement (eastbound to northwest bound) of this traffic. Otherwise, the train would have to move a few miles farther east beyond Fargo Yard to BNSF's Dilworth Yard, have the locomotives moved to the opposite ends of the train, and then return in the opposite direction to make the move toward Grand Forks and beyond. Exhibit III.C-1 depicts the JY Connector and the alternate route a train would have to travel if it did not use the JY Connector. BNSF has accepted the other interchange points that Otter Tail has assumed for coal traffic for purposes of developing an appropriate operating plan for the OTRR.[12]

The OTRR will interchange non-coal overhead traffic with BNSF at Donkey Creek, Moran Junction, Terry, Snowden and Fargo. OTP Nar. at III-C-7. Again, the interchange point proposed by Otter Tail for one set of this overhead traffic needs to be modified. Otter Tail proposes to interchange grain traffic originated on the Red River Valley & Western Railroad ("RRVW") at Fargo. The RRVW uses its connection with the BNSF at Casselton, ND.[13] Therefore, the interchange point for this grain traffic should be moved to Casselton for the OTRR. BNSF has accepted the remaining interchange points for that overhead traffic still in the stand-alone group for purposes of developing an appropriate operating plan for the OTRR.

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[11] Otter Tail did not include the turnout to the JY Connector in the OTRR system.

[12] As explained in Section III.A.1 above, BNSF has excluded certain short-haul coal traffic that would be interchanged with the residual BNSF at Converse and Donkey Creek.

[13] The RRVW does not operate into Fargo.

b. Trains And Equipment

(1) Train Sizes

BNSF accepts that the OTRR will operate loaded and empty unit coal trains and trainloads of other commodities in run-through service (with one exception) [14] using the two-person crews proposed by Otter Tail. OTP Nar. at III-C-8. BNSF also accepts Otter Tail's proposal to operate coal trains using distributed power ("DP"). OTP Nar. at III-C-9. BNSF further accepts the sizes of trains for coal and other commodities that Otter Tail proposes to use on the OTRR. *Id.*

(2) Train Frequency

As a result of adjustments that BNSF has made to the OTRR's coal traffic, the average number of coal trains originated each day on the segments of the OTRR will be modified as shown in Table III.C-1 below.

[14] BNSF and the RRVW do not have an agreement to operate locomotives in run-through service on the traffic selected, and do not do so. Therefore, the OTRR cannot operate locomotives in run-through service with the RRVW.

Table III.C-1

Daily Average Number Of Coal Trains Originated At Mines Located On The OTRR During 2002

Mine Location	Otter Tail [15]	BNSF[16]
Converse to Reno	12.2	2.69
Reno to Donkey Creek	7.5	6.55
Eagle Butte Branch	10.1	6.71
Decker Branch	3.7	4.44
Kuehn Branch	1.0	1.05
Big Sky Branch	0.8	0.63

Similarly, as a result of BNSF's elimination of a portion of the coal traffic that Otter Tail assumed, the average daily number of trains interchanged to BNSF during 2002 will be modified as shown in Table III.C-2 below.

[15] OTP Nar. at III-C-9 to 10.

[16] BNSF Reply electronic workpaper "Additional Support Data.xls," tab "Table III.C-1." BNSF did not change the mine originations on the Decker Branch, Kuehn Branch or the Big Sky Branch. The slight difference in average trains per day between Otter Tail and BNSF results from uses of different methodologies to calculate trains per day.

Table III.C-2

Daily Average Number Of Coal Trains Interchanged By Otter Tail To BNSF At Each Interchange Location In 2002

Interchange Location	OTRR[17]	BNSF[18]
Converse	13.72	3.25
Donkey Creek	12.05	9.15
Moran Junction	0.83	0.76
Mandan	0.17	0.15
Snowden	0.04	0.05
Casselton	N/A (Grain Only)	N/A (Grain Only)
JY Connector, West Fargo	N/A[19]	0.98
Fargo	6.45	6.01
Benson	1.65	1.21

As discussed in Section III.A.1 of this Narrative, BNSF eliminated a portion of the overhead traffic that Otter Tail proposed. As a result of these adjustments to OTRR's overhead traffic, the number of non-coal overhead trains by interchange pair on the OTRR in 2002 will be modified as set forth in Table III.C-3 below.

[17] OTP Nar. at III-C-9 to 10.

[18] BNSF Reply electronic workpaper "Additional Support Data.xls," tab, "Table III.C-2."

[19] Otter Tail erroneously interchanged these trains at Fargo, instead of at the JY Connector in West Fargo, as discussed above.

Table III.C-3

Non-Coal Overhead Trains
By Interchange Pair -- 2002

Interchange Location	Westbound Trains		Eastbound Trains	
	OTRR[20]	BNSF[21]	OTRR[22]	BNSF[23]
1. Fargo/Snowden	4,030	2,823	3,709	2,507
2. Casselton/Snowden		39		37
3. Fargo/Moran Junction	571	571	392	392
4. Terry/Moran Junction	254	254	207	207
5. Donkey Creek/Moran Junction	912	912	1,173	1,173

(3) Locomotives

(a) Road Locomotives

BNSF accepts Otter Tail's proposal to use EMD model SD70MAC ("SD70") locomotives in DP configuration for unit coal trains and as helpers. (The number of locomotives required by OTRR is discussed later.) BNSF also accepts Otter Tail's proposal to use General Electric Dash 9 locomotives for the non-coal overhead traffic on the OTRR system. OTP Nar. at III-C-12. Finally, BNSF accepts Otter Tail's proposal to use run-through power, except in the case of the traffic interchanged with the RRVW because BNSF and the RRVW do not operate locomotives in run-through service for this traffic. OTP Nar. at III-C-13.

[20] OTP Nar. at III-C-11 , Table III-C-3.

[21] BNSF Reply electronic workpaper "Additional Support Data.xls," tab "Table III.C-3."

[22] OTP Nar. at III-C-11 , Table III-C-3.

[23] BNSF Reply electronic workpaper "Additional Support Data.xls," tab "Table III.C-3."

(b) Helpers

Otter Tail proposed locomotive helper service at four locations on the OTRR -- Belle Ayr to Donkey Creek; Clearmont to Parkman; Eagle Butte Branch; and origins on the Decker Branch. OTP Nar. at III-C-14. Helper service is also required at one additional location, between Glendive and Fryburg. BNSF currently provides helper service at this location.[24] The need for helper service over this portion of the OTRR is confirmed by tests undertaken by BNSF to assess the need for helpers in this area. On April 5, 2000, BNSF performed an actual test run of a loaded coal train, consisting of 123 cars, 6,751 feet long, with 3 SD70 locomotives in DP configuration (2 head end/1 rear end) and a total train weight of 16,810 tons, over this segment. Exhibit III.C-2 depicts the results of this test run. This exhibit shows that the test train stalled on Beaver Hill between Glendive and Fryburg with just 3 SD70 locomotives. This test run demonstrated that an additional locomotive is required as a helper for such a loaded coal train to move through this territory.

Mr. Wheeler's modeling of the segment of the OTRR between Snowden and Fargo also demonstrated the number of helper locomotives required at this location. The RTC modeling showed instances in which three, four and, in one case, five locomotives would be required at one time to provide helper service between Glendive and Fryburg, (a round-trip distance of approximately 162 miles).[25] Exhibit III.C-3. is a string depiction of a two-day period of Mr. Wheeler's modeling showing results for the portion of the OTRR between Glendive and Fryburg. On the exhibit, Mr. Wheeler has circled certain groups of three, four and five trains which require helper service during a period of time beginning when a helper locomotive is

[24] BNSF.RP.WP.III-C-0005.

[25] *Id.*

added on to a loaded car/train at Glendive and ending when that helper returns to Glendive Yard and is again available to provide helper service. During such a period when five loaded trains are receiving helper service, five separate helper locomotives would be required to provide helper service. In most instances three helper locomotives were adequate.

In light of the foregoing, Mr. Mueller concluded that helper service should be provided for all loaded unit coal trains between Glendive and Fryburg to avoid stalls that would occur under less than ideal conditions, such as moisture on the tracks or any locomotive operating at less than maximum performance. He conservatively determined that three SD70 locomotives are required for this helper service. He located these locomotives at Glendive Yard.

Otter Tail provided for two helper consists (one SD70 locomotive each) to handle the helper service from Belle Ayr to Donkey Creek; one helper consist (made up of two SD70 locomotives) to provide helper service from Clearmont to Parkman; one helper consist (made up of a single SD70 locomotive) to provide helper service on the Eagle Butte Branch; and two helper consists (made up of two SD70 locomotives each) to provide helper service for trains originating on the Decker Branch. These helper locomotives would be operated by a two-person crew and would be staffed around the clock. OTP Nar. at III-C-14 to 15. BNSF accepts these designations, except as described below.

One additional helper consist (made up of two SD70 locomotives) is required at Dutch. The helper districts served by locomotives working in the vicinity of Dutch are lengthy. The Clearmont to Parkman helper district is approximately 127 miles round trip.[26] The Decker Branch helper district runs in the eastern direction from Nerco Junction to Parkman (approximately 113 miles round trip) and in the western direction from Nerco Junction to Ulm

[26] BN.RP.WP.III.C-0006.

(approximately 83 miles round trip).[27] Thus, a helper consist on a train in this territory will not be available to serve another train for several hours. The additional helper consist (bringing the total helper consists at this location to four) is required to ensure that a helper is available for all trains requiring a helper.

Mr. Mueller provided a total of 14 SD70 locomotives as helpers.

(c) Switch Locomotives And Crews

Otter Tail provided a total of four SD40-2 switch locomotives, two stationed at Donkey Creek and two at Glendive. Otter Tail provided one switch crew on duty 24 hours per day 365 days per year at each of these locations. Otter Tail states that the primary function of the switch crews will be to "(1) remove bad-order cars from trains following FRA-certified inspections;[28] (2) move repaired cars to and from the spare car storage tracks; and (3) insert spare cars into trains as necessary." OTP Nar. at III-C-16.

In addition to the functions identified by Otter Tail, a switch locomotive and crew will also be needed on a round-the-clock basis to perform the intra-/inter-train switching of overhead freight trains at Glendive Yard, as discussed in Section III.C.1.a(2)(d) above. Otter Tail stationed two switch locomotives at Glendive Yard, one of which is to be used for switching empty coal trains. The other switch locomotive, which Otter Tail has provided as a spare, can be used to perform the intra-/inter-train switching. However, one additional switch crew must be stationed at Glendive Yard on a 24-hour basis to staff this second switch locomotive.

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[27] *Id.*

[28] This also will entail moving the bad-order cars to and from the car repair facility at the yard.

(d) Work Train Locomotives

As discussed in Section III.D.4.c, BNSF's maintenance witness, Mr. Albin, determined that the OTRR will require four work trains operating throughout the year to perform maintenance service. One SD40-2 locomotive will be required for each work train. Mr. Mueller has provided four SD40-2 locomotives for the work trains. Combined with the four SD40-2 locomotives provided for switch locomotives, as discussed in the immediately preceding section, he provided a total of eight SD40-2 locomotives for the OTRR.[29]

(4) Railcars

(a) Coal Service

Otter Tail states that the OTRR will need a total of 500 coal cars, including a five (5) percent spare margin.[30] As discussed in Section III.C.2.e below, BNSF determined that the OTRR will require 1,692 coal cars, including a ten (10) percent spare margin, for its proposed service.

(b) Non-Coal Service

Otter Tail states that the OTRR will pay a prorated share of the cost of the cars used for non-coal movements. In the case of cars that are provided by another railroad, the OTRR will pay the appropriate car hire charge while the cars are on its system. For railcars provided by shippers in non-coal overhead service, the OTRR will pay a car hire allowance for each type of car derived from the data reported by BNSF in its R-1 annual report. OTP Nar. at III-C-17.

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[29] The work trains are only scheduled to operate Monday through Friday, 12 hours a day. On nights and weekends, the work train locomotives would be available to handle company material local traffic on the OTRR (fuel, material for the railroad). Otter Tail did not make provision for this service.

[30] OTP electronic workpaper "OTRR CAR COSTS.123," worksheet "Coal Cars."

BNSF generally agrees with Otter Tail's proposal to pay a car hire rate for railcars provided by another railroad or by shippers in non-coal overhead service. BNSF, however, does not agree with the manner in which Otter Tail has determined the applicable car hire rate. BNSF's derivation of the appropriate car hire rates is discussed in Section III.D.2. below. BNSF also corrects several errors in Otter Tail's derivation of car-hours for which a payment must be made in Section III.C.2. below.

2. Cycle Time

The reliable calculation of cycle times on the stand-alone railroad is a critical element of the complainant's burden of proof. A train's cycle time represents the total amount of time the train spends on a railroad's network or under the responsibility of the railroad (*e.g.*, during the loading process). This cycle time is used to determine the amount of equipment (*i.e.*, locomotives and railcars) required to provide service. It is also an important factor in establishing appropriate crew districts. The aggregate of the individual types of equipment and location-specific crew requirements is used to determine the total equipment and personnel required to perform all transportation functions assumed by the OTRR.

Cycle times are made up of two components: (1) transit times and (2) times spent at various locations for trains to perform specific activities such as fueling, inspections, and crew changes. Otter Tail uses its string program to calculate transit times. The times to perform specific activities (*e.g.*, times at mines, yards and interchange locations) were estimated by Otter Tail's operating witnesses and then input into the string program. The string program output was then used to develop a cycle time for each train, consisting of the train's transit time over the OTRR route and the time assumed for the train to perform specific activities.

Both components of Otter Tail's cycle times are flawed and unreliable. There are such significant errors in Otter Tail's string program that it is impossible for the string program to generate accurate transit times. These errors are described in detail in Section III.C.2.a below. In addition, Otter Tail's operating witnesses significantly understated the times that would be required to perform specific activities. In Section III.C.2.b, BNSF identifies the errors in Otter Tail's assumptions and develops realistic activity times for the OTRR trains. BNSF explains in Section III.C.2.c how it developed reliable cycle times for the OTRR. In Sections III.C.2.d and III.C.2.e, BNSF explains how it developed equipment requirements for the OTRR.

a. Otter Tail's String Program Understates Transit Times

Otter Tail claims that its string program serves two purposes. First, the string program was allegedly used to confirm that the network configuration posited by Otter Tail has sufficient capacity to accommodate the OTRR's peak period train volumes. OTP Nar. at III-C-19 to 20. Second, the string program was used to develop transit times and operating statistics for the OTRR. *Id.* at 21-24. The multiple flaws in the string program, however, make it unusable for either of these purposes.

A number of problems with the string program relating directly to its ability to test capacity requirements were discussed in detail in Section III.B.2.a.(3) above. These include:

- The string program allows sidings to hold more trains than is physically possible;
- The string program allows trains to collide with one another;
- The string program assumes that mines have unlimited capacity to hold trains and therefore fails to account for congestion and staging requirements in the PRB;
- The string program fails to account for all empty coal trains on the OTRR; and

- The string program has certain defects related to the complicated traffic group and network configuration that Otter Tail has attempted to model (*e.g.*, unexplained train delays at Glendive Yard and the inability to prioritize different types of traffic traveling on the OTRR).

These problems are compounded by additional defects in the string program that cause it to improperly model train movement and therefore inaccurately calculate cycle times and related statistics. These additional defects include:

- The string program calculates physically impossible acceleration rates for every OTRR train;
- The string program contains inaccurate speed limits; and
- The string program trains experience erratic and physically impossible fluctuations in speed.

Each of these defects is discussed in detail below.

(1) The String Program Calculates Physically Impossible Acceleration Rates For OTRR Trains

To be a reliable model for cycle time calculations, the string program must be able to model the movement of a train as it would occur in the real world, but clearly it does not. There are many fundamental errors in the string program code that are at least partially responsible for this result and which allow a train to move faster than is physically possible. Some of the more obvious errors are described below, but given the volume of code in the string program, there is no reason to believe that this list of errors is comprehensive.

The ability of a train to maintain its speed or to accelerate at any given time depends on (1) the total power or tractive effort available to move the train and (2) the total resistance acting to keep the train from moving or accelerating. Tractive effort depends on the type and number of locomotives on the train. Tractive effort actually available to accelerate or move the train is reduced by the total resistance, which in turn depends on a number of factors, including the train

weight, the type of cars on the train, and the grade and curvature of the track. Otter Tail's string program generates physically impossible transit times by *overstating* the tractive effort of the OTRR trains and *understating* the resistance encountered by the OTRR trains.

Otter Tail made at least two errors when calculating the tractive effort of certain OTRR trains. First, the string program overstated the tractive effort available from Dash 9 locomotives powering general freight trains at speeds less than 10 mph.[31] Second, the string program overstated the tractive effort available from SD70MAC locomotives powering coal trains at speeds of 10 mph or greater.[32] Obviously, overstating locomotive capabilities increases the speed at which trains travel on the OTRR, particularly on ascending grades.

Otter Tail also made multiple errors when calculating each train's total resistance. To understand the errors, it is helpful to identify the variables that appear in Otter Tail's string program resistance formula. Total resistance is the sum of five separate resistance components:

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[31] At speeds less than 10 mph, the string program calculated total tractive effort using the formula: {

}. OTP Errata electronic work paper "otter_tail_string.prg" at line 1298. Regardless of locomotive type, the string program assumed that the locomotive weight is { } tons and the adhesion value is { }. *Id.* at lines 1101 and 1242. Using these figures, the string program calculated total tractive effort per locomotive equal to 144,900 pounds. As shown in Exhibit III.B-7, a Dash 9 locomotive is never capable of delivering this level of tractive effort, even in its highest throttle position. The string program therefore overstated the pulling force of the Dash 9 locomotives at speeds less than 10 mph.

[32] At speeds of 10 mph or greater, the string program calculated total tractive effort using the formula: {

}. OTP Errata electronic work paper "otter_tail_string.prg" at line 1300. The string program erroneously assumed that all of the OTRR trains are powered by 4400 horsepower locomotives (Dash 9s). Since the OTRR's coal trains are powered by 4000 horsepower SD70MAC locomotives, the string program overstated tractive effort for these trains. Exhibit III.B-7 confirms that an SD70MAC locomotive cannot achieve the tractive effort of a Dash 9 locomotive at speeds of 10 mph or greater.

(1) rolling resistance; (2) train speed-related resistance; (3) air drag resistance; (4) grade-related resistance; and (5) curve-related resistance.[33] Otter Tail erred in calculating each of the five resistance components.[34]

One significant error in Otter Tail's resistance calculation is that Otter Tail purports to calculate resistance by summing the five resistance factors even though they are measured in different units -- rolling resistance, train speed-related resistance, and air drag resistance are stated in pounds per ton of train weight, while grade- and curve-related resistance are stated in pounds for the train. Attempting to add variables stated in different units produces a nonsensical result. Otter Tail should have multiplied the resistance it calculated for the first three components by the train weight so that all five are expressed in the same units.[35] As a result, the string program understated three of the resistance components by a factor equal to the train weight (as great as 17000 tons for loaded unit coal and grain trains). Stated differently, the string program calculated three of the resistance components as if each OTRR train weighs only 1 ton.[36]

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[33] The program uses the formula: {

}. OTP Errata electronic work paper "otter_tail_string.prg" at line 1296.

[34] Standard resistance equations also include an inertia or starting resistance variable that Otter Tail completely omitted from the string program calculations. OTP.OP.WP.2530.

[35] OTP Errata electronic work paper "otter_tail_string.prg" at lines 1244 and 1271-1297. Interestingly, Otter Tail included the train weight multiplier in these calculations in its opening evidence but, without explanation, removed the multiplier from its errata calculations. OTP Opening electronic work paper "otter_tail_string.prg" at lines 1260 and 1299-1309.

[36] The string program calculations for grade-related and curve-related resistance include a variable for train weight. However, the string program appears to account for the weight of the cars only and ignores the weight of the locomotives in these calculations. Additional errors in Otter Tail's grade-related and curve-related resistance calculations are discussed below.

Mixing units and omitting train weight were not Otter Tail's only errors. Otter Tail's calculation of air drag resistance, for example, treats all car types as exhibiting the same level of resistance.[37] It is well-known that whether a car is loaded or empty, and the type of car -- gondola, covered hopper, or container or trailer on flat car -- has a significant impact on air drag resistance. Otter Tail's own work papers show that each car type should have a unique coefficient for air drag resistance.[38] Despite this, Otter Tail uses a single coefficient for all cars, and the coefficient value used by Otter Tail is not found in any of its work papers.

Otter Tail also erred in calculating grade-related resistance, assuming that trains traveling in opposite directions traverse the exact same grade -- an obvious impossibility. In the real world, for example, westbound trains traveling between E. Windsor and W. Windsor encounter an ascending grade of 0.97 and trains traveling in the opposite direction encounter a descending grade of the same magnitude (-0.97).[39] The string program, however, treats both westbound and eastbound trains traversing this section as facing descending grades.[40] This error caused the string program to underestimate transit times.

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[37] OTP Errata electronic workpaper "otter_tail_string.prg" at line 1291. The same equation with identical constants is used by the string program for all trains, regardless of car type.

[38] OTP.OP.WP.2511-2545. BNSF showed in Section III.B.2.a.(4) that the RTC Model relies on a unique air drag coefficient for each car type.

[39] OTP Errata electronic workpaper "grades.dbf" at line 485. If the program worked properly, it would incorporate a positive grade into its calculations when the train is traveling uphill and a negative grade when the train is traveling downhill. As explained in the next footnote, the string program incorporates either a positive or negative grade for trains traveling in both directions.

[40] BNSF Reply electronic workpaper "Reverse Grades Comparison v1.xls." The string program used the same grade value for movements in both the prevailing and non-prevailing directions. *Compare* lines 1107, 1163 and 1271 of OTP Errata electronic workpaper "otter_tail_string.prg" with lines 1876, 1933 and 2047 from the same work paper.

Finally, Otter Tail understated curve-related resistance for curved track sections greater than two degrees. Otter Tail erroneously multiplied curve-related resistance by a factor of 0.1, resulting in curve-related resistance being 90 percent lower than it should be.[41]

(2) The String Program Contains Inaccurate Speed Limits

The speed limits used in the string program are set forth in electronic workpaper "route.dbf." Although Otter Tail did not explain how it calculated these speed limits, it appears that Otter Tail averaged the speed limits shown in BNSF's track charts to develop the speed limits used in the string program.[42] There are two problems with this approach. First, Otter Tail ignored speed limits listed in BNSF's timetables that would also apply to the OTRR. Second, the use of average speed limits ignores the effect that changes in speed limits have on the movement of trains across the system.

BNSF's timetables identify certain speed limits that have been imposed by the municipalities through which BNSF travels.[43] There is no reason that these speed limits would not apply to the OTRR, which would replace the BNSF railroad line through the relevant municipalities. These restrictions would have a significant impact on the Otter Tail trains, causing them to decelerate as they approach these areas, and then accelerate as they leave in order to return to the track speed limit. Otter Tail's transit times ignore these impacts.

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[41] OTP Errata electronic workpaper "otter_tail_string.prg" at lines 1272-1280.

[42] For the Snowden to Glendive segment, Otter Tail assumed higher speed limits than the ones shown in BNSF's track charts. BNSF accepts these speed limits because Otter Tail provided for upgraded track construction and signaling on this line. However, Otter Tail cannot ignore municipal speed limits on this line.

[43] BNSF Reply electronic workpapers "Timetables and Track Charts.zip."

The use of average speed limits also understates the OTRR transit times. To illustrate the effect that Otter Tail's errors have on its transit times, BNSF compared transit times from the string program and from the RTC Model for a loaded coal train traversing the OTRR from E. Eldridge to E. Bloom, a distance of 18.7 miles. For the first 6.9 miles, the maximum train speed for a loaded coal train on this segment is 50 mph. The maximum train speed drops to 35 mph for the next 5.5 miles, and then returns to 50 mph for the final 6.3 miles.[44] The speed limit is shown graphically in Exhibit III.C-4, which contains detailed output data from the RTC Model for a loaded coal train traversing this segment. This Exhibit also shows the importance of using actual speed limits, instead of averages. While the train is restricted to 35 mph, it encounters a grade that causes its speed to drop well below the 35 mph speed limit. The Exhibit further shows that, even though the maximum authorized speed returns to 50 mph, the train travels at a speed significantly below that maximum until well after it clears the grade.

Instead of using the actual speed limits over this segment, Otter Tail restricted trains to an average speed limit of 50 mph over the entire segment. The string program generated a transit time of 23 minutes (an average speed of 48.8 mph) over this section, compared to 33 minutes (an average speed of 34 mph) by the RTC Model.[45] The use of average speed in the string program ignores the significant reduction in speed that the train experienced when it attempted to ascend the grade while traveling at a reduced speed.

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[44] *Id.*

[45] BNSF Reply electronic workpaper "coal tpc comparison.xls." The RTC program files for this train are located in electronic workpaper "coal tpc comparison.zip."

(3) The String Program Trains Experience Erratic And Physically Impossible Fluctuations In Speed

The string program makes numerous calculations concerning second-by-second movements of trains on the OTRR but does not generate an output file that allows the user to see such data. BNSF's witness Mr. Monks captured the program's calculations to analyze the nature of the train movements being modeled by Otter Tail. Exhibit III.C-5 shows a graphical representation of the movements the string program calculates for a loaded coal train.[46] The train moves erratically, engaging in frequent, abrupt speed changes that would be impossible in the real world. Whatever the string program may be modeling, it is not the movement of real locomotives or trains.

It is no answer that investigating moment-by-moment movements of the trains is unnecessary because, "on average," they move smoothly. A train that moves at 5 mph for 10 minutes and then at 55 mph for 10 minutes averages 30 mph, but it would be meaningless to argue that the average speed says anything useful about the actual movements of the train. If the string program "averages" are being generated from nonsensical underlying train movement calculations, the "average" is equally meaningless. The patent unreliability of the string program calculations concerning train movements suggests that the string program itself is an unreliable model of railroad operations.

b. Analysis Of Time For Non-Transit Time Portions Of The Cycle

Mr. Mueller reviewed Otter Tail's assumptions regarding the amount of time the OTRR's trains would take to perform several specific activities that must be considered in addition to transit times in calculating relevant on-SARR cycle times. Mr. Mueller provided the times for

[46] BNSF Reply electronic workpaper "speeds-L-CATMALM133 (Erratic Speeds).xls."

these activities to Mr. Wheeler to use in the RTC Model simulations. This analysis is set out below.

(1) Off-Line Times At Mines

Otter Tail assumed that six hours would be consumed loading each train at the mines. OTP Nar. at III-C-20. Mr. Mueller accepts this time as reasonable for average mine loading. Otter Tail's assumption of a six-hour loading time at the mine is not consistent with its own string program. As discussed in Section III.B.2.a.(3) of this Narrative, Otter Tail's string program shows empty trains dwelling at mines for significantly longer periods of time prior to loading.

(2) Time In Yards

(a) Donkey Creek Yard

i) Coal Trains

Otter Tail assumed that each empty coal train would require two hours at Donkey Creek Yard for the exchange of locomotive power, performance of FRA-certified inspections, removal of bad-order cars, insertion of spare cars, and changing crews. OTP Nar. at III-C-21. Through a detailed analysis of the specific activities that would be carried out at Donkey Creek Yard, Mr. Mueller determined that six hours are required on average to complete the Class I initial terminal inspection and air brake test, repair or set out and replacement of bad-order cars, servicing of the locomotives and changing crews on empty trains at Donkey Creek Yard.

Mr. Mueller observed the activities included in a Class I initial terminal inspection at BNSF's Alliance Yard in January 2003 and his observations, as well as his extensive experience

managing coal operations in the PRB, are the bases for the time assessments described below.[47] BNSF's Alliance Yard performs Class I initial terminal inspections (some of which are extended haul inspections) on the empty unit coal trains on which Otter Tail proposes to perform FRA-certified inspections at Donkey Creek Yard.

Mr. Mueller's detailed assessment of the time that OTRR trains would spend in Donkey Creek is set out below:

• The empty train arrives at Donkey Creek Yard and stops on a yard track as instructed by the yardmaster. Even though the OTRR is equipped with electric switches that will be under the control of the yardmaster, the train will be required to enter at restricted speed.[48] Trains moving at restricted speed within the limits of a yard typically move at 5 to 8 MPH. This time is not included here in the dwell time in the yard.	
• The inbound crew that is on the head end locomotive consist sets the train air brakes as required and then detaches the locomotives from the train, requests the route to the service track from the yardmaster, and exits this yard track when there is no conflicting movement from other trains departing on the same lead, other locomotive consists moving to or from the service track, or moves being made by the switch engine removing or replacing cars to other empty trains in this yard.	**10 minutes**[49]

[47] BN.RP.WP.III.C-0009-0012.

[48] Otter Tail provided electric switches for yard tracks. Mr. Mueller determined that the yardmaster should control and operate these switches.

[49] All times are cumulative.

• As described by OTRR, the rear consist is removed by a contractor. Additional time is required for this crew to arrive by vehicle, board the locomotive, change from DP mode to lead operation, detach it from the train and exit this yard track.	**10 minutes**
• The Donkey Creek yardmaster, who controls the electric switches, applies Blue Flag Protection to both ends of the yard track. This requires that the yardmaster line and lock switches at both ends of the track "away from the track" and physically place a track blocking device on the switch control panel. These requirements are mandated by FRA Blue Flag regulations.[50]	**5 minutes**
• Two mechanical inspectors perform a Class I initial terminal inspection of the train. During the inspection, they make minor repairs such as replacing worn brake shoes, missing brake shoe keys, air hoses, air hose hangers, and air hose gaskets and arrange for more extensive repairs as discussed below.	**30 minutes**
• Another mechanical inspector working with a truck equipped with a welder and torch makes repairs as discovered by car inspectors that require more extensive equipment to accomplish, i.e., replacement of broken or missing truck springs (require jacking of the car), welding broken train lines, air hose replacements, retesting cars with air cut outs or failure to set, straightening pinlifters, replacing pinlifter brackets, straightening crossover hand holds, side hand holds or broken steps.	**1 hour**

[50] The Blue Flag requirements are intended to ensure that there are no cars moving onto the inspection tracks that might inadvertently collide with the trains on the tracks, thereby causing injury to workers. 49 C.F.R. §§ 218.27 and 218.29.

- Mechanical inspectors authorize the Donkey Creek yardmaster to remove Blue Flag Protection, advise the yardmaster they have completed their inspection and identify to him which cars could not be repaired in the train and need to be switched out of the train to move to the car repair facility. The defects requiring a car to be switched out of the train would include wheel defects (cracked, flat spots, shelled, etc.), bearing defects, broken brake beams, slack adjusters, broken hand holds requiring riveting or bolting, bent or broken doors, or coupler defects. **10 minutes**

- Two-man switch crew proceeds to track, switches out bad-order car(s) and places them on a track designated by the yardmaster. As discussed in Section III.B.3.a.(1)(c) above, there would be an average of { } bad-order cars per empty train inspected at Donkey Creek. At this time, the switch crews would also remove cars that went bad-order and were repaired offline and are being returned to the OTRR on empty trains. The switch crew would also remove any other cars on the train that contain material being shipped to the OTRR, i.e., fuel tank cars, locomotive material, car material or maintenance-of-way material. **1 hour**

- Two-man switch crew switches out spare cars from spare car tracks as instructed by the yardmaster and places them in the train. Spare cars must be of the proper type and ownership and turned correctly, which requires additional moves and possibly moving them around a wye track in order to be in the proper position to move in this train and bring it to ideal tender. The number of spare cars required is often greater than the bad-order cars removed because defective cars are switched out as discovered during the train cycle and not only during Class I initial terminal inspections. That results in many trains arriving at Donkey Creek Yard require spare cars be added to replace bad-order cars removed along the train's route in addition to the spare cars required to replace bad-order cars removed during the initial terminal inspection at Donkey Creek Yard. This virtually assures that every train will need to have cars added to it as it processes through the Donkey Creek Yard. **1 hour**

• After the switch crew has completed its work, the road crew for the outbound train moves to the track as instructed by the yardmaster and places the head-end locomotive consist on the head of the train. At the same time, the contract hostler is moving the rear DP locomotive to the rear of the train as instructed by the yardmaster.	**15 minutes**
• Outbound road crew works with the contract hostler to insure proper linking of head and rear locomotives for DP operation.	**10 minutes**
• Two mechanical inspectors again request the yardmaster to Blue Flag the track in preparation to perform initial terminal air brake test. This again requires that Blue Flag protection is provided as required by FRA.	**10 minutes**
• Locomotives on both ends of the train charge the train air brake system preparing for air brake test.	**20 minutes**
• Two mechanical inspectors perform initial terminal air brake test, inspecting both sides of the train to insure all train air brakes properly apply.	**30 minutes**
• Subtotal time from stopping on a yard track, receiving the Class I initial terminal inspection, switching of cars into and out of the train, moving serviced locomotives back on the train, air brake system charged, and air brake set inspected at Donkey Creek.	**5 hours - 30 minutes**
• The above times do not include any time the train might be held by the mainline dispatcher as the result of conflicting moves being made at the west end of the yard with inbound loaded trains arriving, or at the east end of the yard with loaded trains departing from Donkey Creek. It also assumes that all personnel perform work as required when required and without delay. Allowing an additional 30 minutes to account for such circumstances brings the total time to six hours.	**30 minutes** **6 hours**

- At this point, the train is ready to depart the yard track as instructed by yardmaster and receives a roll-by inspection from the mechanical inspector to insure that all train air brakes have fully released. Mr. Wheeler included this time in the RTC model transit times. Therefore, this time is not included here in the dwell time at the yard.

Mr. Mueller's assumption of six hours is very conservative when compared to BNSF's actual experience. The average dwell time for processing empty unit coal trains for the first six months of 2003 was { } hours at BNSF's Alliance Yard { } and { } hours at BNSF's Guernsey Yard { }.[51] The actual dwell times for empty trains experienced by BNSF are thus substantially greater than the dwell time that Mr. Mueller has specified above for the OTRR.

Otter Tail assumed 15 minutes for eastbound loaded trains at Donkey Creek to exchange locomotive power and to change crews for interchange with the residual BNSF. OTP Nar. at III-C-21. Mr. Mueller determined that one hour would be required for interchange of trains between the OTRR and other railroads, principally the residual BNSF. At the interchange at the Donkey Creek Yard, for example, the OTRR crew will depart the train and a BNSF crew will board the train. Several activities are involved in effecting the interchange. The boarding crew will have to receive their operating authority, read and understand current notices and bulletins affecting their assignment, hold a safety briefing, board the train, perform a set and release air test to ensure continuity of the train's air brake line and, after receiving authority from the yardmaster (who has to coordinate the train's departure with the BNSF's mainline dispatcher), depart the yard.

[51] BNSF Reply electronic workpaper "Line Seg Cycle thru June 2003.pdf."

It also will be necessary for the two railroads to coordinate the arrival of the train in the yard with the travel of the BNSF crew from the location where it comes on duty to the yard. In the case of an interchange from OTRR to BNSF at the Donkey Creek yard, for example, the BNSF crew boarding the train will be at its on-duty location in Gillette, WY, approximately 10 miles from Donkey Creek. The OTRR dispatcher will notify BNSF of the time the train is estimated to arrive at Donkey Creek yard. BNSF will then arrange for the crew to be called on duty and to travel to Donkey Creek to meet the train.

Despite good faith efforts of the two railroads to coordinate these activities, it is likely that the train and the crew will arrive at Donkey Creek Yard at different times, due to a number of circumstances. For example, the OTRR dispatcher's estimate of the arrival time of the train may be off by even a short period of time, such as 10 or 15 minutes. The train may be delayed in arriving, or adverse whether conditions could delay the arrival of the crew. Delays related to coordinating the arrival of the train and the crew are even more likely to occur in instances in which the boarding crew's on-duty location is a significant distance from the yard where it will board the train (such as the 129-mile distance between the BNSF crew's on-duty location at Glasgow and the OTRR's Snowden Yard, as discussed below).

It should also be noted that the clock begins running on a train crew's 12-hours-of-service limitation when the crew reports to its on-duty location. When the crew reaches its 12-hours-of-service limitation, it must go off duty and be replaced by another crew. A railroad typically does not want to have its crews using up their time by waiting for the arrival of a train in a yard. To minimize the number of crews required, it is common railroad operating practice to require a train to wait on the arrival of a crew, rather than to require the crew to wait for the arrival of the train.

Taking these factors into consideration, Mr. Mueller allotted one hour to accomplish an interchange. This is a conservative time period for accomplishing the interchange. It assumes, for example, that the train will arrive at the time estimated by the OTRR dispatcher and provided to BNSF, and that adverse weather or other conditions will not delay arrival of the BNSF crew. This time could also be extended by the discovery of any problems or defective equipment in the train that were not known prior to the train's arrival at Donkey Creek, and that must be corrected before the train departs on the BNSF mainline. The departure may also be delayed by conflicts with other movements in the yard, or on the mainline that is under the control of the BNSF dispatcher who must coordinate movement of the train with other traffic on that line.

In the *TMPA* case, the Board approved a one-hour period for interchange. *TMPA* at 74. In that case, the one-hour time period was described as "needed for the crew to be briefed, receive paperwork, board the train, perform an air test and depart." Id. The one-hour time period allotted by Mr. Mueller for an interchange is consistent with the one-hour time period for interchange approved by the Board in *TMPA*.

ii) Non-Coal Trains

Otter Tail provided one hour at Donkey Creek Yard for westbound, non-coal overhead trains for an FRA-certified 1,000-mile inspection and crew change. OTP Nar. at III-C-21. Mr. Mueller accepts this time for the interchange, although, as discussed in Section III.C.3. below, it is not necessary to perform a 1,000-mile inspection on these trains at Donkey Creek Yard. Although an exchange of locomotives is not scheduled at Donkey Creek, many of the non-coal trains passing through the yard will have locomotives scheduled for required maintenance at the locomotive facility that will need to be removed and replaced by another locomotive. Otter Tail has not allowed any time for this activity at Donkey Creek. Otter Tail provided 15 minutes at

Donkey Creek Yard for eastbound, non-coal overhead trains that are being interchanged to BNSF. OTP Nar. at III-C-21. Mr. Mueller has allowed one hour for interchange of these eastbound trains to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform an air test and depart the yard, as discussed in Section III.C.2.b.(2)(a)(i) above.

(b) Glendive Yard

i) Coal Trains

Otter Tail assumed that each empty coal train would require two hours at Glendive Yard for the exchange of locomotive power, performing an FRA-certified inspection, removing bad-order cars, inserting spare cars, and changing crews. OTP Nar. at III-C-21. For the reasons discussed in Section III.C.2.b.(2)(a)(i) above, Mr. Mueller determined six hours are required on average to complete the Class I initial terminal inspection and air brake test of an empty coal train, and servicing of locomotives at Donkey Creek Yard. The same activities and time period would be required for performance of a Class I initial terminal inspection and air brake test of an empty coal train at Glendive Yard.[52]

Otter Tail provided 30 minutes for loaded eastbound coal trains at Glendive Yard to exchange locomotive power and to change crews. OTP Nar. at III-C-21. Otter Tail also provided one hour at Glendive Yard for loaded coal trains moving to Benson for interchange with BNSF, and loaded coal trains that originate south of Donkey Creek that are moving to Fargo for interchange with BNSF, for performance of an FRA-certified 1,000-mile inspection and crew change. OTP Nar. at III-C-21. As discussed below, Mr. Mueller determined Otter Tail did not provide sufficient time at Glendive to perform a 1,500-mile inspection, which would take

[52] Again, this is significantly less than the time BNSF actually incurred during the first six months of 2003 at either Alliance or Guernsey Yards. Each of the OTRR's empty coal trains will be inspected at either Glendive Yard, Donkey Creek Yard, or Converse Yard.

at least 2 hours.[53] He further determined that all but two of these loaded coal trains require a 1,500-mile inspection at Glendive Yard.

Mr. Mueller reviewed each of the activities to be performed on a loaded coal train at Glendive Yard and assessed the amount of time required to complete such activity, as described below.

• Train arrives at Glendive Yard and stops on a yard track as instructed by the yardmaster. Even though the OTRR is equipped with electric switches that will be under the control of the yardmaster, the train will be required to enter at restricted speed.[54] This time is not included in the dwell time in the yard.	
• The inbound crew that is on the head end locomotive consist sets the train air brakes as required and then detaches the locomotives from the train, requests the route to the service track from the yardmaster, and exits this yard track when there is no conflicting movement on the same lead.	**10 Minutes**
• As described by OTRR, the rear DP locomotive is removed by a contractor. Additional time is required for this crew to arrive by vehicle, board the locomotive, change from DP mode to lead operation, detach it from the train and exit this yard track as instructed by the Glendive Yardmaster.	**10 Minutes**

[53] The two exceptions are loaded coal trains moving to Stanton, ND and Hoot Lake, MN, which will receive a 1,000-mile inspection because the round trip distance between Glendive and each of these destinations is less than 1,000 miles.

[54] Otter Tail provided electric switches for yard tracks. Mr. Mueller determined that the yardmaster should control and operate these switches.

- The Glendive Yardmaster, who controls the electric switches on the receiving and departure tracks, applies Blue Flag Protection to both ends of this yard track. This requires that he line and lock the switches at both ends of the track "away from the track" and place a track blocking device on his switch control panel. These requirements are mandated by FRA Blue Flag regulations. **5 Minutes**

- Two mechanical inspectors perform a 1,500-mile "extended haul" or a 1,000-mile inspection of the train. This is an inspection focused on the train air brake system and not on the car safety appliances or running gear. It is anticipated that very few bad order cars will be detected and require removal from the train as a result of this inspection. **30 Minutes**

- The mechanical inspectors advise the Glendive Yardmaster they have completed the appropriate inspection as required and if there were any cars that could not be repaired in the train, they would advise him at that time that those cars needed to be switched out of the train. The Glendive Yardmaster will remove the blue flag protection after receiving authority from the mechanical inspectors. **10 Minutes**

- The road crew for the outbound loaded coal train moves their head end locomotive consist to the train as instructed by the yardmaster and places it on the train, couples the train air brake system, and prepares for the required brake test. At the same time, the helper crew with the helper locomotive and the rear DP locomotive is moving their locomotive consist to the rear of the train.[55] **15 Minutes**

- The outbound road crew works with the helper crew to insure the proper linking of head and rear locomotives for DP operation and begins charging the train air brake system. **10 Minutes**

[55] The sequence of events up to this point allots one hour and 20 minutes for the locomotives to move to the service facility, be serviced, and move back to the train. This is a very conservative allotment of time for completion of these activities.

• The two mechanical inspectors perform the train air brake test, driving along both sides of the train to insure all train air brakes set, and then again driving along both sides of the train to insure all train air brakes properly release.	**30 Minutes**
Total Time for foregoing activities	**2 Hours**

- The loaded coal train is now ready to depart the yard track as authorized by the Glendive Yardmaster in coordination with the OTRR dispatcher.

ii) Non-Coal Trains

Otter Tail provided one hour for westbound overhead trains at Glendive Yard for FRA-certified 1,000-mile inspection and crew change. OTP Nar. at III-C-21. As discussed in Section III.C.3.a. below, Mr. Mueller determined that the overhead trains that do not require intra-/inter-train switching also do not require a 1,000-mile inspection at GlendiveYard. Therefore, he decreased the time that these trains are required to spend in the yard from the one hour provided by Otter Tail to 30 minutes for performance of a crew change.

Otter Tail provided 15 minutes at Glendive Yard for eastbound overhead traffic for a crew change. OTP Nar. at III-C-21. Mr. Mueller has provided 30 minutes for a crew change for those overhead trains that do not require intra-/inter-train switching at Glendive Yard. The additional time is required because the size of the yard and traffic moving through it will produce some delay in effecting a crew change at this location when compared to smaller yards with less traffic (such as Moran Junction and Dutch). Otter Tail did not schedule an exchange of locomotives for any of the non-coal trains at Glendive Yard. Most of the OTRR's non-coal locomotive fleet will be on trains moving on the BNSF Northern Corridor travelling over the OTRR between Fargo and Snowden. The OTRR's only facility for maintenance and repair of its locomotives is at Donkey Creek. Therefore, locomotives will need to be exchanged from many

trains at Glendive to permit locomotives to receive scheduled periodic maintenance. Otter Tail, however, failed to provide any time for this activity.

Mr. Mueller also evaluated the amount of time that would be required to process the overhead freight trains that require intra-/inter-train switching at Glendive. As discussed in Section III.C.1.a.(2)(d) above, certain of the overhead trains passing through Glendive Yard, in both the eastbound and westbound direction, will require extensive intra-/inter-train switching to be performed at the yard. Otter Tail did not include any time for performance of this intra-/inter-train switching. Mr. Mueller reviewed each of the activities to be undertaken in performing intra-/inter-train switching and assessed the amount of time required to complete such activity, as described below. Mr. Mueller observed these activities at BNSF's Minot Yard in July, 2003 and his observations, as well as his extensive experience in railroad operations, are the basis for these time estimates described below. The specific tasks and time associated with them are set out below:

- Train arrives Glendive yard and proceeds to yard track at restricted speed as determined by the Glendive yardmaster. As Otter Tail has equipped the OTRR Glendive yard with electric switches that will be controlled by the Glendive yardmaster, the train should be able to arrive at the designated yard track without stopping to line any switches in connection with its route. This time is not included in the dwell time at the yard.

- Inbound road crew makes appropriate train brake set and removes head end power to proceed as instructed by the Glendive yardmaster to the locomotive servicing track. **10 Minutes**

- The Glendive yardmaster can now line the switches away from both ends of the subject receiving yard track and block them to provide Blue Flag Protection for the mechanical inspectors. **10 Minutes**

- Two mechanical inspectors perform initial terminal inspection of train at the same time making minor repairs such as replacing worn brake shoes, air hoses, gaskets, etc. At this time the carmen will also bleed the train air brake system, preparing it to be switched. During this time, if more extensive repairs, such as bent or broken coupler devices or bent or broken safety appliances are found, mechanical inspectors operating with a small truck containing welding equipment will be summoned to make these repairs. **1 Hour**

- Mechanical inspectors complete train inspection and advise the Glendive yardmaster of the results of their inspection, i.e., any cars that need to be removed from the train that they were unable to repair. **10 Minutes**

- After receiving instructions from the Glendive yardmaster and a list of the cars on the train to be switched, indicating which track each car is to be switched to depending on its destination, the switch crew will switch the train in accordance with all governing operating and safety rules, including special instructions concerning the switching of special multi-platform and stack intermodal equipment. (See copy of Special Instructions Para 3.A which states in part "These cars must not be cut off in motion or struck by any car moving under its own momentum.")[56] This restriction requires that the switch crew handle each car to the track it is destined to by shoving all the way to a coupling and then shoving the track into the clear. This is a much more time consuming operation than flat switching other types of freight cars that are not similarly restricted. At the completion of the classification of cars they will be picked up in groups in the proper sequence and placed back in the train on the inspection track as designated by the Glendive yardmaster. **3 Hours**

- As instructed by the Glendive yardmaster and after the switch engine has departed the track and the switches have been lined and blocked for Blue Flag Protection, the Carmen will be dispatched to couple the train air brake hoses. **30 Minutes**

[56] BNSF Reply electronic workpaper "BNSF System Special Instructions.pdf."

• The outbound train crew puts the locomotives on the head end of the properly-grouped outbound train.	**10 Minutes**
• Locomotives are on the head end of the train bringing the train brake air pressure up to the required minimum to perform the initial terminal train air brake test.	**10 Minutes**
• After charging the train air brake system, the outbound train crew will make a required set of the train air brakes, which will be observed by the mechanical inspectors while driving each side of the train.	**20 Minutes**
• After the mechanical inspectors have observed that the train air brakes have been properly applied, the outbound road crew will release the brakes and depart the yard as instructed by the Glendive yardmaster. Mechanical inspectors will observe the train as it rolls by insuring all train air brakes have fully released.	**10 Minutes**
• Total Time	**5 Hours 50 Minutes, (rounded to 6 hours to make some provision for delays resulting from conflicting movements in the yard.)**

BNSF's historical data shows that an average of { } hours was required in November, 2002, and an average of { } hours was required in December, 2002, for the intra-/inter-train switching at Minot.[57] This is substantially longer than the six-hour time period Mr. Mueller has provided for this switching at the OTRR's Glendive Yard, indicating that Mr. Mueller's time assessment is reasonable.

[57] BNSF Reply electronic workpaper "Minot Dwell Time v1.xls," tab"Summary."

(c) Converse Yard

Otter Tail provided 45 minutes for empty coal trains at Converse Yard for performance of an unspecified inspection. Otter Tail also provided 15 minutes at Converse Yard for loaded coal trains being interchanged to BNSF for the crew change between the OTRR and BNSF crews. OTP Nar. at III-C-21. As discussed in Section III.C.3.a. below, Mr. Mueller determined that it is necessary to perform an initial terminal inspection on empty unit coal trains at Converse Yard. Mr. Mueller assessed the time for that activity, as described below:

• The empty train arrives at Converse Yard and stops on the designated inspection track. The head-end locomotives will be positioned on the concrete drip pans on the north end of this track so they can be fueled by truck while the Class I inspection is being performed.	
• Two mechanical inspectors apply Blue Flag Protection to both ends of this inspection track. This requires that they line and lock switches at both ends of the track "away from the track" and physically place a "blue flag" in the center of the track. These requirements are mandated by FRA Blue Flag regulations.[58]	**10 minutes**[59]
• Two mechanical inspectors perform Class I initial terminal inspection of the train. During the inspection, they make minor repairs such as replacing worn brake shoes, missing brake shoe keys, air hoses, air hose hangers, and air hose gaskets.	**1 hour**[60]

[58] The Blue Flag requirements are intended to ensure that there are no cars moving onto the inspection tracks that might inadvertently collide with the trains on the tracks, thereby causing injury to workers. 49 C.F.R. §§ 218.27 and 218.29.

[59] All times are cumulative. The mechanical inspectors have to physically go to the tracks to apply this protection at Converse Yard in contrast to Donkey Creek Yard, where the yardmaster can use electric switches to apply this protection remotely. Thus this action requires more time at Converse Yard (10 minutes) than at Donkey Creek Yard (5 minutes).

- The mechanical inspectors return to track to remove Blue Flag Protection, unlock switches, advise the dispatcher they have completed inspection and identify to him which cars need to be switched out of the train to move to the rip tracks. The defects requiring a car to be switched out of the train would include wheel defects (cracked, flat spots, shelled, etc.), bearing defects, broken brake beams, slack adjusters, broken hand holds requiring riveting or bolting, bent or broken doors, or coupler defects. **10 minutes**

- The OTRR outbound train crew uses SD70 locomotive on train to switch out bad-order car(s) and place them on the rip track. Assuming bad-order car frequency similar to that at Donkey Creek, there would be an average of { } bad-order cars per empty train inspected at Converse Yard. At this time, the train crew would also remove cars that went bad-order and were repaired offline and are being returned to the OTRR on empty trains. The train crew would also remove any other cars on the train that contain material being shipped to the OTRR, *i.e.*, fuel tank cars, locomotive material, car material or maintenance-of-way material. The train crew switches out spare cars from spare car track and places them in the train. Spare cars must be of the proper type and ownership and turned correctly. There is no wye track at Converse Yard; therefore, any cars that need to be turned **1 hour**[61]

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[60] Due to the limited number of trains to be inspected at the Converse Yard, Mr. Mueller concluded it would not justify the investment in the equipment required to make major in-train repairs at this location (*i.e.*, trucks equipped with a welder and torch). The two mechanical inspectors at Converse Yard would make minor in-train repairs or have the car set out of the train for repair later. Thus, Mr. Mueller has provided one hour for this inspection and repair at Converse Yard rather than the one hour and thirty minutes he provided at Donkey Creek and Glendive Yards.

[61] As discussed in Section III.C.2.b.(2)(b) above, the time developed for the initial terminal inspection at Donkey Creek Yard includes 1 hour for removal of bad-order cars and 1 hour for insertion of spare cars. Mr. Mueller provided a total of 1 hour for performance of both activities at Converse Yard because Converse Yard is much smaller than Donkey Creek Yard with the spare car track and bad-order track located adjacent to the inspection track. Therefore, minimal time would be consumed by congestion and moves to and from the rip tracks and spare car tracks. Similarly, there would be a much smaller number of spare cars at Converse Yard, requiring less time in moving cars on the spare tracks to reach a spare car for a specific shipper.

at Reno Junction or at one of the mines. The number of spare cars required is often greater than the bad-order cars removed because defective cars are switched out as discovered during the train cycle and not only during the initial terminal inspection. That results in many trains arriving at Converse Yard requiring spare cars be added to replace bad-order cars removed along the train's route in addition to the spare cars required to replace bad-order cars removed during initial terminal inspections at Converse Yard. This virtually assures that every train will need to have cars added to it as it processes through the Converse Yard.

- Two mechanical inspectors return to Blue Flag the track in preparation to perform initial terminal air brake test. This again requires that Blue Flag protection is provided as required by FRA. **10 minutes**

- Two mechanical inspectors perform initial terminal air brake test, inspecting both sides of the train to insure all train air brakes properly apply. **30 minutes**

- Total time from stopping on a yard track, receiving the Class I initial terminal inspection, switching of cars into and out of the train, and Class I initial terminal inspection and air brake test. **3 hours**

- At this point, the train is ready to depart the yard track as authorized by the OTRR mainline dispatcher and receives a roll-by inspection from the mechanical inspectors to insure that all train air brakes have fully released.

The difference between the time required for an initial terminal inspection at Donkey Creek Yard (6 hours) and Converse Yard (3 hours) results in part from the reduced time required at Converse Yard for in-train minor repair of bad-order cars and a simplified switching of bad-order cars from trains and insertion of spare cars into trains, as explained above. Additionally, the locomotives will not be removed from the train for servicing at Converse Yard, as they will be at Donkey Creek Yard. Therefore, the activities, and associated times, relating to removal and reattachment of locomotives included in the dwell time for the initial terminal inspection at

Donkey Creek Yard are not included in the dwell time for the initial terminal inspection at Converse Yard.

Mr. Mueller provided one hour at Converse Yard for loaded coal trains to accomplish the interchange between OTRR and BNSF to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test and depart the yard, as discussed in Section III.C.2.b.(2)(a)(i) above. The OTRR and BNSF would also have to coordinate travel of the BNSF crews that will board the trains from their nearest crew location at Guernsey, approximately 117 miles, and more than two hours travel time, away from Converse Yard.

(d) Dutch Yard

Otter Tail provided 15 minutes for all trains passing through Dutch Yard for a crew change. OTP Nar. at III-C-21. Mr. Mueller accepts that this amount of time is adequate given the small size of Dutch Yard.

(e) Moran Junction

Otter Tail provided 15 minutes at Moran Junction for a crew change on all through trains, and 15 minutes for all trains being interchanged with BNSF. OTP Nar. at III-C-21. Mr. Mueller accepts that 15 minutes is appropriate for a crew change on through trains for a facility of this size and with this traffic volume. Mr. Mueller, however, provided one hour for all trains interchanged with BNSF at Moran Junction to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test and depart the yard, as discussed in Section III.C.2.b.(2)(a)(i) above. OTRR crews would also have to travel from their nearest crew location at Dutch, and BNSF crews would have to travel from their nearest crew location at Sheridan, each 129 miles, and over two hours travel time, from Moran Junction.

(f) Snowden Yard

Otter Tail provided 15 minutes at Snowden Yard for all trains interchanged to and from BNSF. OTP Nar. at III-C-21. Again, Mr. Mueller has provided one hour for all trains at Snowden Yard to accomplish the interchange to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test and depart the yard, as discussed in Section III.C.2.b.(2)(a)(i) above. BNSF crews would also have to travel from their nearest crew location at Glasgow (129 miles away) and OTRR crews would have to travel from their nearest crew location at Glendive (approximately 80 miles away).

(g) Terry Yard

Otter Tail provided 45 minutes at Terry Yard for westbound trains interchanged from BNSF for performance of an unspecified inspection. Otter Tail provided 15 minutes for eastbound trains interchanged at Terry Yard for a crew change on trains interchanged to BNSF. OTP Nar. at III-C-21. As discussed in Section III.C.3.a. below, Mr. Mueller determined that it is not necessary to perform an inspection on these trains at Terry Yard. Mr. Mueller provided one hour for westbound and eastbound trains interchanged at Terry Yard to accomplish the interchange between BNSF and OTRR to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test and depart the yard, as discussed in Section III.C.2.b.(2)(a)(i) above. OTRR crews and BNSF crews would have to travel from their nearest crew locations at Glendive, approximately 40 miles and 45 minutes from Terry Yard.

(h) Mandan Yard

Otter Tail provided 15 minutes at Mandan Yard for a crew change on all loaded and empty coal trains interchanged to and from BNSF. OTP Nar. at III-C-21. Mr. Mueller provided

one hour for this interchange to provide time for the arriving crew to be brief, receive paperwork, board the train, perform a set and release air test and depart the yard, as discussed in Section III.C.2.b.(2)(a)(i) above. Otter Tail provided 15 minutes for a crew change at Mandan Yard for all through trains. OTP Nar. at III-C-21. Mr. Mueller accepts that 15 minutes is adequate for performance of this function on the non-coal trains, which do not require fueling at Mandan.

Otter Tail did not provide any time for fueling loaded or empty coal trains at Mandan Yard. As discussed in Section III.B.3.a.(7) above, it will be necessary to fuel coal trains at Mandan Yard. Mr. Mueller provided one hour for fueling of the empty and loaded through coal trains at Mandan Yard. This time is required for the train to enter the yard, park at the fuel station, fuel the front-end locomotives from the fuel station and the rear-end locomotive from a truck, and depart the yard after fueling has been completed.

(i) Casselton Yard

As discussed in Section III.C.1. above, it is necessary to add a turnout at Casselton for grain trains being interchanged between the OTRR and Red River Valley & Western Railroad. Mr. Mueller has provided one hour for this interchange to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test, and depart, as discussed in Section III.C.2.b.(2)(a)(i) above. The RRVW crews would also have to bring locomotives from Whapeton, 70 miles away, to effect an interchange from OTRR in light of the fact the two railroads will not be operating in run-through service, as discussed in Section III.C.1.b(3)(a) above.[62] OTRR crews would have to travel from their nearest location at Fargo, approximately 22 miles away.

[62] Similarly, OTRR would have to ferry locomotives from Glendive Yard to pick up the cars left by the RRVW in interchange to OTRR at Casselton.

(j) JY Connector, West Fargo

As discussed in Section III.C.1. above, it is necessary to add a turnout at the JY Connector in West Fargo for coal trains being interchanged with BNSF for movement to Minnesota Power's Clay Boswell Plant near Cohasset, Minnesota and Laskins Plant near Colby, Minnesota, and for interchange of the American Crystal trains moving to sugar processors. Mr. Mueller provided one hour for this interchange to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test and depart, as discussed in Section III.C.2.b.(2)(a)(i) above. BNSF crews would also have to travel from their nearest location at Dilworth (10 miles away) and OTRR crews would have to travel from Fargo (five miles away).

(k) Fargo Yard

Otter Tail provided 15 minutes at Fargo Yard for a crew change on all trains interchanged to and from the BNSF. OTP Nar. at III-C-21. Mr. Mueller provided one hour for this interchange to provide time for the arriving crew to be briefed, receive paperwork, board the train, perform a set and release air test and depart, as discussed in Section III.C.2.b.(2)(a)(i) above. BNSF crews would also have to travel five miles from Dilworth.

Otter Tail provided 15 minutes at Fargo Yard for a crew change on through coal trains to and from Benson. OTP Nar. at III-C-21. Mr. Mueller agrees that this is an adequate time period for this crew change at a yard of this size.

(l) Benson Yard

Otter Tail provided 15 minutes for a crew change at Benson Yard on all trains being interchanged to and from BNSF. OTP Nar. at III-C-21. Mr. Mueller provided one hour for performance of this interchange to provide time for the arriving crew to be briefed, receive

paperwork, board the train, perform a set and release air test and depart, as discussed in Section III.C.2.b.(2)(a)(i) above. BNSF crews would also have to travel from their nearest crew location at Willmar, just over 30 miles away.

Otter Tail provided 15 minutes at Benson Yard for a crew change on all through trains to and from Big Stone. OTP Nar. at III-C-21. Mr. Mueller agrees that this is an adequate time period for performance of this crew change for a yard of this size.

(m) Summary

A comparison of the yard dwell times provided by OTRR and BNSF is set forth in Exhibit III.C-6.

(3) Helpers

Otter Tail included 15 minutes for adding a helper locomotive to a train or removing the helper locomotive from the train. Mr. Mueller agreed that 15 minutes is adequate to add or remove a helper locomotive.

(4) Random Failures

In assessing total time that OTRR trains would spend on OTRR lines, it is important also to include any delays attributable to line outages. Otter Tail's string program analysis did not account for any line closures, whether for maintenance to be performed or because of unexpected shutdowns. This is unrealistic. No railroad can assume perfect operations. Unexpected events occur all the time, and any attempt to depict realistic operating conditions must take those events into account. These unexpected events can have an enormous impact on the operation of trains over a line segment. As Mr. Wheeler testifies, the effect of equipment failures, line failures or other events causing delays can ripple throughout a railroad network.

Mr. Albin, BNSF's witness responsible for MOW costs, explains in Section III.D.4.a that random failures regularly occur on a high-density railroad and must be considered even during periods of high traffic volume. As Mr. Albin explains, there are three types of essential railroad maintenance activities that require extended periods of track time: (1) programmed replacement by seasonal work gangs, *i.e.,* rail, tie, surfacing, planned contract work, and the like, (2) regular inspections and planned repairs, and (3) maintenance work required to address unplanned events like the repair of broken rail. Programmed MOW work can be planned and to some extent can be done in a way that avoids interference with peak traffic periods. To a lesser extent, the more regular inspections and planned day-to-day maintenance can also be worked around peak traffic periods, although they cannot be altogether ignored just because traffic volumes are heavy. Safety would be compromised if a railroad totally avoided routine inspections just because traffic levels were high during a particular time. But the third category of unplanned activities cannot be avoided or planned around peak traffic periods.

Mr. Albin presented evidence on the actual track-related random failures experienced by BNSF during the month of November, 2002 on the Orin line segment and Glendive to Fargo segment replicated by OTRR. These actual track-related random failures, taken from BNSF's Random Failures Reports, are set out in Table III.D.4-1. These occurrences cannot be ignored and time must be spent performing maintenance that shuts down the lines in order to address them.

In addition to track-related random failures included in BNSF's Random Failures Reports, Mr. Albin emphasizes there are a number of events that cause delays but are not reported. The Random Failures Reports include only those failures that the dispatcher's office records as a result of track/signal failures, i.e., broken rail, signal failure, and hot box detector

alarms. The Random Failures Reports do not include train delay due to faulty rear-end devices, locomotive failure, cars requiring set-out, or other mechanical failures. Similarly, it may not include failures caused by events such as embankment failures, plugged culverts, low bridge end, switch maintenance (points not matching, frog low), reported tight rail during hot weather and frost heaves during winter weather in North Dakota.

Furthermore, Mr. Albin points out that the duration of failures in the Random Failures Reports does not necessarily include all time necessary to correct the failure. For example, in the case of a broken rail, the time included in the Random Failures Reports concludes when the rail is temporarily repaired by being angle barred and trains begin running again. Not included is the subsequent track time required as follow-up to make permanent repairs, i.e., removing angle bars and welding in a rail, grinding it to match, and tamping up the area of the joint to allow trains to proceed at track speed. Also not included is the slow order for time necessary due to the temporary joint. Other events not included are track time to correct defects reported and found by track inspectors or train crews that may not stop trains immediately but do require 2 to 3 hour track windows for correction (i.e., line and service irregularities to avoid slow orders or possible derailments).

Also, track time is regularly required for special inspections during extremely hot weather for potential sun kinks or after severe rain storms that could result in washouts or other embankment problems, or during severely cold weather for broken rail and pull-aparts. These incidents, which can interrupt or delay train service, are not included in the Random Failures Reports.

To address the track-related random failures identified by Mr. Albin as occurring during the period to be modeled, Messrs. Wheeler, Mueller and Albin reviewed the random failures

listed by Mr. Albin, and identified those that occurred during the period from November 15-25 that would either cause a complete stoppage, or a slowdown, of traffic. They eliminated all of the other random failures. Mr. Wheeler then used the list of random failures in modeling the segments of the OTRR that were examined by the RTC model.[63] Because these failures do not include many other events that would stop or delay OTRR trains, such as train-related random failures and the railroad's associated recovery time, Mr. Wheeler's approach was conservative.

(5) Dwell Time At Power Plant Destination (Big Stone Station)

Otter Tail included six hours for unloading time at the sole local destination on the OTRR (i.e., Otter Tail's Big Stone Station). OTP Nar. at III-C-20. Mr. Mueller accepts this time for unloading at the Big Stone Station.

c. BNSF's Corrected Cycle Times For The OTRR

BNSF's cycle times for the OTRR are set forth in electronic work paper "LUMS and Carmiles (OTP-BNSF) v2.xls." As described above, cycle times are made up of two components -- transit times and times spent at various locations for trains to perform specific activities. BNSF relied on Mr. Mueller's recommendations, as stated in Section III.C.2.b, to develop times spent at various locations. BNSF describes below its methodology for developing transit times for different sections of the OTRR.

BNSF relied on the transit times from the RTC Model simulations for the two sections of the OTRR that were simulated for purposes of assessing capacity requirements: (1) Snowden,

[63] The process for determining the final list of random failures used in Mr. Wheeler's modeling is set forth in BNSF Reply electronic workpapers "Glen-Fargo Random Failure.xls," and "Orin Random Failures.xls." For purposes of Mr. Wheeler's modeling, the actual level of random failures experienced on the Orin line was adjusted to reflect the reduced level of OTRR traffic on this segment when compared to the existing BNSF and UP traffic.

MT to Glendive, MT to Fargo, ND, and (2) Converse, WY to Gillette, WY.[64] A comparison of transit times for coal trains operating between Glendive, MT and Fargo, ND is shown in Table III.C-4.[65]

Table III.C-4
Comparison Of Average Transit Times In Hours Between Glendive And Fargo[66]

		Loaded Direction			Empty Direction		
From	To	BNSF Actual	OTP String Program	RTC Model	BNSF Actual	OTP String Program	RTC Model
Glendive	Mandan	8:28	5:25	7:53	7:38	5:41	5:42
Mandan	Casselton	5:31	3:46	5:46	6:18	4:18	4:50
Casselton	Fargo	0:29	0:19	0:28	0:24	0:28	0:25
Total (Glendive-Fargo)		14:28	9:30	14:07	14:20	10:27	10:57

The Table shows that loaded coal trains experience transit times comparable to BNSF's fourth quarter 2002 transit times, while empty coal trains experience slightly better transit times. The Table further confirms that the string program understates transit times, particularly for loaded coal trains traveling in the prevailing or loaded direction.

For the sections of the OTRR that BNSF did not model, BNSF had to develop alternative transit times. BNSF compared its average transit times for trains in the fourth quarter 2002 with

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[64] Mr. Wheeler's simulation of the OTRR operations between Converse and Gillette includes the Campbell and Reno Subdivisions and all of the relevant Wyoming PRB mines.

[65] The volume of coal traffic between Snowden and Glendive is minimal. Since Otter Tail did not include any of the coal trains on this route in its string program, BNSF can not compare the transit times for coal trains on this section of the OTRR.

[66] The comparison is based on average fourth quarter 2002 transit times developed from BNSF's Unit Coal Train Performance Report (BNSF Reply electronic workpaper "Line segments 04Q02.pdf"), Otter Tail's string program, and the RTC Model simulation described in Section III.B.2.a.(4). BNSF Reply electronic workpaper "Transit Time Comparison Snowden-Fargo (Coal).xls." BNSF used its average fourth quarter 2002 transit times because that time period captures peak traffic levels on the route replicated by Otter Tail. *See* Section III.B.2.a.(4)(b)i).

the transit times generated by the string program.[67] For coal trains traversing the portion of the OTRR between Gillette, WY and Glendive, MT, this comparison is shown in Table III.C-5.

Table III.C-5
Comparison Of Average Transit Time In Hours Between Gillette And Glendive

		Loaded Direction		Empty Direction	
From	To	BNSF Actual	OTP String Program	BNSF Actual	OTP String Program
Gillette	Sheridan	4:32	4:17	3:46	3:24
Sheridan	Glendive	11:46	8:33	10:53	8:58
Total (Gillette-Glendive)		16:18	12:50	14:39	12:22

As discussed in Section III.B.2.a.(1), the OTRR and BNSF have similar capacity on this section, but the OTRR is expected to handle additional traffic. The difference between BNSF's and the OTRR's traffic is modest in the base year, but grows substantially in future years. Under these circumstances, it is unrealistic to expect that Otter Tail could achieve substantially better transit times than BNSF actually achieved with similar infrastructure. Moreover, as discussed above, Otter Tail's string program has many errors that reduce transit times. These and other errors render all output of the string program unreliable. Therefore, BNSF used its fourth quarter 2002 transit times as a surrogate for the transit times that the OTRR reasonably could expect to achieve on this segment.

BNSF also compared its average transit times for trains in the year 2002 with the transit times generated by the string program for the portion of the OTRR between Fargo and Benson.[68] This comparison is shown in Table III.C-6.

[67] BNSF Reply electronic workpaper "Gillette-Glendive and Fargo-Benson Transit Time Comparison.xls."

Table III.C-6
Comparison Of Average Transit Time In Hours Between Fargo and Benson

		Loaded Direction		Empty Direction	
From	To	BNSF Actual	OTP String Program	BNSF Actual	OTP String Program
Fargo	Benson	7:05	2:36	5:51	2:16

BNSF demonstrated in Sections III.B.2.a.(3) and III.C.2.a that the transit times generated by the string program are completely unreliable. However, since the OTRR will handle less traffic on this section than BNSF currently handles, it is possible that OTRR trains could achieve somewhat faster transit times than real-world BNSF trains. Therefore, it would not be appropriate to use BNSF's actual transit times. To develop alternative transit times for this section of the OTRR, Mr. Wheeler used the RTC Model to calculate the unopposed running time of an average loaded coal train traveling from Fargo to Big Stone and the unopposed running time of an average empty coal train traveling from Big Stone to Fargo. He determined that the minimum run time for a loaded train was four hours and thirteen minutes (4:13) and for an empty train three hours and three minutes (3:03).[69] BNSF's use of unopposed transit times is extremely conservative since trains will not travel unopposed over this section of the OTRR.

d. Locomotive Count

As discussed previously, Otter Tail posited a locomotive fleet consisting of SD70 locomotives for the OTRR's unit coal trains and helper units and GE Dash 9 locomotives for OTRR's overhead general freight traffic. (Otter Tail assumed that the OTRR would use SD40 locomotives as switch engines.) For the coal fleet, Otter Tail asserts that the OTRR will require

[68] Since Otter Tail did not model any trains traveling to or from its Big Stone Plant, BNSF cannot compare transit times for the portion of the OTRR between Benson and Big Stone.

[69] BNSF Reply electronic workpaper "Fargo - Big Stone load & empty.xls."

108 SD70 locomotives to handle its 2002 coal traffic (including 92 road locomotives and 16 helper locomotives).[70] For the non-coal fleet, Otter Tail asserts that the OTRR will require 45 Dash 9 locomotives in 2002.[71] Otter Tail describes its methodology for calculating the OTRR's locomotive requirements in the following matter:

> The loaded train and empty train locomotive cycle hours were identified for the peak one-day period. Annual road train locomotive cycle hours were developed by multiplying the locomotive cycle hours for the peak one-day period by 365 to reflect a full year. The resulting annual locomotive road train cycle hours were then adjusted by the change in OTRR tonnage from 2021 back to 2002 to develop the annual locomotive cycle hours applicable to the 2002 traffic. To develop the number of road train locomotives required by the OTRR, the total number of road train locomotive cycle hours for 2002 was divided by 8,760 hours per year and then increased by five (5) percent to reflect spare locomotive units.

OTP Nar. at III-C-23 to 24. (Footnotes omitted.)

For several reasons, Otter Tail's calculations were flawed and resulted in a substantial understatement of locomotive requirements. BNSF revised Otter Tail's locomotive calculations using a methodology that has been approved by the Board to determine the locomotive fleet requirements for a stand-alone railroad that handles the volume of traffic that BNSF has determined would be available to the OTRR. These issues are addressed below.

(1) Otter Tail Significantly Understated Locomotive Requirements

For several reasons, Otter Tail's methodology for determining the necessary size of the OTRR's locomotive fleet is inappropriate, unreliable and results in a substantial understatement of the number of locomotives that would be needed on the OTRR.

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[70] Otter Tail Errata workpaper "OTTER TAIL_OPR_EX p.123," tab "Summary."

[71] *Id.*

First, as noted above, Otter Tail bases its locomotive count on the amount of time that OTRR locomotives would be on OTRR lines. However, to determine locomotive unit hours, Otter Tail relies on the output of its string program analysis. BNSF has discussed above the numerous flaws in the string program analysis. In particular, BNSF has shown that the various flaws in the analysis tend to understate transit times by a substantial amount; therefore use of the string program output to establish equipment requirements would tend to understate those requirements. In addition, as discussed above, Otter Tail's string program analysis ignores many time elements and understates other time elements (e.g., time in yards) that must be considered in determining total on-OTRR time. The output of the string program, including locomotive unit hours, is unreliable and cannot be used for purposes of establishing OTRR locomotive requirements.

Second, Otter Tail applied an inappropriate and illogical formula for deriving locomotive requirements from the string program's assessment of locomotive unit hours. Otter Tail's calculations are set out in Otter Tail's Errata Exhibit III-C-1. Otter Tail first established locomotive unit hours for coal and non-coal locomotives separately, based on its string program output, for the supposed peak day October 18, 2021.[72] It multiplied these numbers by 365 to produce annual figures for 2021. Since this produced annualized statistics for 2021, Otter Tail then needed to produce statistics corresponding to the base year 2002.[73] The ratio it used to go from the 2021 requirements to the 2002 requirements was the ratio of the volume of traffic that would be carried by the OTRR based on annualizing the peak day movements in 2021 to the actual volume of traffic moved in the year 2002. But this ratio was vastly overstated (and the

[72] As discussed above, this supposed peak day was not, in fact, the peak day for either the coal or the non-coal traffic on the OTRR.

[73] *See*, Otter Tail Errata Exh. III-C-1.

reduction in statistics to produce base year figures thus vastly overstated) by comparing annualized peak day statistics in 2021 to actual volumes in 2002, an apples-to-oranges comparison. In effect, Otter Tail compared a peak to a non-peak aggregate, gaining itself a substantial reduction in its base year numbers.

The erroneous nature of this adjustment approach is obvious by looking at its effect on non-coal locomotive requirements. Otter Tail assumes that there will be no growth in non-coal traffic between 2002 and 2021. Therefore, there is no reason to believe that the OTRR would need any more locomotives in 2021 than it needs in the base year, or that any reduction in locomotives would be appropriate from 2021 to the base year. Yet by applying its mistaken ratio, Otter Tail concludes that the OTRR would transport the same amount of non-coal traffic in 2002 as in 2021 but that doing so would require only *71 percent* as many locomotives in 2002 as in 2021.

While coal volume does increase from 2002 to 2021, the mistaken ratio vastly overstates the necessary reduction in locomotives to go from year 2021 requirements to base year 2002 requirements. The correct reduction ratio would be to compare actual peak year volumes (not using annualized peak day traffic levels) to actual 2002 volumes. That would produce a reduction ratio that reflects the changes in traffic volume that would occur between 2002 and 2021. Simply by applying this correction, without correcting other errors in Otter Tail's calculations or assumptions, produces an approximate 29 percent increase in coal locomotive requirements.[74]

[74] BNSF Reply electronic workpaper "EXHIBIT_III-C-1 Corrected.123," tab "A."

Third, Otter Tail omitted 207 empty coal trains from its string analysis.[75] This omission clearly affects the transit time assumptions that the string program generates for all trains. In addition, it means that the string program ignores the locomotive requirements for the missing trains.

Otter Tail's understatement of locomotive requirements is evident in other ways. BNSF's witness Mr. Leopold carried out an analysis of Otter Tail's string diagram output to determine the number of Dash 9 locomotives that Otter Tail's string program indicates would be needed by the OTRR for its non-coal traffic.[76] Specifically, he looked at the number of non-coal trains that the string program analysis indicated would be present on the OTRR every minute of Otter Tail's supposed peak period from October 12 through 18, 2021. Mr. Leopold found that even before considering a spare margin for locomotives, this analysis suggested the need for 66 Dash 9 locomotives during the period that Otter Tail assumes would be the peak period on the OTRR.[77]

Fourth, Otter Tail's use of a 5 percent spare margin for the OTRR's coal and non-coal locomotive fleet is inappropriate. In calculating the OTRR's road locomotive requirements, Otter Tail includes a 5 percent spare margin {

[75] *See* Otter Tail's Errata electronic workpapers "Timesl.dbf" and "Timese.dbf."

[76] The analysis could not be performed for the coal locomotives because of Otter Tail's omission of the 207 empty coal trains from its string analysis. *See* Otter Tail's Errata electronic workpapers "Timesl.dbf" and "Timese.dbf."

[77] *See* BNSF Reply electronic workpaper "Locomotive Adequacy Analysis (OTRR) Non Coal only," worksheet "Notes."

} In developing a spare margin, however, a railroad must take into account all time periods when a locomotive is not available for service for any reason. Relying on availability under the { }, which does not take all such time into account, overstates the actual availability of locomotives and understates the spare margin required to ensure actual locomotive availability.

[78] The relevant provisions of the EMD contract are included in BNSF's workpapers. *See* BNSF.RP.WP.III.C-0022-0024 and 0088-89.

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In fact, BNSF's experience demonstrates conclusively that the { } did not translate into a 5 percent unavailability for SD70s. BNSF experienced an bad-order percentage for SD70 locomotives covered by the { } of { } percent during 2002.[80] It is clear that Otter Tail's 5 percent unavailability assumption for locomotives on the OTRR is unreasonable and unsupported for the OTRR coal fleet.

It is also clear that the 5 percent unavailability assumption is totally inappropriate for the OTRR's non-coal fleet. Otter Tail has designed and constructed the OTRR with one locomotive maintenance facility at Donkey Creek, WY to maintain all of its locomotives, including the Dash 9 locomotives used for non-coal traffic. OTP Nar. at III-B-9, III-C-13. However, most of the OTRR's non-coal trains do not move through Donkey Creek. Most of those trains move from Snowden to Glendive and Fargo without going near the locomotive maintenance facilities at Donkey Creek. Periodic (quarterly) maintenance and inspections are required to be performed

[79] BN.RP.WP.III.C-0113-0114.

[80] BNSF Reply electronic workpaper "Spare Margin (SD70MAC).xls," tab "Spare Margin."

on all locomotives.[81] Therefore, the OTRR must take the time to move those locomotives out of route to Donkey Creek and then back into service.[82] Those locomotives would have to be considered unavailable during that relocation time, adding substantially to the unavailability percentage for OTRR non-coal locomotives. Indeed, given the need to move these locomotives to a facility not on the routes of movement of most of the OTRR's general merchandise trains, it is reasonable to assume that the spare margin that the OTRR would experience is actually much higher than the BNSF's real world spare margin for these locomotives.

(2) Revised Calculation of Road Locomotives Required For OTRR's Coal Fleet

BNSF recalculated the OTRR's locomotive requirements using a methodology that has been accepted by the Board. BNSF's recalculation identifies the number of locomotives that would be required to handle the revised volume of traffic that BNSF assumes will be available to the OTRR. BNSF carried out these calculations separately for OTRR's coal and non-coal locomotive fleets.

BNSF used the same methodology for calculating the OTRR's locomotive requirement for coal trains that BNSF used in the *TMPA* case to calculate locomotive requirements. The Board accepted that methodology in *TMPA* and it should do so here as well. Under this methodology the OTRR's locomotive requirement is calculated using the following formula:

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[81] 49 C.F.R. § 229.23.

[82] It is clear that Otter Tail is not assuming that those Dash 9 locomotives would be switched onto coal trains for movement to Donkey Creek. Otter Tail specifically stated that the SD70MAC locomotives will be used exclusively on coal trains and helpers and the Dash 9 locomotives will be used on non-coal trains. OTP Nar. at III-C-11-12. Other operating problems would prevent the exchange of power between the coal and general freight trains.

OTRR Coal Locomotive Requirement = Total OTRR Annual Coal Locomotive Unit Hours / Annual Available Coal Locomotive Unit Hours per Locomotive * Coal Locomotive Spare Margin * Peaking Factor

Each of the elements in this simple formula is addressed below.

Total OTRR Annual Coal Locomotive Unit Hours are calculated in three steps. First, rather than extrapolate from the locomotive unit hours for a peak day, BNSF determined the annual number of coal trains traversing a given OTRR segment and multiplied by the average transit time of trains traversing that segment to obtain segment train hours. Average transit times per segment were obtained as discussed above in Section III.C.2.c. using the RTC model and actual BNSF transit times and appropriate assumptions about yard and dwell times. The coal train hours for all OTRR segments were then summed to produce annual OTRR coal train hours. Finally, Total OTRR Annual Coal Locomotive Unit Hours were derived by multiplying total annual coal train hours by three, the number of locomotives on each coal train.

The *Annual Available Coal Locomotive Unit Hours per Locomotive* are equal to 8,760, the number of hours in a year.

The *Coal Locomotive Spare Margin* is a factor that is used to adjust the Annual Available Coal Locomotive Unit Hours for those times when locomotives are not available for service. Under this methodology, locomotives are considered unavailable when they are either in the shop for repairs or in defect status. In BNSF's experience, SD70MACs are unavailable for service { } percent of the time.[83] Otter Tail has presented no evidence that BNSF's locomotive operations for its coal fleet are inefficient and it has pointed to no changes in operating practices by the OTRR that would allow the hypothetical railroad to achieve better

[83] BNSF Reply electronic workpaper "Spare Margin (SD70MAC).xls," tab "Spare Margin."

performance than BNSF has been able to achieve. Otter Tail's reliance on the { } is misplaced for reasons discussed previously.

The *Peaking Factor* is applied to take into account those periods when the OTRR is operating more coal trains than it would on an average volume day. Peak days are an operating reality and occur throughout the year, as described in the next paragraph. The OTRR cannot rely on its interchange partners to supply locomotives on an as needed basis. As the Board found in *TMPA*, it is "a carrier's obligation to have sufficient locomotives to serve its customers during peak periods." *TMPA* at 81. The OTRR cannot shift its locomotive responsibility to connecting carriers.

BNSF calculated the Peaking Factor by dividing the number of loaded coal trains on the peak day as determined by Otter Tail by the number of coal trains operating on the average day. This approach was accepted by the Board in *TMPA*.[84] It is a conservative estimate of the actual peak requirements since, as noted previously, the peak day chosen by Otter Tail is not actually the peak traffic day for either coal or non-coal traffic. If the true peak day for each traffic group were used to determine the locomotive requirements for each locomotive fleet (coal and non-coal), the fleet requirements would be higher than those calculated by BNSF. Moreover, there are many days in the year in which the OTRR would experience traffic volumes that are comparable or higher than the traffic volumes on Otter Tail's peak day.[85] Otter Tail's work papers, however, identify 15 other days, in eight different months, throughout the year in which there were at least as many loaded coal trains. In fact, 12 of those 15 other days actually had more loaded trains, with the highest totaling 55 trains, 8 percent higher than Otter Tail's "peak"

[84] *TMPA* at 81.

[85] Otter Tail opening electronic work paper "Peak Coal Trains.xls" Otter Tail identified 51 loaded coal trains on its "peak" day of October 18, 2002.

day.[86] As a result, BNSF's acceptance of Otter Tail's "peak" day is a reasonable basis for developing the SD70MAC requirements necessary to handle the many peak periods that the OTRR will experience.

Using this methodology, Mr. Plum determined that the OTRR would require 158 road locomotives for coal trains in 2002.[87]

Table III.C-7 compares the number of road locomotives for coal traffic for the OTRR calculated by Otter Tail and by BNSF.[88]

Table III.C-7
Comparison Of Base Year Road Locomotive Requirements
For OTRR Coal Traffic As Determined By Otter Tail And BNSF

Otter Tail	BNSF
92	158

(3) Revised Calculation Of Road Locomotives Required For OTRR's Non-Coal Fleet

BNSF used the same formula for calculating the OTRR's non-coal locomotive requirements as it used for calculating coal locomotive requirements, as discussed in the previous

[86] Otter Tail opening electronic workpaper "Peak Coal Trains.xls."

[87] BNSF Reply electronic workpaper "LUMs and Carmiles (OTP-BNSF) v2.xls," worksheet "Equipment Counts."

[88] The derivation of base year coal locomotives from the peak year requirement is set out in BNSF Reply electronic workpaper "LUMs and Carmiles (OTP-BNSF) v2.xls," tab "Equipment Counts."

section. In applying this formula to non-coal locomotive requirements, however, BNSF made two significant adjustments to reflect the circumstances applicable to non-coal locomotives.

First, as noted above, OTRR must transport the Dash 9 locomotives from the Snowden/Glendive/Fargo line where they are used in general merchandise service to the locomotive maintenance facilities at Donkey Creek for periodic maintenance. The amount of time that is consumed in moving these locomotives to Donkey Creek and returning them to service must be included in the annual locomotive hours used to calculate locomotive requirements because these locomotives are the responsibility of the OTRR during this time period. Thus, in determining the total OTRR Annual Non-Coal Locomotive Unit Hours, BNSF included the time for ferrying non-coal locomotives out-of-route to and from OTRR's locomotive maintenance facility at Donkey Creek, as discussed above.[89] Similarly, BNSF included the hours required to ferry locomotives to Casselton to pick up cars interchanged from the RRVW railroad as discussed in Section III.C.2.b.(2)(i). Exhibit III.C-7 depicts the routes that would be traveled by the locomotives being ferried from Glendive to the locomotive shop at Donkey Creek and to the interchange with the RRVW at Casselton.

Second, BNSF determined the Non-Coal Locomotive Spare Margin used in the formula based upon the utilization factor experienced for BNSF's pool of Dash 9 locomotives in Havre, Montana. This is the pool of locomotives used to power BNSF's movements of general freight in the same area as the OTRR is assumed to operate, so the experience of this pool of locomotives is most relevant to the OTRR. BNSF's utilization report for these locomotives includes a number of components, one of which is "available and not utilized."[90] BNSF

[89] BNSF Reply electronic workpaper "LUMs and Carmiles (OTP-BNSF) v2.xls."

[90] BNSF Reply electronic workpaper "Spare Margin (C44-9).xls," tab "HV - All."

excluded this component in calculating its spare margin because it assumed that any locomotive that is available on the peak day would be used. In other words, BNSF does not include in the spare margin any time that locomotives are available but not being utilized, since the use of a peaking factor ensures that the locomotive fleet will be sufficient for peak periods. In calculating its spare margin for non-coal locomotives, BNSF included the remaining components set out in the utilization report -- maintenance time, refueling time, time locomotives in shop, and other unavailable time. BNSF also added a component for sanding, fueling and servicing of the Dash 9 locomotives in calculating these spare margins in order to allocate to OTRR responsibility for a fair share of the servicing time required for these locomotives.[91]

BNSF calculated the Peaking Factor for use in the formula in the same manner described above in connection with coal locomotives. BNSF notes that 33 non-coal trains that enter the OTRR on Otter Tail's peak day.[92] There are 12 other days throughout the year when at least as many non-coal trains entered the SARR, including one with 39 trains, 18 percent greater than Otter Tail's October 18, 2002 peak day that BNSF used to develop its peaking factor.[93] BNSF's peaking factor is therefore conservative.

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[91] BNSF did not include a component for sanding, fueling and servicing in calculating the spare margin for coal locomotives because these hours were already included in the dwell time at Glendive or other locations where locomotives are serviced by the OTRR. In contrast, the OTRR does not regularly service non-coal locomotives so the time associated with these activities for non-coal locomotives are not already captured elsewhere. Nevertheless, the time associated with these activities must be shared among the owners of the locomotives. Simply because the SARR decides to route its trains over lines that do not have these facilities does not mean that the SARR could expect to avoid any responsibility for the costs of these activities. The cost sharing should be based on the same factors as the ownership of the locomotives, namely amount of time on-SARR.

[92] BNSF Reply electronic workpaper "Locomotive and RR Owned Cars Peaking Factor OTP.xls," tab "Summary." Otter Tail developed the date that its non-coal trains entered the SARR from the BNSF train events reported at the SARR on junction.

[93] BNSF Reply electronic workpaper "non coal peak.xls."

Mr. Plum determined that the OTRR would require 70 road locomotives for non-coal trains in 2002 using this methodology.[94]

Table III.C-8 compares the total number of road locomotives for non-coal traffic required for the OTRR as calculated by Otter Tail and by BNSF.

Table III.C-8
Comparison Of Base Year Road Locomotive Requirements
For OTRR Non-Coal Traffic As Determined By Otter Tail And BNSF

Otter Tail	BNSF
45	70

e. Railcar Count

Otter Tail calculated its railcar requirement in a manner similar to what is used for locomotives, as described below:

> The loaded train and empty train cycle hours for movements in railroad-supplied cars were identified for the peak day. Annual railroad-provided car cycle hours were developed by multiplying the car cycle hours for the peak day by 365 to reflect a full year. The resulting annual car cycle hours were further adjusted by the change in the OTRR tonnage from 2021 back to 2002 to develop the annual railroad-provided car cycle hours applicable to the 2002 traffic. To develop the number of cars required by the OTRR, the total number of railroad-provided car cycle hours for 2002 was divided by 8,760 hours per year and then increased by five (5) percent to reflect spare cars.

OTP Nar. at III-C-24.

Using this methodology, Otter Tail assumed that the OTRR would require a total of 104 open top hoppers (AAR car types H and K) and 396 gondolas (AAR car types G and J) to

[94] BNSF Reply electronic workpaper "LUMs and Carmiles (OTP-BNSF) v2.xls," worksheet "Equipment Counts."

transport coal for customers who use railroad-supplied cars.[95] It did not calculate the size of the railcar fleet that the OTRR would need to handle the non-coal traffic, but rather determined the number of car-hours for which a lease payment would need to be made.[96]

As in the case of locomotives, Otter Tail made several errors in its implementation of this methodology. First, it relied on the flawed output of its string program, which, as discussed above, understates transit and cycle times and therefore understates equipment requirements that are based on unit-hours. Second, it applied an illogical and inappropriate ratio to determine the base-year unit-hours from the peak-year statistics generated by the string program. This issue is discussed above in connection with the locomotive requirements and does not need to be repeated here. Third, Otter Tail understated coal railcar requirements by erroneously excluding several empty coal trains from the string program. This issue is also discussed above. Fourth, Otter Tail made several errors in identifying the cars for which the stand-alone railroad would be responsible. These errors are discussed below. Finally, Otter Tail applied a 5-percent spare margin for all cars without providing any support for that assumption. OTP Nar. at III-C-24.

Given the errors in Otter Tail's approach and the fact that Otter Tail overstated the traffic that would be available to the OTRR, BNSF restated the car requirements for the OTRR. As described below, BNSF used a methodology to establish the number of cars that the OTRR would require that is similar to that used by BNSF to determine locomotive requirements. The development of coal and non-coal railcar requirements are addressed separately below.

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[95] OTP Errata electronic workpaper "OTRR Car Costs.123," worksheet "Coal Cars."

[96] Id.

(1) Restatement Of OTRR Coal Railcar Requirements

The first step in assessing OTRR's coal railcar requirements is to determine the percentage of total coal railcars on the OTRR that are the responsibility of the OTRR. Many coal shippers own their own railcar fleet, and the OTRR is not responsible for the ownership costs of these cars. Otter Tail erred, however, in its identification of the system-owned cars from the traffic tapes. OTRR referred to the car initials identified in traffic tapes and assumed that the railroad would be responsible for providing only those cars with railroad-markings (*i.e.*, "BN," "BNSF"). In other words, Otter Tail assumed the OTRR would not be responsible for providing the equipment for any traffic that BNSF handled in cars with private markings, *i.e.*, car initials that end with an "X." As shown by materials that BNSF produced in discovery, BNSF leases many cars from private-car owners to serve its coal customers and the ownership cost of these cars must be the responsibility of the OTRR[97]

Mr. Plum consulted with BNSF's manager of equipment planning for coal to determine the specific movements (origin/destination pairs) for which BNSF was responsible to provide coal cars.[98] Once these O/D pairs were identified, it was possible for Mr. Plum to identify the specific private railcars that BNSF was leasing to provide coal service. Applying the approach described above, Mr. Plum determined that 26 percent of the carloads were transported in

[97] BN.RP.WP.III.C-0118-0127.

[98] Car initials COAX, FURX, and WFCX were identified as 100% supplied by BNSF. Furthermore, Clayton, Decatur, Iola, Minnesota Power and Light, and Oklaunion were identified as locations supplied by BNSF. BNSF Reply electronic workpaper "III C/OPSTATS/cars data (SMRTOWC3) - dtw.xls," worksheet "car init lease status."

system-owned railcars. Otter Tail's analysis indicated that 15 percent of the coal carloads were transported in system-owned railcars (*i.e.*, provided by BNSF).[99]

After determining the percentage of coal cars for which the OTRR is responsible, BNSF then determined the system railcar requirements using the same basic approach that BNSF used to determine locomotive requirements. Specifically, BNSF determined car-hours based on annual volumes for each movement and on-SARR time assumptions developed by Mr. Leopold. See Section III.C.2.d. above. BNSF divided these hours by the total number of hours in a year (8,760) and applied the same peaking factor described above in connection with OTRR locomotives. BNSF then applied a spare margin of 10 percent,[100] BNSF's calculations are set out in Reply electronic work paper "LUMs and Carmiles (OTP-BNSF) v2.xls."

Table III.C-9 compares the number of railcars for the OTRR calculated by Otter Tail and by BNSF.

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[99] BNSF Reply electronic work paper "III - C/OPSTATs/cars data (SMRTOWC3) - dtw2.xls" indicates that BNSF adjusted Otter Tail's assignment of car ownership to include portions of shipments to Bayport, Becker, and Renville, MN; Centralia, WA; East Dubuque IL; Halloran and Hastings, NE; Joseph City, AZ; and Wesco, OK,

[100] As noted previously, Otter Tail cited no support for its 5-percent spare margin. In fact, Otter Tail itself has a spare margin in its coal car fleet greater than 5 percent. Examination of the traffic tapes shows that Otter Tail has at least an 8-percent spare margin. BNSF Reply electronic workpaper "otp car spare.xls."

Table III.C-9
Comparison Of Coal Railcar Requirements For
OTRR As Determined By Otter Tail And BNSF

Type of Car	Otter Tail[101]	BNSF	
	2002	2002[102]	2021[103]
J – Plain gondola	396	1,447	1,617
G – Plain gondola	Incl. above	7	8
H – Open top hopper, General	104	123	137
K – Open top hopper, Special	Incl. above	115	128
Total	500	1,692	1,890

(2) Restated Non-Coal Railcar Requirements

The OTRR would handle four different categories of non-coal cars -- (1) cars owned or leased by BNSF (system cars, for which OTRR would be responsible); (2) foreign cars owned by another railroad; (3) private cars owned by a shipper; and (4) cars owned by TTX.[104] The loaded and empty general freight car-miles Otter Tail presented in Otter Tail Errata Exhibit III-C-1, developed using the string model, were allocated by AAR car type and ownership category (*e.g.*, system, foreign, private, TTX) according to BNSF 2002 actual traffic records for the non-coal traffic handled by the OTRR. More specifically, Otter Tail determined the number of loaded miles by car-owner category and AAR car type. Otter Tail then calculated each car type's mileage as a percentage of total mileage traveled. Finally, these percentages were multiplied by

[101] Otter Tail Errata electronic workpaper "OTRR Car Costs.123," tab "Coal Cars."

[102] BNSF Reply electronic workpaper "LUMs and Carmiles (OTP-BNSF) v2.xls," tab "Equipment Counts."

[103] BNSF Reply electronic workpaper "BNSF 2021 - LUMS and Carmiles (OTP-BNSF) v2.xls," tab "SUMMARY."

[104] TTX is a consortium, owned by a number of railroads including BNSF. Cars owned by TTX are treated as private cars.

the total general freight miles Otter Tail developed in Otter Tail Errata Exhibit III-C-1 in order to determine total freight car-miles by car type.

BNSF generally adopts Otter Tail's approach regarding freight car requirements for the non-coal traffic, but refines its breakdown of freight car-miles by car type from BNSF 2002 actuals to exclude the highest priority intermodal trains that Otter Tail rerouted over the OTRR as well as other non-coal traffic that BNSF excluded. These exclusions are discussed more extensively above in Section III.A, but are noted here as a source of the differences between the parties' allocations of mileage and time by car type and car owner.[105] Specifically, BNSF determined the number of loaded miles by car-owner category and AAR car type for the OTRR's non-coal traffic. BNSF, like Otter Tail, then calculated each car type's mileage as a percentage of the total. However, unlike Otter Tail, BNSF determined the car-miles for intermodal flat cars, and excluded miles for trailers and containers in order to obtain a more accurate distribution of car-miles. Since multiple trailers and containers move on articulated cars, the inclusion of trailer and container miles distorts the mileage split across car types.[106]

To determine the total number of general freight car-miles generated on the OTRR, BNSF developed the average number of cars per train by train type from BNSF 2002 train event records for the OTRR's non-coal trains. BNSF then multiplied the average number of cars per train by its calculated train-miles to calculate car-miles by train type. Next, BNSF adjusted the

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[105] *Compare* Otter Tail Errata electronic workpaper "OTRR Car Costs.123" with BNSF Reply electronic workpaper "OTRR Car Costs Revised.xls"

[106] Otter Tail committed an error that actually overstated the car and associated freight car expense for equipment used in non-coal service. Otter Tail's error stemmed from its use of BNSF's train event data to develop total OTRR car miles for the non-coal cars. BNSF's train event data treats some cars, particularly articulated equipment used to handle multiple intermodal containers, as multiple cars. By using the car count from the BNSF train event records, Otter Tail overstated the actual number of cars used to transport the OTRR's intermodal freight. BN.RP.WP.III.C-0128-0129.

car-miles on P, Q, S, and Z trains to correct for the overstatement of car-miles due to the inclusion of articulated cars on those trains.[107] Finally, BNSF multiplied the percentage split of car-miles by car type by the total number of general freight car-miles in order to get the correct number of loaded and empty freight car-miles by car type.

Having developed the OTRR car-miles associated with the non-coal traffic, BNSF, like Otter Tail, used the relationship between its calculated OTRR general freight car-miles and hours to determine the total car-hours, by car type, for the system cars that are the OTRR's responsibility. BNSF also accepts Otter Tail's approach to converting the monthly lease rates to hourly values, for applying to the car-hours for each car type.

Table III.C-10 below compares the total numbers of car-miles and car-hours determined by Otter Tail and BNSF for the OTRR. These figures include the results of applying the peaking factor and 10 percent spare margin to system equipment.

Table III.C-10
Comparison Of Car Hours And Car Miles
Used In OTRR Non-Coal Service
Determined By Otter Tail And BNSF[108]
(Totals In Millions)

Car Supplier	Otter Tail		BNSF	
	Car Hours	Car Miles	Car Hours	Car Miles
System	1.86	69.31	2.85	78.67
Foreign	1.39	51.60	1.46	40.31
Private	4.75	176.72	0.76	21.05
TTX	1.19	44.40	2.91	80.09
Total	9.19	342.04	7.99	220.12

[107] BNSF Reply electronic workpaper "train car counts.xls," tab "car miles."

[108] BNSF Reply electronic workpaper "Railcar Costs.xls," tab "Summary Non-Coal."

3. Other

a. FRA-Certified Inspections

(1) Coal Traffic

Otter Tail proposes to have the OTRR perform the following inspections on coal trains:

- Empty coal trains will receive a 1,000-mile inspection at Donkey Creek Yard.
- Empty coal trains will receive a 1,500-mile inspection at Glendive Yard.
- Loaded coal trains moving to interchange at Benson and loaded coal trains that originate at mines south of Donkey Creek that are moving to interchange at Fargo will receive a 1,000-mile inspection at Glendive Yard.
- Empty coal trains received from BNSF at Converse Yard will be inspected.

OTP Nar. at III-C-25.

Otter Tail used various terms in describing the inspections that will be performed by the OTRR at its yard or interchange points of Converse, Donkey Creek, Terry and Glendive. In order to clarify the inspections required and to account for the varying times that each inspection would consume, BNSF witness Mueller summarized the scope of the three inspections, *i.e.*, Class I Brake Test – Initial Terminal Inspection, Class IA 1,000 mile inspection, and Extended Haul Trains (1,500-mile inspection).

(a) Class I Brake Test – Initial Terminal Inspection

This is by far the most extensive of the inspections as it incorporates all of the requirements for inspecting the freight car brake system, safety appliances, wheels, bearings, car body and draft gear. (*See* 49 CFR §§ 232.205 and Part 215). Defects found during this inspection must be repaired or the car must be removed from the train. Defects routinely discovered during this inspection, as described in 49 CFR § 231.1, include defective hand brakes,

bent or broken steps and ladders, uncoupling lever bent, broken or missing, running board or hand hold/railing bent or broken.

At the same time the mechanical inspectors would be looking for any defects described in 49 CFR § 215.103-129 that would require repair or removal from the train and would include cracked, shelled or signs of overheated wheels. They would also be inspecting the wheel bearings for signs of overheating, cracks or missing caps or end bolts. Additionally they would inspect the car body for any cracks, damaged or bent portions. Finally, as provided in 49 CFR § 232.205, they would inspect the train braking system for proper brake piston travel, brake shoe wear and during the air test insuring a 100% set of all the brakes and a full release of all the train brakes. By FRA regulation any of the defects as summarized above must be repaired in train or the car placed in a bad order status and removed from the train at its designated initial terminal.[109]

The Class I initial terminal inspection and brake test is the inspection required for empty coal trains passing through the Glendive, Donkey Creek and Converse facilities on the way to loading in the PRB. This inspection will also be required on the non-coal trains that are reclassified through intra-/inter-train switching at Glendive Yard.

Otter Tail states that the OTRR will perform an unspecified, but reduced, level of inspection on empty coal trains interchanged to it from BNSF at Converse because these trains will only be on the OTRR for 70 miles and BNSF will have performed an inspection at Guernsey Yard slightly over 100 miles before the train arrives at Converse. OTP Nar. at III-C-25, n.39. Otter Tail will be originating this traffic. As discussed in Section III.C.2.b.(2)(c) above, it has recognized the need to perform the origin functions on coal traffic it originates at Glendive and

[109] 49 C.F.R. § 215.101.

Donkey Creek Yards and must do so at Converse, as well. Therefore, Otter Tail must take responsibility for performance of the origination function, including a Class I initial terminal inspection and air brake test at Converse.

(b) Class IA Brake Test – 1,000 Mile Inspection

As defined in 49 CFR § 232.207, this test is performed on trains at a location not more than 1,000 miles from the last Class I or Class IA brake test. This inspection requires the inspectors to observe each side of the train to insure that all brakes apply and remain applied until release is initiated by the controlling locomotive. The inspector must also insure that all parts of the brake system and brake equipment are properly secured.

The Class 1A brake test is the inspection that will be required at Glendive on loaded coal trains destined to Stanton, ND and Hoot Lake, MN because the round trip distance from Glendive to each of these utilities is less than 1,000 miles.

(c) Extended Haul Trains – 1,500 Mile Inspection

Pursuant to 49 CFR § 232.213, a railroad is permitted to move a train up to 1,500 miles between brake tests and inspections if the train meets certain requirements with regard to set outs and pick ups en route. An initial Class I terminal inspection must be performed on extended haul trains as described above by a "qualified mechanical inspector" (QMI), as defined by 49 CFR § 232.5. At a point designated by the railroad, not to exceed 1,500 miles from the location of the Class I inspection, an inspection must be performed, again by a QMI, to identify any defective, inoperative, or ineffective brakes or any other condition not in compliance. Additionally, at the point of destination or as designated by the railroad, an inbound inspection must be performed by a QMI.

All loaded coal trains at Glendive, except the two referenced above that receive a 1,000 mile inspection, will require the 1,500-mile Extended Haul inspection. The distance from Glendive to each of the utilities exceeds 1,000 miles, and is less than 1,500 miles, and therefore requires OTRR designate them as Extended Haul to avoid additional inspections east of Glendive.[110]

(2) Non-Coal Traffic

Otter Tail has made provision for various types of inspections of westbound non-coal overhead trains at Donkey Creek Yard, Glendive Yard, and Terry Yard. OTP Nar. at III-C-25. Mr. Mueller has determined that inspection of these trains (except for the seven movements previously identified that require intra-train switching) at these locations is not necessary. Even with the miles added as a result of the rerouting of a portion of this traffic, each of these trains will reach another inspection location on the BNSF within 1,000 miles of its previous inspection.

b. Train Control And Communications

Otter Tail's proposals for train control and communications are discussed in Section III.F.6.

c. Miscellaneous

Like Otter Tail, BNSF discusses other aspects of the OTRR's operating plan involving locomotive maintenance and fueling, equipment maintenance, and personnel (including train crew districts and manning) in detail in Section III.D of this Narrative.

[110] BNSF Reply electronic workpaper, "Northern Tier Train Miles From Glendive.xls."

D. OPERATING EXPENSES

1. Locomotives

Otter Tail's Errata to its Opening Evidence assumed that the OTRR would require 92 SD70MAC and 45 C44-9 locomotives for road service, 16 SD70MAC locomotives for helper service, and 4 SD40-2 locomotives for switch service at Donkey Creek and Glendive. OTP Errata Opening Exh. III-C-1. As demonstrated in the preceding section, the safe and efficient operation of the OTRR fleet at the level of traffic specified by BNSF would require a minimum of 158 SD70MAC and 70 C44-9 locomotives for road service, 14 SD70MACs for helper service, and 8 SD40-2 locomotives for switch and work train service.[1] The costs associated with the OTRR locomotive fleet are discussed below. As BNSF explains, Otter Tail made several methodological errors in determining equipment costs, which BNSF corrects and applies to the revised fleet requirements needed to handle the traffic volume specified by BNSF in Section III.A.

a. Leasing

Otter Tail assumed that the OTRR would lease its locomotives, and BNSF has adopted that approach. Otter Tail assumed an annual lease cost of { } and { } for each SD70MAC and C44-9 locomotive, respectively, based on a lease agreement provided by BNSF in discovery.[2] The agreement selected by Otter Tail begins September 28, 2001 and includes schedules of basic rent payments for SD70MACs and

[1] As discussed in section III.C.2.d above, BNSF uses a spare margin of { } percent for its SD70MAC locomotive fleet and { } for its C44-9 locomotive fleet; Otter Tail used a { } percent spare margin for all locomotives.

[2] *See* OTP Errata Opening electronic workpaper "Otter Tail _Opr_Exp.123," worksheet "Summary."

C44-9s. The schedules show that the payments due January 15, 2002 and July 15, 2002 are approximately { } and { } of the lessor's total cost of both the SD70MACs and the C44-9s ({ } and { }, respectively). Otter Tail summed these two payments ({ } + { } = { } for SD70MAC; { } + { } = { } for C44-9) and asserted that the total annual payment was representative of a typical lease year. This assertion is incorrect, however, because the basic rent payments over the 22-year agreement range from { } to slightly over { } of the lessor's total costs. Because the purpose of the DCF stand-alone analysis is to capture representative annual costs, the correct annual lease payments should be based on the normalized annual payments included in the agreement. Based on a normalized schedule, the annual lease payments for SD70MACs and C44-9s are { } and { }, respectively.[3] BNSF's Reply evidence adopts these normalized lease figures for its OTRR SD70MAC and C44-9 locomotives.

For the SD40-2 locomotives, Otter Tail assumed an annual lease cost of { } per locomotive, based on a rate of { } per day. This figure is extremely conservative. BNSF produced extensive locomotive leasing information to Otter Tail, including daily rate information for numerous SD40-2 units. The daily rates ranged from a low of { } up to { }. Otter Tail simply selected the lowest available daily lease rate and assumed that it was a representative figure. Otter Tail should have taken the weighted average of BNSF's leased units with per diem charges, which results in a more representative rate of approximately { } per day. This higher weighted rate is actually still very conservative. As of June 2001, typical lease rates for SD40-2s ranged

[3] *See* BNSF Reply electronic workpaper "Loco Lease.xls," worksheet "Summary."

from $175 to $225 per day (depending on warranties).[4] While Otter Tail is entitled to hypothesize a least cost alternative, it still must be bound by the realities of the marketplace. BNSF's Reply evidence uses the more realistic { } rate per day.

Table III.D.1-1 compares the parties' respective 2002 locomotive lease costs.

Table III.D.1-1
Comparison of OTRR Locomotive Costs – 2002

	Otter Tail	BNSF	Difference
1. Number of SD70MAC Locomotives	108	172	64
2. Annual SD70MAC Unit Lease Cost	{ }	{ }	{ }
3. Number of C44-9 Locomotives	45	70	25
4. Annual C44-9 Unit Lease Cost	{ }	{ }	{ }
5. Number of SD40-2 Locomotives	4	8	4
6. Annual SD40-2 Unit Lease Cost	{ }	{ }	{ }
7. Total Locomotive Lease Cost	{ }	{ }	{ }

b. Maintenance

Otter Tail assumed that maintenance of the OTRR locomotive fleet would be performed by an independent contractor located at Donkey Creek. Otter Tail's cost analysis is based on BNSF maintenance agreements for SD70MAC, C44-9, and SD40-2 units produced in discovery. *See* OTP Nar. III-D-4, (*citing* Workpaper Vol. 4, pages 2613-2734 and OTP Errata Opening electronic workpaper "LOCO MAINT_Otter Tail.123"). BNSF accepts the methodology used by Otter Tail, although Otter Tail's implementation of its methodology contains several errors.

(1) SD70MAC Errors

For the SD70MAC units, Otter Tail essentially assumed that the OTRR would step into the shoes of BNSF regarding a legacy maintenance contract between the Electro-Motive Division of General Motors Corporation and The Atchison, Topeka and

[4] *Railway Age*. June 2001. Pg. 61 (OTP.OP.WP.2758-59).

Santa Fe Railroad ("ATSF"), executed on March 13, 1995. Since 1995, the contract has been amended several times. Nonetheless, the essence of the contract remains similar – BNSF pays for basic maintenance based on the number of locomotive unit-miles incurred per month.

Otter Tail's Opening Evidence assumed a maintenance cost of { } per diesel unit-mile (as of December 2001) for the SD70MAC units.[5] However, both Otter Tail's Opening and Errata electronic files "LOCO MAINT_Otter Tail.123" and "Otter Tail_Opr_Exp.123" show that Otter Tail actually used a combination of a { } base rate and a { } "overmile" rate, adjusted up from starting points of { } and { } respectively.[6] According to the relevant fee schedule to the EMD/BNSF maintenance agreement covering SD70MACs, these rates reference the per-mile charge for units that operate over { } miles per month, the highest rate mileage category in the maintenance agreement. Otter Tail's use of these rates is consistent with its calculations in OTP Errata Opening Exh. III-C-1, which estimated OTRR SD70MAC locomotive requirements of 108 locomotives (Column 6, Lines 6 + 7) operating a total of 20,888,221 LUMs during 2002 (Column 2, Line 5). Thus, on average, each SD70MAC is expected to operate 193,858 locomotive unit-miles per unit per year, or 16,155 miles per month. Nonetheless, as explained below in Section III.D.1(d)(3), BNSF provides a more accurate calculation of locomotive unit-miles. Specifically, BNSF's OTRR SD70MAC units each average 8,980 LUMs per month.[7]

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[5] *See* OTP Nar. III-D-4.

[6] *See* OTP Errata Opening electronic "LOCOMAINT_Otter Tail.123."

[7] *See* BNSF Reply electronic workpaper "Revised Locomaint_Otter Tail.xls." The actual real-world utilization rate for the 350 BNSF SD70MAC locomotives covered by the EMD contract during 2002 averaged { } per unit per month. BNSF

Therefore, BNSF used the lowest mileage rate of { } from the mileage rate table in the maintenance agreement relied upon by Otter Tail, which corresponds to { } LUMs per month. This mileage rate increases to { } after indexing. Since OTRR's SD70MAC LUMs per month are less than the minimum in the maintenance agreement, BNSF does not include any "overmiles" in its SD70MAC maintenance cost calculation.

In addition to the basic maintenance fee per locomotive, Otter Tail also calculated an annual charge designed to account for overhauls of the SD70MAC units in the OTRR fleet, using the same maintenance agreement used for the mileage maintenance charge. That contract provides figures for the required first and second overhauls of the SD70MAC units.[8] Specifically, the agreement states "the cost of the overhaul material *only* for the first SD70MAC overhauls will be { }" and "the cost of the overhaul material *only* for the second SD70MAC overhauls will be { }," each subject to economic adjustments as outlined in the agreement.[9] Otter Tail used the overhaul cost of { }, as adjusted, for the cost of the overhauls of the OTRR SD70MAC fleet, but failed to include *any* additional cost for the necessary labor. In fact, according to a BNSF SD70MAC invoice spreadsheet produced to Otter Tail,[10] BNSF actually paid { }

Reply electronic workpaper "MAC payments_Reply.xls," tab "Miles 2002." This indicates that under BNSF's revised SAC calculations, the OTRR would achieve an improvement in utilization of nearly { } above this BNSF real-world experience in its use of SD70MAC locomotives. This indicates that BNSF's evidence is conservative.

[8] The maintenance agreement requires that SD70s be overhauled every { } years or { } miles, whichever comes first.

[9] *See*, BNSF.RP.WP.III.D-0021.

[10] *See* BNSF.RP.WP.III.D-0009.

each for the { } SD70MACs overhauled during 2001.[11] The actual 2001 overhaul costs are clearly more accurate than simple escalation of aged contracts; therefore, BNSF uses the { } per SD70MAC overhaul figure in its Reply evidence.

Otter Tail's Errata also changed the interval assumption between major SD70MAC overhauls. In its Opening Evidence, Otter Tail assumed a { }-year interval based on its original calculation of an average of 13-14 thousand locomotive unit-miles per month. After the Errata, however, which increased the number of locomotive unit-miles to over 16,000 per month, Otter Tail's interval reduced to { } years between major overhauls. BNSF's more accurate calculation of LUMs per month dictates use of a { }-year interval between overhauls since the lower figure of locomotive unit-miles allows for a major overhaul every { } years rather than every { } miles (as specified in the maintenance agreement). BNSF's total overhaul charges are ultimately added to the mileage-based maintenance charges in order to develop a total annual maintenance amount for the SD70MAC units.[12]

(2) C44-9 Errors

Otter Tail assumed a maintenance cost of { } per diesel unit-mile (as of December 2001) for the C44-9 locomotives. *See* OTP Nar. III-D-4. Otter Tail's assumption was based upon a maintenance agreement between BNSF and { }. However, the source of the figure in the narrative is again unclear because Otter Tail's Errata electronic workpapers "LOCO

[11] The { } figure includes { } hours of labor per locomotive at { } per hour.

[12] In its Errata electronic workpaper "LOCO MAINT_Otter Tail.123," Otter Tail develops the annual overhaul cost for the SD70, C44-9, and SD40-2 units in the OTRR fleet. BNSF Reply electronic workpaper "Revised Locomaint_Otter Tail.xls," shows the corrected calculations.

MAINT_Otter Tail.123" and "Otter Tail_Opr_Exp.123" used a base mileage rate of { } and overmile rates of { } and { } for greater than { } locomotive unit-miles per month and { } locomotive unit-miles per month, respectively. Regardless, BNSF finds both of the aforementioned base mileage rates to be unrepresentative for several reasons.

First, Otter Tail indexed incorrectly. Although Otter Tail selected the correct base mileage rate (which is the rate corresponding to the period between 4/1/01 and 3/31/02 – { }), the contract clearly states that all rates should be annually adjusted from December 1998 levels. Otter Tail erred by indexing the rate from a base level of December 2000 rather than from December 1998. Moreover, Otter Tail should have only indexed the rate to December 2000 rather than December 2001, because indexing to December 2000 would be appropriate in order to gain an adjusted rate for Otter Tail's desired time period of 1/1/02 to 3/31/02 (the first quarter of OTRR operations). In other words, Otter Tail mistakenly used the wrong base year and then indexed one year too many.

In addition, Otter Tail did not account for the fact that, according to the contract, only { } of the labor index should be used to escalate mileage rates for the first { }. BNSF corrects each of these errors. *See* BNSF Reply electronic file "Revised Locomaint_Otter Tail.xls."

Finally, Otter Tail did not use the correct percentages to calculate its overmile rates. According to the contract, different overmile rates apply according to the number of additional miles traveled. Essentially, the contract requires that an amount equal to { } of the indexed base mileage rate be paid for greater than { } locomotive

unit-miles per month, while { } of the indexed base mileage rate is to be paid for greater than { } locomotive unit-miles per month. Otter Tail inexplicably used overmile amounts equal to { } and { } of the indexed base rate rather than the appropriate { } and { }. BNSF corrects all of these mistakes in the Reply. *See* BNSF Reply electronic workpaper "Revised Locomaint_Otter Tail.xls."

As it did with the SD70MAC units, Otter Tail also incorrectly calculated overhaul costs for the C44-9 units. Although Otter Tail used the correct base number and year, it again indexed one year too many. Moreover, in determining the cost per overhaul per year, Otter Tail used the SD70MAC charge per overhaul in the capitalization calculation rather than the C44-9 charge per overhaul. Finally, though Otter Tail's Errata assumption of { } years between overhauls was consistent with its assumption of 21-22 thousand locomotive unit miles per month, BNSF assumes a { } year interval between overhauls based on its more accurate { } locomotive unit miles per month. BNSF corrects these mistakes in the Reply, as well.

(3) SD40-2 Errors

Otter Tail made errors similar to those explained above for the SD40-2 locomotives. Otter Tail assumed that the OTRR would adopt the terms of a maintenance contract between {

}.[13] Although the original contract has been modified multiple times, the essence of

[13] {

the contract remains the same and maintenance charges are calculated in a similar fashion as seen in the other SD70MAC and C44-9 contracts.[14]

Otter Tail assigned a per-mile charge of { } for the SD40-2 locomotives in its Opening Evidence and calculated a { } indexed overhaul charge per locomotive. Once again, Otter Tail's electronic file figures do not support what is written in its narrative, both mileage and overhaul costs are indexed one year too long, and Otter Tail used the wrong labor/materials weight in the last two years of its annual indexing calculation. In addition, Otter Tail once again used the SD70MAC charge per overhaul in the capitalization calculation rather than the correct SD40-2 figure. BNSF's Reply corrects these errors.

(4) Summary

BNSF's development of the number of SD70MACs, C44-9s, and SD40-2s that would be required by the OTRR is discussed in Section III.C above. The SD70MAC and C44-9 locomotives both average fewer LUMs per month than in Otter Tail's analysis, while the SD40-2s average slightly more LUMs per month. To develop maintenance costs for the locomotive units, BNSF used appropriate mileage rates from the maintenance agreements used by Otter Tail and applied them to the more accurate LUM and locomotive count calculations based on revised traffic levels specified by BNSF in Section III.A. Also, due to the differences in the calculation of average locomotive unit-

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}

[14] {

}

miles per month, BNSF adopts a more lengthy { }-year overhaul interval for the SD70MACs and the C44-9s. Finally, BNSF used an actual overhaul cost figure for the SD70MACs and corrected numerous Otter Tail mistakes in indexing and the like.

Table III.D.1-2 compares Otter Tail's and BNSF's costs for locomotive maintenance.

Table III.D.1-2
Comparison of Locomotive Maintenance – 2002[15]

	Otter Tail	BNSF	Difference
SD70MACs			
1. Locomotive Unit-Miles	20,888,221	18,533,818	(2,354,403)
2. Cost/LUM	{ }	{ }	{ }
3. Annual Maintenance	{ }	{ }	{ }
4. Annual Overhaul Charge/Unit	{ }	{ }	{ }
5. Total Number of Units	108	172	64
6. Total Overhauls	{ }	{ }	{ }
C44-9s			
7. Locomotive Unit-Miles	11,705,605	11,603,758	(101,847)
8. Cost/LUM	{ }	{ }	{ }
9. Annual Maintenance	{ }	{ }	{ }
10. Annual Overhaul Charge/Unit	{ }	{ }	{ }
11. Total Number of Units	45	70	25
12. Total Overhauls	{ }	{ }	{ }
SD40-2s			
13. Locomotive Unit-Miles	210,240	272,880	62,640
14. Cost/LUM	{ }	{ }	{ }
15. Annual Maintenance	{ }	{ }	{ }
16. Annual Overhaul Charge/Unit	{ }	{ }	{ }
17. Total Number of Units	4	8	4
18. Total Overhauls	{ }	{ }	{ }
19. Total Annual Maintenance	**$19,483,866**	**$25,812,288**	**$6,328,422**

BNSF's witnesses Mueller and Phillips have provided that the OTRR has the necessary mechanical facility at OTRR Donkey Creek, based upon the guidelines in the

[15] BNSF's calculations are based on the revised traffic volumes as discussed in Section III.A. above.

maintenance contract between {

}.[16]

c. Locomotive Servicing

Otter Tail developed an average locomotive servicing cost of $0.078 per locomotive unit-mile, including sand and lube oil, based on "BNSF's 2002 Annual Report, Form R-1 to the STB, indexed to 1Q02." OTP Nar. at III-D-6. While Otter Tail's use of a 2002 BNSF average cost is appropriate, Otter Tail attempted a "sleight-of-hand" when indexing for inflation. Otter Tail consistently attempts this subterfuge when indexing BNSF actual 2002 averages.

First, Otter Tail used one index – the RCAF-U – to de-escalate the average 2002 servicing cost per locomotive unit-mile to a first quarter 2002 level but then switched to another index – the RCAF-A – to generate unit costs for subsequent quarters (*e.g.*, for the second, third, and fourth quarters of 2002 and for all subsequent periods in the DCF period).[17] Switching adjustment factors in this manner is never appropriate. The inevitable result of the switch is corruption of the actual data used as the original input. Not surprisingly, this error works in Otter Tail's favor. Because the RCAF-A declined significantly over the four quarters of 2002 when compared to the RCAF-U, Otter Tail's "adjustments" meant that for each quarter after the first quarter of 2002 Otter Tail used costs that were below the actual BNSF costs that Otter Tail started with.

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[16] BNSF.RP.WP.III.D-0034.

[17] *Compare* OTP Errata Opening electronic workpaper "Otter Tail_Opr_Exp.123," cell D126 (de-escalation by RCAF-U) *with* OTP Errata Opening electronic workpaper "Exhibit-III-H-1.123," worksheet "Operating SAC," column AH (using RCAF-A).

Second, Otter Tail should never have used the RCAF-A at all. The RCAF-A is derived by adjusting the RCAF-U to reflect the productivity gains of Class I railroads. Given that the OTRR is presumed to be a least-cost, highly efficient railroad, it is completely unrealistic to assume that the OTRR would be able to achieve the magnitude of productivity gains possible for the existing Class I railroads. For this reason, the Board confirmed in *TMPA,* slip op. at 161, that operating costs should be indexed by the RCAF-U. As the Board explained: "The RCAF-A considers productivity adjustments for the railroads based on all of their business operations . . . We have no evidence, and we find it unrealistic to assume, that projected industry-wide productivity adjustments would result primarily from the transportation of coal." As noted previously, the OTRR is primarily a coal railroad whose operations have already been posited based on an assumption that they are the least-cost, most efficient operations that are feasible for a railroad of this type. Clearly, the productivity improvements that existing Class I railroads can expect to achieve do not apply to the OTRR.

BNSF's Reply evidence uses Otter Tail's calculation of a first quarter service cost per locomotive unit-mile, but then escalates the costs by the RCAF-U. The following table compares the 2002 locomotive maintenance and servicing costs submitted by the parties.

Table III.D.1-3
Comparison of Locomotive Maintenance and Servicing – 2002

	Otter Tail	BNSF	Difference
1. Service Cost/Locomotive Unit-Mile	$0.078	$0.078	$0
2. Locomotive Unit-Miles	32,804,066	30,410,456	(2,393,610)
3. Total Locomotive Service Costs	$2,557,221	$2,370,628	$186,593

d. Fuel

The single largest operating cost item for the SARR is locomotive operating costs, and the most significant component of that cost is the cost of fuel. Otter Tail understated fuel costs for the OTRR in several ways, discussed below.

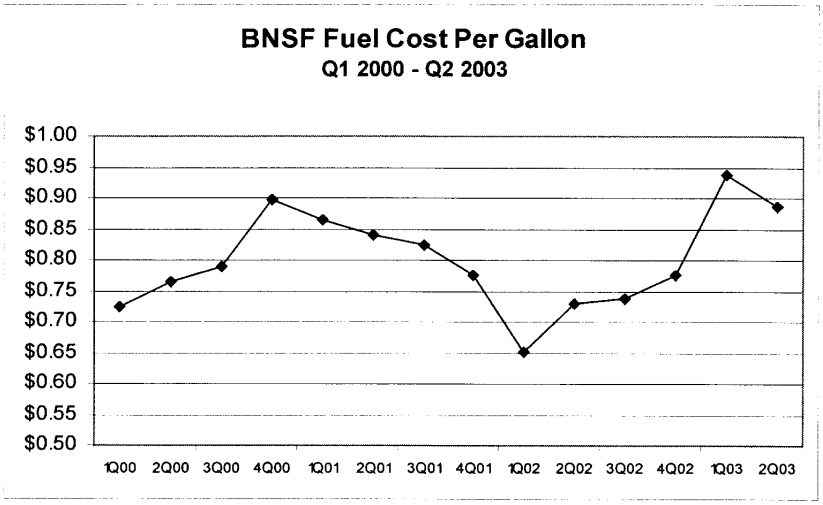
(1) Otter Tail's Fuel Price Assumptions Fail To Account For The Large Recent Increases In Fuel Prices

Otter Tail derived its fuel price per gallon assumptions for the OTRR from a BNSF Financial Presentation that identified an average first quarter 2002 fuel cost of $0.65 per gallon.[18] That same presentation, however, showed that after the first quarter of 2002, fuel prices increased dramatically to an average of $0.73 per gallon for the second quarter, $0.74 for the third quarter and $0.78 for the fourth quarter, resulting in an average price per gallon for the full year 2002 of $0.73.[19] The aberrant nature of the first quarter price of $0.65 per gallon is demonstrated by the chart below, which shows the average price per gallon paid by BNSF in each quarter from Q1 2000 to Q1 2003. The average price paid by BNSF over this period was $0.794 – more than 22 percent higher than the per-gallon price used by Otter Tail.[20]

[18] *See* OTP Opening workpaper Vol. IV, pp. 2740 to 2741.

[19] This average price of $0.73 per gallon is consistent with the average cost per gallon derived from the BNSF Annual Report Form R-1 for 2002.

[20] Quarterly fuel prices were obtained from BNSF Quarterly Investors' Reports. *See* BNSF.RP.WP.III.D-0115-0125.



Under the Board's DCF procedures, operating expenses are indexed quarterly, beginning with the first quarter of SARR operations, using the Rail Cost Adjustment Factor unadjusted for productivity.[21] In the DCF filed with its opening evidence, Otter Tail estimated OTRR operating expenses at first quarter 2002 levels – including the cost for fuel – and indexed them forward using the RCAF-A. This approach fails to account for the substantial price increases in fuel that have actually occurred because both the RCAF-A and RCAF-U indexes understate the impact that changes in fuel prices have on the operating cost of the SARR. This is because the RCAF index is an amalgam of seven separate indexes weighted to mirror the Class I railroads' operating expense structure and thus produce an index applicable to total railroad operating expenses. Specifically, the RCAF is comprised of separate indexes for labor, fuel, materials and supplies, equipment rents, depreciation, interest, and a separate index for other expenses including purchased

[21] As discussed previously, notwithstanding the Board's clear findings in TMPA that the RCAF-U is the proper mechanism for inflating stand-alone operating expenses, Otter Tail uses an inflation index that is adjusted for railroad industry-wide productivity – the RCAF-A.

services, casualties and insurance, general and administrative, other taxes, loss and damage and special charges. These index values are weighted based on the annual distribution of Class I railway expenses. However, the cost structure of a stand-alone railroad as posited by a complainant tends to be very different from the cost structure of a real world railroad. Comparison of the weightings used by the Board to develop the composite RCAF index with the mix of OTRR operating expenses reveals wide differences in virtually all of the categories, with the largest difference in the relative weighting of fuel. Table III.D.1-4 compares the index weighting used in the RCAF to the mix of stand-alone operating expenses indexed by the RCAF used by Otter Tail as inputs in the Board's DCF.[22]

Table III.D.1-4
Comparison of RCAF Component Weight with Operating Expense Weight

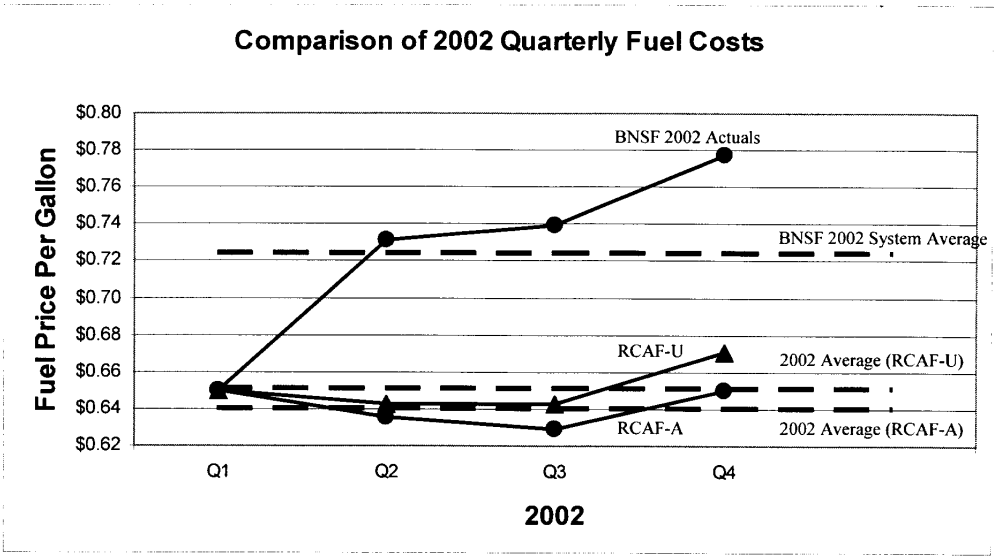
RCAF Component	Approximate RCAF Component Weight (2001)	Approximate Relative Operating Expense Weight
Labor	38%	23%
Fuel	11%	30%
Materials & Supplies	5%	0.3%
Equipment Rents	11%	20%
Depreciation	11%	0%
Interest	4%	0%
All Other Expenses	22%	27%

Thus, there is a mismatch between the weightings of the components of the RCAF and the components of the OTRR operating expenses. The RCAF (based on real world railroad cost structures) gives 11 percent weighting to changes in fuel to reflect the relative importance of fuel in Class I railroads' operating costs. However, Otter Tail posits a SARR that has fuel cost accounting for 30 percent of its operating costs. This

[22] *See* OTP Errata Opening electronic workpaper "Exhibit-III-H-1," p. 23.

mismatch under-weights the fuel component of the RCAF by nearly two-thirds, thereby understating the OTRR fuel costs, particularly during a period of rapid increases in fuel price like those experienced in the last year and a half.

Under Otter Tail's methodology of applying the RCAF-A index to the First Quarter 2002 fuel price, the OTRR's operating expenses will fall short of BNSF's actual annual fuel cost of $0.73 per gallon in 2002. In fact, even when Otter Tail's indexing approach is corrected to use the RCAF-U, rather than the RCAF-A, the indexed costs still understate BNSF's actual fuel expense. The graph below displays the 2002 fuel costs resulting from Otter Tail's approach, based on applying each of the RCAF-A and RCAF-U indices to BNSF's actual First Quarter cost of $0.65. Applying the RCAF-A results in an annual average fuel cost of $0.641 per gallon, *lower* than the already anomalous first quarter figure and more than 12% below BNSF's actual 2002 fuel cost of $0.73. Similarly, applying the RCAF-U produces an average 2002 cost of $0.651, only slightly higher than the first quarter cost and nearly 11% lower than BNSF's actual fuel cost. Clearly, starting with the $0.65 cost and applying either the RCAF-U or the RCAF-A index fails to capture the significant increases in fuel prices illustrated in the graph above. Otter Tail's approach is therefore unacceptable.



BNSF addresses the index weighting problem by using as the starting point for the DCF analysis the BNSF system-wide average fuel cost experienced in 2002 rather than the aberrational first quarter 2002 figure -- $0.73 instead of $0.65. BNSF uses the RCAF-U to de-escalate the 2002 average fuel cost from "mid-year" to a First Quarter 2002 level, in the same fashion that other operating cost items are developed (such as locomotive servicing, discussed above in section III.D.1.c). This approach reduces the immediate effects of the dramatic fuel price changes that actually occurred in 2002, which Otter Tail's operating expenses completely fail to reflect, and helps correct the mismatch between the weighting of fuel expenses in the RCAF indices vis-à-vis the OTRR's different cost structure.

(2) Otter Tail Calculated Fuel Consumption Rates Inaccurately

BNSF generally accepts Otter Tail's basic methodology for calculating fuel consumption rates in the absence of an in-depth fuel study. However, Otter Tail made a significant mistake in applying its methodology by excluding fuel consumed during

switching from its calculation. Specifically, Otter Tail developed fuel consumption based on the portion of BNSF's fuel costs that URCS allocates to GTM and LUM (44.483% and 54.368%).[23] By ignoring the fact that URCS also allocates fuel costs to switching, Otter Tail's approach failed to capture more than 10 percent of the actual 2002 BNSF expense. When it excluded switching gallons from its 2002 BNSF Train Fuel Gallons figure, which is the base number from which all of the rest of the analysis flows, Otter Tail inappropriately understated the consumption rates. BNSF corrected this error and as a result the OTRR system average fuel consumption rates rose from 3.42 to 3.60 per locomotive unit-mile for the SD70MAC units that power the coal trains, and from 2.74 to 2.89 per locomotive unit-mile for the C44-9 units on the non-coal trains.[24] Since Otter Tail assumed that fuel consumption for the SD40-2 units would be the average of the SD70MAC and C-44 rates, the SD40-2 figure also rises from 3.08 to 3.24 gallons per mile.[25] *See* OTP Nar. III-D-6.

(3) Otter Tail's Locomotive Unit-Miles Calculation Is Unreliable

Finally, an accurate assessment of locomotive unit-miles is necessary to calculate the fuel component of locomotive operating costs. Otter Tail's calculation of locomotive unit miles is flawed and substantially understates this important operating statistic. Otter Tail sets out its unit-mile calculations in its Errata Exh. III-C-1. To develop these unit-mile calculations, Otter Tail starts with the statistics generated by its string program

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[23] *See* BNSF Reply electronic workpaper "Otter Tail Fuel Corrected.xls."

[24] *See* BNSF Reply electronic workpaper "Otter Tail Fuel Corrected.xls."

[25] *See* OTP Nar. III-D-6, OTP Errata Opening electronic workpaper, "OTRR Fuel Consumption.123," and BNSF Reply electronic workpaper "Otter Tail Fuel Corrected.xls."

analysis for the supposed peak day in 2021. The first problem with this approach is that Otter Tail's string program is unreliable and understates operating statistics by assuming unreasonably fast transit times, ignoring several time elements, allowing trains to reside in sidings that could not accommodate them, among numerous other things. These issues were discussed above in Section III.B. and III.C. of this Narrative.

Moreover, apart from the fact that the underlying statistics are bad and unreliable, Otter Tail used a convoluted and inappropriate ratio to derive unit-miles for the base year from the string program statistics. Otter Tail took the peak day, peak year unit-miles, annualized those unit-miles and then reduced that amount by the ratio of the annualized traffic volume in 2021 (based on the peak day) to the actual base year traffic volume. Whatever purpose Otter Tail had in mind for this tortured methodology, it produces unusable results. It is actually quite simple and straightforward to calculate unit-miles by creating operating statistics for each train in the peak year. Since the parties agree on the number of locomotives per train, and the number of miles that each train travels is easily calculated, it is simple to count up the unit miles without having to resort to convoluted methodologies. BNSF carried out this straightforward calculation and used the resulting unit-mile statistics in its revised fuel cost estimates.[26] As a result of BNSF's analysis, the calculation of gallons of locomotive fuel needed by the OTRR is significantly more accurate.

(4) Conclusion

The following table compares the 2002 locomotive fuel costs submitted by the parties.

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[26] *See* BNSF Reply electronic workpapers "LUMs and Carmiles (OTP-BNSF) v2.xls" and "Otter Tail Fuel Corrected.xls."

Table III.D.1-5
Comparison of Locomotive Fuel Costs

	OTTER TAIL	BNSF	Difference
SD70MACs			
1. Locomotive Unit Miles	20,888,221	18,533,818	(2,354,403)
2. Gallons/Locomotive Unit Mile	3.42	3.60	0.18
3. Total Gallons	71,347,653	66,672,474	(4,675,179)
4. Price/Gallon	$0.6500	$0.7243	($0.0743)
C44-9s			
6. Locomotive Unit Miles	11,705,605	11,603,758	(101,847)
7. Gallons/Locomotive Unit Mile	2.74	2.89	0.15
8. Total Gallons	32,120,086	33,530,929	1,410,843
9. Price/Gallon	$0.6500	$0.7243	($0.0743)
SD40-2s			
11. Locomotive Unit Miles	210,240	272,880	62,640
12. Gallons/Locomotive Unit Mile	3.08	3.24	0.16
13. Total Gallons	647,506	885,087	237,581
14. Price/Gallon	$0.6500	$0.7243	($0.0743)
Total Fuel Costs	**$67,674,909**	**$73,221,105**	**$5,546,196**

e. Other

This section intentionally left blank.

2. Railcars

a. Leasing And Maintenance

Otter Tail committed several errors when developing railcar operating expenses. Specifically, Otter Tail:

- Incorrectly calculated OTRR car requirements
- Selected full-service railcar leases in a questionable manner
- Calculated certain railcar lease costs incorrectly and indexed erroneously
- Excluded appropriate railcar maintenance costs
- Incorrectly handled private car no payment car-miles

(1) Incorrect Car Requirements

First, Otter Tail's car requirements for both coal and general freight transport are incorrect, as discussed previously in section III.C above.

(2) Questionable Selection Of Railcar Leases

Second, Otter Tail's Opening Evidence assumed that all of its required coal and non-coal system rail cars would be acquired using full-service leases. For coal car lease costs, Otter Tail used lease rates of $5,063 per year for H and K cars and $4,834 per year for G and J cars. OTP Nar. at III-D-7. Although actual BNSF leases were produced for both gondolas and open top hoppers, Otter Tail chose to rely upon an undocumented gondola lease figure printed in an industry magazine.[27]

Otter Tail's methodology for selecting non-coal system freight car leases is also mysterious. Although there is no explanation in its narrative or workpapers, it appears that Otter Tail simply selected its lease rate sources based upon whatever source offered the lowest cost. BNSF corrects this random assignment of lease costs by always using actual BNSF lease figures when available. The use of BNSF actuals is especially appropriate because the OTRR is hypothesized to handle non-coal traffic only in overhead services and its only connection is with BNSF. When multiple leases apply, BNSF uses whichever lease begins closest to January 1, 2002 in order to ensure the most applicable rate. BNSF only resorts to the use of publicly available sources when no actual BNSF lease information is available. Finally, BNSF uses the most applicable lease for each car type.[28] BNSF Reply electronic workpaper "Railcar Costs.xls," worksheet

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[27] June 2001 *Railway Age* Guide to Equipment Leasing (OTP.OP.WP.2758-59).

[28] For example, BNSF 2002 actuals show that { } of refrigerated cars are mechanical and { } are non-mechanical. *See* BNSF Reply electronic workpaper "Car

"System Lease Summary," shows all produced leases for each car type and the worksheet "System" within the same file assigns the most applicable lease cost to each car type.

(3) Incorrect Lease Cost Calculations And Erroneous Indexing

Third, even when Otter Tail did use actual BNSF leases, some of those agreements entailed fluctuating payments similar to those discussed in the locomotive leasing section above. Once again, Otter Tail simply used the 2002 payment figures, asserting that they were representative of typical yearly lease costs. In other words, Otter Tail completely disregarded the large fluctuations in costs over the approximate twenty-year lease terms. BNSF once again corrects this error by normalizing the lease costs over the life of the lease to ensure capture of typical year expenses.

Otter Tail also indexed many lease figures incorrectly. Though Otter Tail intended to ensure that all lease figures are indexed to first quarter 2002 levels, several leases establish a fixed monthly lease amount and should be left alone for the entire lease term. BNSF corrects this error in order to ensure the greatest accuracy possible despite the fact that such errors reduced costs.

(4) Exclusion Of Railcar Maintenance Costs

Fourth, Otter Tail tried to account for maintenance costs by assuming that only full-service leases would be used for railcars. Otter Tail did not support its full-service lease figures with any specific documentation, however. Instead, it used the Railway Age "2001 Guide to Equipment Leasing," which estimated differences between net leases and full-service leases for several railcar types. Otter Tail then extrapolated those cost

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Types.xls." While Otter Tail uses a non-mechanical lease figure, presumably because the cost is considerably lower, BNSF weights the lease costs according to the actual usage split.

differences across all of the car types used on the OTRR. BNSF approaches lease costs more realistically by looking at the net lease costs associated with each car type according to the BNSF actual leases produced, as discussed above. BNSF then adds actual 2002 monthly maintenance costs by car type according to the BNSF 2002 R-1 Schedules 415 and 710. These schedules show the net repair cost by car type for 2002 as well as the number of cars by car type in the year. Thus, the monthly maintenance costs can be easily derived.

Otter Tail may attempt to argue that use of BNSF actual lease rates is inappropriate for a least-cost railroad. However, as discussed in III.A above, Otter Tail hypothesizes that the OTRR will originate and terminate no non-coal traffic. Rather, the OTRR is assumed to function as nothing more than a short bridge carrier between the residual BNSF on both its east and its west. The most representative data for the cars that OTRR will handle are data for the system cars of its connection. Thus, because the OTRR will be using the same fleet of railcars as BNSF, using actual net lease costs plus actual maintenance and repair costs for each type of car is considerably more accurate than estimating full-service lease costs from a magazine article based on national averages. Even more important, a full-service lease covers only routine maintenance and would not account for other significant repairs that cars might need. Using BNSF actual lease rates by specific car type alleviates all such problems and leads to a more accurate total railcar expense.

The following table compares system railcar lease costs between Otter Tail and BNSF.[29]

[29] Includes maintenance figures and indexing effects.

Table III.D.2-1
Comparison of Monthly Lease Costs for System Freight Cars

Car Type	Otter Tail	BNSF	Difference
A – Equipped Box	{ }	{ }	{ }
B – Unequipped Box	{ }	{ }	{ }
C – Covered Hopper	{ }	{ }	{ }
E – Equipped Gondola	{ }	{ }	{ }
F – Flat	{ }	{ }	{ }
G – Unequipped Gondola	{ }	{ }	{ }
H – Unequipped Open Hopper	{ }	{ }	{ }
J – Gondola	{ }	{ }	{ }
K – Equipped Hopper	{ }	{ }	{ }
P – Conventional Intermodal	{ }	{ }	{ }
Q – Lighter Weight, Low Profile Intermodal		{ }	{ }
R – Refrigerator	{ }	{ }	{ }
S – Intermodal Stack Car		{ }	{ }
T – Tank	{ }	{ }	{ }
U – Containers	{ }	{ }	{ }
V – Vehicular Flat	{ }	{ }	{ }
Z – Trailers	{ }	{ }	{ }

(5) Incorrect Handling Of Private Car No Payment Car-Miles

Fifth, Otter Tail "backed into" non-coal foreign and private car costs per-mile using information from BNSF's R-1. While BNSF accepts Otter Tail's use of the R-1 to develop costs for handling non-coal traffic in foreign and private equipment, it corrects a significant error in Otter Tail's calculation of private car costs. To develop the costs of private cars, Otter Tail identified for each car type, i.e., covered hoppers and tank cars, the total per diem payments reported in Schedule 414 to BNSF's 2002 R-1, and the total car-miles reported in Schedule 755. Before dividing the per diem payments by the miles, however, Otter Tail attempted to account for the separate "no-pay" car-miles that are reported in the Schedule 755 by distributing them over the car-miles identified for each

car type. As a result, Otter Tail inflated the number of car-miles for each car type by more than 80%, effectively reducing the average cost per car-mile by 45 percent.[30]

This approach is incorrect for at least two reasons. First, Otter Tail ignored the fact that the majority of BNSF's "no pay" car-miles are generated by shipper equipment used in coal service. In fact, Otter Tail inexplicably assumed that all of BNSF's no-pay miles can be assigned to non-coal service, and, as a result, improperly overstated the car-mile divisor used to develop the per-mile costs. Second, Otter Tail assumed that the no-pay miles should be assigned in proportion to the number of miles reported for each car type, i.e., because intermodal flat cars comprise 22% of the total private car-miles across car types, Otter Tail assigned 22% of the no-pay miles to intermodal flat cars. By overstating the total miles of intermodal flat cars, Otter Tail understated the resulting cost per mile that it used to develop the OTRR's freight car expense.

BNSF corrected this mistake in the following manner. BNSF obtained the actual 2002 distribution of system-wide no-pay miles by car type, and added these totals by car type to the private car miles obtained from the R-1. This corrects Otter Tail's erroneous allocation across car types, and produces more accurate costs per mile by car type. Then, BNSF extracted the actual 2002 distribution of no-pay miles by car type over the OTRR system from the BNSF 2002 traffic files and determined which no-pay miles were attributable to coal service or to general freight service. With this separation, BNSF further adjusted the calculations for certain car types to exclude the no-pay miles generated in OTRR coal service, which Otter Tail explicitly incorporated in its separate

[30] The inflation factor is 1.8268, which is the total number of private car-miles plus the total number of no payment car-miles divided by the total number of private car-miles. ((4,304,949 + 3,559,520) / 4,304,949 = 1.8268). OTP Errata electronic workpaper "OTRR Car Costs.123."

development of the coal fleet requirements for the OTRR. To make this adjustment, BNSF took the non-coal no-pay miles figures obtained from the OTRR traffic subset for the four types of coal cars (plain gondolas, equipped gondolas, general service open-top hoppers, and special service open-top hoppers) and inflated the figures by the ratio of overall no-pay miles over the OTRR system to overall no-pay miles over the entire BNSF system.[31] Ultimately, BNSF corrects Otter Tail's erroneous inclusion of coal no-pay miles in its development of private car costs for equipment used in non-coal service.

The table below compares Otter Tail's incorrect distribution of no payment car-miles with actual BNSF no payment car-miles by car type. The most obvious discrepancy is the fact that the majority of no payment car-miles are attributable to coal cars rather than private cars. Therefore, Otter Tail *significantly* understated its private car per mile costs.

[31] The inflation figure was { }, or { } BNSF system-wide no-pay miles / { } OTRR no-pay miles. The system-wide number here does not match the figure in the R-1 exactly but the difference is essentially negligible.

Table III.D.2-2
Comparison of Otter Tail and BNSF Actual Coal, Private, and TTX No Payment Car-Miles

Car Type	Otter Tail		Actual BNSF	
	Miles	%	Miles	%
Coal	-	0%	{ }	{ }
Non-Coal	**3,559,519**	**100%**	{ }	{ }
A – Equipped Box	2,375	0%	{ }	{ }
B – Unequipped Box	25,766	1%	{ }	{ }
C – Covered Hopper	352,459	10%	{ }	{ }
E – Equipped Gondola	6,709	0%	{ }	{ }
F- Flat	96,673	3%	{ }	{ }
G, J – Unequipped Gondola	9,325	0%	{ }	{ }
H – Unequipped Open Hopper	12,030	0%	{ }	{ }
K – Equipped Hopper	15,291	0%	{ }	{ }
L – Specialty	156,692	4%	{ }	{ }
P, Q, S – Intermodal	779,450	22%	{ }	{ }
R – Refrigerator	5,702	0%	{ }	{ }
T – Tank	410,720	12%	{ }	{ }
U – Trailers	779,450	22%	{ }	{ }
V – Vehicular Flat	127,427	4%	{ }	{ }
Z – Containers	779,450	22%	{ }	{ }
Total[32]	**3,559,519**	**100%**	{ }	{ }

The table below summarizes the differences in private railcar expenses resulting from the non-coal no-pay mileage correction between Otter Tail and BNSF. As discussed above, BNSF does not treat trailers and containers as cars and thus includes rates for P, Q, and S miles only.

[32] Otter Tail took its total no payment car-miles figure from BNSF's 2002 R-1 Schedule 755, Line 84, and grossed up all non-coal car-miles by that figure.

Table III.D.2-3
Comparison of Private Railcar Per-Mile Costs

Car Type	Otter Tail	BNSF	Difference
A – Equipped Box	$0.0004	{ }	{ }
B – Unequipped Box	$0.1314	{ }	{ }
C – Covered Hopper	$0.0447	{ }	{ }
E – Equipped Gondola	$0.0001	{ }	{ }
F – Flat	$0.1046	{ }	{ }
G – Unequipped Gondola	$0.0446	{ }	{ }
H – Unequipped Open Hopper	$0.0000	{ }	{ }
J – Gondola	$0.0446	{ }	{ }
K – Equipped Hopper	$0.0007	{ }	{ }
L – Specialty	$0.0002	{ }	{ }
P – Conventional Intermodal	$0.1112	{ }	{ }
Q – Lighter Weight, Low Profile	$0.0000	{ }	{ }
R – Refrigerator	$0.0799	{ }	{ }
S – Stack Car	$0.0000	{ }	{ }
T – Tank	$0.0309	{ }	{ }
U - Containers	$0.1112	{ }	{ }
V – Vehicular Flat	$0.1439	{ }	{ }
Z – Trailers	$0.1112	{ }	{ }

Finally, the table below compares total railcar lease and maintenance costs between Otter Tail and BNSF:[33]

Table III.D.2-4
Comparison of Total Railcar Lease and Maintenance Costs

Car Type	Otter Tail	BNSF	Difference
Coal			
Count of Gondolas	396	1,454	1,058
Annual Cost per Gondola	{ }	{ }	{ }
Cost of Gondolas	{ }	{ }	{ }
Count of Open Top Hoppers	104	238	134
Annual Cost per Hopper	{ }	{ }	{ }

[33] Otter Tail includes TTX car mileage with private car mileage and thus applies private car rates to TTX miles. BNSF accepts this approach in Reply.

Car Type	Otter Tail	BNSF	Difference
Cost of Hoppers	{ }	{ }	{ }
Total Coal Cars	{ }	{ }	{ }
General Freight			
A – Equipped Box	{ }	{ }	{ }
B – Unequipped Box	{ }	{ }	{ }
C – Covered Hopper	{ }	{ }	{ }
E – Equipped Gondola	{ }	{ }	{ }
F – Flat	{ }	{ }	{ }
G – Unequipped Gondola	{ }	{ }	{ }
H – Unequipped Open Hopper	{ }	{ }	{ }
J – Gondola	{ }	{ }	{ }
K – Equipped Hopper	{ }	{ }	{ }
L – Specialty	{ }	{ }	{ }
P – Conventional Intermodal	{ }	{ }	{ }
Q – Lighter Weight, Low Profile		{ }	{ }
R - Refrigerator	{ }	{ }	{ }
S – Stack Car		{ }	{ }
T – Tank	{ }	{ }	{ }
U - Containers	{ }	{ }	{ }
V – Vehicular Flat	{ }	{ }	{ }
Z – Trailers	{ }	{ }	{ }
Total Railcar Costs	{ }	{ }	{ }

b. Private Car Allowance

Otter Tail assumed that the OTRR would pay no private car allowances to private coal car owners, because current freight rates presumably reflect private car ownership. Similarly, the OTRR would pay no mileage allowances or per diem payments. Otter Tail Nar. III-D-8. BNSF adopts these assumptions.[34]

c. Other

This section intentionally left blank.

[34] Coal cars that are privately owned that are under the OTRR's control are treated as system cars and the applicable lease value is applied.

3. Personnel

a. Operating Personnel

(1) Staffing Requirements

The table below compares the OTRR transportation personnel assumed by Otter Tail and the minimum number determined to be required by BNSF. The most significant difference between the parties on operating personnel relates to the required number of train crew, which Otter Tail has substantially understated. The staffing requirements are discussed in more detail below.

Table III.D.3-1
Comparison of Transportation Department Employees

	Position (1)	OTRR Number of Employees (2)	BNSF Number of Employees (3)	Difference
1.	Vice President - Transportation	1	1	-
2.	Administrative Assistant	1	1	-
3.	Director - Safety Rules and Training	1	1	-
4.	Manager - Safety Rules and Training	2	2	-
5.	Director - Operations Control	1	1	-
6.	Manager - Operations Control	5	5	-
7.	Dispatchers	14	14	-
8.	Crew Management	10	10	-
9.	Director - Customer Service	1	1	-
10.	Manager - Customer Service	5	5	-
11.	Director - Train and Locomotive Operations	1	1	-
12.	Manager - Train and Locomotive Operations	6	5	(1)
13.	Assistant Manager - Train and Locomotive Operations	10	11	1
14.	Yardmasters	0	10	10
15.	Crew Haulers	0	40	40
16.	Train Crew Personnel	446	664	218
17.	Total Transportation Department Personnel	504	772	268

(a) Transportation Department Personnel

(i) Vice President - Transportation

Otter Tail includes a Vice-President, Transportation, and an Administrative Assistant. OTP Nar. at III-D-10. Mr. Mueller accepts these positions.

(ii) Safety, Rules And Training

Otter Tail proposes one Director-Safety, Rules and Training and two Managers. OTP Nar. at III-D-11. Mr. Mueller agrees this staffing is adequate for the transportation group. As discussed below, the mechanical and engineering group has its own Director and Managers of Safety, Rules and Training, which allows the three positions in the Transportation Department to be devoted exclusively to the transportation group.

(iii) Operations Control

Otter Tail proposes one Director-Operations Control and five Managers. OTP Nar. at III-D-11. With the duties assigned to these positions, Mr. Mueller agrees this staffing is adequate.

Otter Tail has provided for three dispatching desks, each staffed by a Dispatcher three shifts per day, seven days per week. Otter Tail has provided 14 Dispatchers to provide coverage. OTP Nar. at III-D-11-12. Mr. Mueller agrees this level of staffing is adequate.

Otter Tail has provided for a Crew Manager to be on duty one shift, five days per week plus two Crew Callers on duty three shifts a day, seven days per week. Otter Tail has provided a total of 10 people to staff these positions. OTP Nar. at III-D-12. Mr. Mueller agrees this level of staffing is adequate.

(iv) Customer Service

Otter Tail proposes to staff the customer service function with a Director, Customer Service, assisted by 5 managers, who will be responsible for the same functions as the Coal Desk Managers at major railroads such as BNSF. OTP Nar. at III-D-12. Mr. Mueller agrees that this staffing is sufficient to handle the customer service function for the OTRR.

(b) Train And Locomotive Operations

Otter Tail proposes one Director-Train and Locomotive Operations, who will provide supervision to the six Managers located at Donkey Creek, Reno, Dutch, Glendive, Mandan and Fargo. The Managers will be salaried positions, working a five-day week but on call 24 hours per day, seven days per week. Their duties will be similar to a Trainmaster on a Class I railroad. Otter Tail has also provided 10 Assistant Managers-Train and Locomotive Operations who will perform duties as directed by their respective Managers. Two (2) Assistant Managers are located at Reno, Donkey Creek and Glendive, and one (1) Assistant Manager will be stationed at Moran, Snowden, Fargo and Benson. OTP Nar. at III-D-13. In light of the reduction in traffic moving through Converse, Mr. Mueller determined that the Manager and two (2) Assistant Manager positions at Reno could be eliminated. He added one Assistant Manager position at Converse because of the need for the empty coal train inspection, locomotive servicing, bad-order car removal and spare car replacement functions at this location. He also added one Assistant Manager position at each of the Donkey Creek and at Glendive Yards based on the high level of activity and the need for 24-hour coverage at each of these yards.

The Donkey Creek Yard is responsible for the Class I initial terminal inspection of empty coal trains, including removal of bad-order cars, adding fill cars, and locomotive servicing and maintenance. Donkey Creek is a crew change point and interchange location with the residual BNSF for loaded and empty coal trains and non-coal trains. In addition, the locomotive maintenance facility located in the Donkey Creek Yard has responsibility for maintenance and repair of all locomotives in the OTRR fleet -- a total of 250 locomotives in the base year that require quarterly maintenance and repairs as needed.[35]

The Glendive Yard is responsible for the inspection of empty and loaded coal trains. Specifically, Class I initial terminal inspections are performed on empty coal trains at Glendive Yard, and 1,000- or 1,500-mile inspections, as required, are performed on loaded coal trains. In addition, Glendive Yard is a crew change point for all trains passing through and is responsible for intra-/inter-train switching on seven movements of non-coal overhead trains. Helper locomotives are also added to all loaded coal trains at the Glendive Yard.

The Manager- and three Assistant Managers-Train and Locomotive Operations at each of the Donkey Creek and Glendive Yards will have overall responsibility for the operation of the terminal and will be required to be "in the field" a majority of their time. These first line supervisors need to be in contact with the train crews that are reporting for duty or being relieved from duty at these terminals. This is the principal function of a trainmaster on a Class I railroad, the function that Otter Tail states these managers are to

[35] The 253 locomotives are the total of the SD70 road and helper locomotives (172) Dash 9 locomotives (70) and SD40-2 switch and work train locomotives (8) which BNSF has determined the OTRR requires in the base year (2002).

perform. OTP Nar. at III-D-13. In particular, trainmasters (and thus OTRR's Locomotive Operations Managers) are responsible for conducting safety meetings, interpreting rules and safety instructions, investigating accidents and injuries, operations testing, and coordination of overall yard operations including supervision of the yardmasters. On an average day, approximately 60 train crews will go on and off duty at Donkey Creek and approximately 80 train crews will go on and off duty at Glendive. It is therefore apparent the Train and Locomotive Manager and Assistant Managers will not have the time nor be in a position to manage the minute-by-minute operation of the Donkey Creek Yard or Glendive Yard as required, which necessitates adding the position of yardmaster at each yard to perform this function.

Mr. Mueller provides for the assignment of five yardmasters at both the Donkey Creek and Glendive Yards (one position on a 24/7 basis at each location, for a total of 10 people). The yardmasters are responsible for the move-by-move operation and coordination of train arrivals and departures, movement of locomotives to and from the service area, and supervision of switch crews working in the yard. The yardmasters are also responsible for data reporting for the car and locomotive inventory system that must be maintained at each of these yards. Otter Tail did not provide any yardmasters in its staffing at Donkey Creek or Glendive.

The yardmasters' responsibilities include directing the movement of all trains into and out of the terminal, in coordination with the road dispatcher. Additionally the yardmaster determines the order in which empty and loaded coal trains will be inspected, and directs the car inspectors accordingly. The yardmaster is also responsible for directing the switch crews (one switch crew at Donkey Creek and two switch crews at

Glendive) that will be working at all times removing bad-order cars from inbound trains after they have been inspected, and adding fill cars as needed. At the Glendive Yard, the yardmaster will also direct the intra-/inter-train switching required on the seven non-coal trains discussed in Section III.C.1.a(2)(c). There is a further requirement for any bad-order cars to be moved to the car repair facility, and after repairs have been made, movement of the repaired cars to the spare car tracks for sorting by car type and car ownership, or in the case of non-coal cars, forwarded on the appropriate train. There will also be numerous locomotive consist movements at the Donkey Creek and Glendive Yards, in connection with the movement of locomotives from trains to and from the main locomotive service and/or maintenance facility. These are also under the direction and coordination of the yardmaster. Finally, because Otter Tail has provided for power switches at each of these yards to facilitate the movement of arriving and departing trains, and BNSF accepts this designation, Mr. Mueller assigns the control of these switches to the yardmaster, in conjunction with his responsibility for coordinating the train arrival and departure with the dispatcher. It would be impossible for major yards such as Donkey Creek Yard or Glendive Yard to function without this level of supervision on an around-the-clock basis.

Mr. Mueller has provided one crew hauler/utility clerk position at each of Converse, Donkey Creek, Dutch, Fargo, Benson, Snowden, Moran Junction, Glendive, and Mandan Yards. Otter Tail did not include this position in its staffing, instead providing taxi service for within-yard travel at certain locations. The main duties assigned to these positions will involve the transporting of train crews within the yards and providing transportation for relief train crews for crews that have exceeded their 12

hours-of-service limitation on the mainlines. These positions will be manned on a 24/7 basis (for a total of 40 employees) and each yard will require a four-wheel drive Suburban truck (total 9) in order to access the railroad right of way and the yard tracks. The rugged terrain, lack of hard top roads and the harsh weather conditions in the Powder River Basin, Montana, and the Dakotas, make it essential for these vehicles to be equipped with four-wheel drive.

When these crew haulers/utility clerks are not hauling crews they would also be responsible for additional duties not provided for in the Otter Tail plan, such as janitorial duties at the crew facility and offices, maintaining the informational bulletin boards, maintaining the peripheral devices and paper for the printers at that location, receiving, storing and issuing stationery supplies and personal protective equipment, cleaning and maintaining the vehicle they are utilizing, and other administrative duties that may be required by the operating supervisors at that location.

(c) Train Crew Personnel

(i) Otter Tail Significantly Understated The Number Of Road Crew Personnel Required To Transport Its Traffic

In an effort to calculate the number of road crew personnel required to operate its stand-alone railroad, Otter Tail attempted to count the number of crew starts that would occur on its supposed peak day, October 18.[36] It then multiplied this number by 365 to

[36] *See* OTP Errata Opening electronic workpaper "crew calculation for OttRR Open.xls." Otter Tail's own work papers show that while October 18 may be characterized as exhibiting relatively heavy traffic, heavy traffic on that date is by no means an isolated occurrence. There is at least one day – and sometimes two or three – in nearly every month on which Otter Tail counts { } or more trains compared to the { } it asserts for October 18. There are 63 days spread throughout 2002 when Otter

derive an annual number of crew starts for the peak year.[37] To derive the road crew personnel requirements for base-year operations, Otter Tail calculated base year crew starts by multiplying peak year requirements by a fraction meant to reflect the decrease in coal volumes between 2021 and 2002.[38] Road crew numbers were calculated from this result by assuming that each crew had two men and that each crew person would be able to perform 270 crew starts a year.[39]

It would be appropriate to estimate crew requirements by a method similar to that employed by Otter Tail, *i.e.*, by annualizing the number of crew personnel required to serve trains on a peak day. Such an approach would ensure sufficient personnel to satisfy the peak requirements of the railroad. Otter Tail, however, made a number of errors in executing its approach, the net result of which was to understate road crew personnel requirements by over 46 percent under Otter Tail's own methodology.

First, Otter Tail miscounted the number of crew starts that occur on its peak day. In some cases starts were double-counted and in others starts were omitted. While the individual errors were large, the double-counting partially offset the omissions. A correct count of the crew starts for Otter Tail's traffic, based on the string program time output on which Otter Tail relied, produces a modestly higher number of crew starts for the supposed peak day than asserted by Otter Tail.[40]

Tail counts at least { } trains. *See* OTP Opening electronic work paper "Peak Coal Trains.xls," at worksheet "Train Count Summary."

[37] *See* OTP Errata Opening Exh. III-C-1.

[38] *See* OTP Nar. at III-C-22.

[39] *See* OTP Erata Exh. III-C-1.

[40] *See* BNSF Reply electronic workpaper "OTP Corrected Crew Counts.xls" at worksheet "OTRR Road Crew Summary."

Second, the string program time output on which Otter Tail relies is entirely missing { } returning empty coal trains that should have been modeled. Otter Tail apparently neglected to model any returning empty coal trains that corresponded to loaded trains that moved South out of the mines. BNSF identified the missing empty coal trains and returned them to the OTRR system after the appropriate off-line time specified in Otter Tail's work papers. As shown in BNSF's electronic work papers, a number of these empty coal trains would require crews on October 18.[41]

Third, Otter Tail's method for calculating base year road crew requirements from peak year requirements is obviously unsound. Otter Tail posits that the OTRR would transport 89 percent of 2021 traffic in 2002, but claims that it would need only 68 percent as much crew in 2002 to do so.[42] Put another way, Otter Tail assumes that its crews would be 31 percent more productive in 2002 than in 2021 (measured by tons transported per crew start). This lopsided outcome stems from the ratio Otter Tail used to calculate base year requirements. Otter Tail failed to distinguish between coal traffic, which increases over the 20 years, and non-coal traffic which does not. When Otter Tail calculated base year road crew requirements, it did so by comparing only coal volumes in the two years. In addition, Otter Tail compared an exaggerated 2021 volume derived by

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[41] *See* BNSF Reply electronic workpaper "OTP Corrected Crew Counts.xls" at worksheet "Missing Coal Trains." Had Otter Tail properly modeled these trains, its data files would have contained a corresponding empty coal train for each loaded coal train. *See* OTP Errata Opening electronic workpapers "timese.dbf" and "timesl.dbf." The string program is supposed to return these trains to the OTTR after the off-line time specified in OTP Opening electronic workpaper "Pktrns.dbf" but apparently failed to do so. BNSF used the off-line times from Otter Tail's errata "Pktrns.dbf" in its calculations.

[42] Otter Tail asserts that the OTRR will transport 230,312,875 net tons in 2021 and 205,616,902 net tons in 2002. *See* OTP Opening Exh. III-A-5 at pages 1 and 5. Otter Tail likewise asserts that { } crew starts will occur in 2021 compared to { } in 2002. *See* OTP Errata Opening Exh. III-C-1.

annualizing the amount of coal transported on the "peak" day to the actual 2002 volume. In effect, Otter Tail compared a peak to a non-peak aggregate, thereby gaining itself a substantial reduction in base year crew requirements. It also effectively reduced the number of crews required to serve non-coal traffic when the volume of such traffic does not change.

Assuming that the number of crews required is proportional to the number of tons transported,[43] an acceptable method for performing the calculation Otter Tail attempted would have been to use an adjustment ratio based on annual 2021 and 2002 coal tonnages for coal traffic and annual 2021 and 2002 non-coal tonnages for non-coal tonnages. There is no circumstance in which it would be appropriate to compare a peak volume to an aggregate annual volume since doing so creates a ratio that automatically understates base year requirements.

Correcting for Otter Tail's various mistakes results in 677 road crew personnel in 2002 (under Otter Tail's methodology) to transport Otter Tail's traffic group compared to the 463 Otter Tail claims.[44] Adding the personnel omitted by Otter Tail would increase T&E costs by nearly ${ } million in the base year even when calculated using Otter Tail's understated average salary and fringe benefit figures.[45]

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[43] In fact, the number of crews depends on the number of trains, not the tonnages transported. Generally, however, when the number of tons per train is consistent, use of tonnages should produce an acceptable approximation.

[44] *See* BNSF Reply electronic workpaper "OTP Corrected Crew Counts.xls" at worksheet "OTRR Road Crew Summary."

[45] In calculating the number of road crew personnel required, Otter Tail assumes that each crew member would be able to complete 270 crew starts a year. BNSF has argued in prior cases that this number is much too high. Indeed, as shown below in Section III.D.3.a.(2), very few BNSF employees complete anywhere near that many starts, and those that do are highly compensated. Although it appears patently unreasonable to assume that OTRR employees could *average* 270 starts a year – more

(ii) Crew Requirements For BNSF Traffic Group

To calculate the road crew personnel for the BNSF-specified traffic group, BNSF accepted Otter Tail's general approach, but with the corrections described above. In other words, BNSF counted the number of crew starts that would occur in each crew district on the "peak" day identified by Otter Tail after subtracting the trains BNSF excluded from the original Otter Tail traffic group. BNSF then annualized the number of crew starts and calculated the base year crew starts by applying the corrected volume ratios as described above. To calculate the number of base year road crew personnel, BNSF divided annual crew starts by 270 and then multiplied by two (to provide for one conductor and one engineer), just as Otter Tail did. Otter Tail's methodology, as corrected, indicates that 552 road crew personnel would be required to transport the BNSF-specified traffic group.[46]

In addition to road crews, OTRR would need crews for switch, helper and work engines. BNSF witness Mueller analyzes OTRR's switch, helper and work engine requirements in detail in Section III.C above. Otter Tail assumes that crews for switch and helper locomotives would work 270 12-hour shifts a year. Because this would mean that switch and helper crews work an entirely unrealistic 3240 hours a year, BNSF has assumed that switch and helper crews would work eight-hour shifts instead, resulting in three shifts per day rather than two. With this adjustment to Otter Tail's assumptions,

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than one start every weekday of the year – BNSF has elected not to contest this assumption so long as OTTR's T&E personnel receive the high compensation that would be commensurate with the exceptionally heavy workload assumed.

[46] *See* BNSF Reply electronic workpaper "BNSF Crew Counts v1.xls."

staffing engines indicated by Mr. Mueller, would require 24 switch crew personnel, 80 helper crew personnel, and 8 work train crew personnel.

(iii) Taxi And Overnight Expenses

BNSF accepts Otter Tail's per trip and per night taxi and overnight costs as well as Otter Tail's criteria for determining when such costs would be incurred. BNSF includes in its results the taxi and overnight expenses for crews transporting the BNSF-specified traffic. However, BNSF does not include yard taxi runs in the Reply because it provides crew haulers at each of the crew districts.

(2) Compensation

(a) Train Crews

The compensation levels Otter Tail posits for its conductors and engineers are far too low to be justified and bear no relationship to what a real railroad the size of the OTRR would have to pay to attract and retain qualified employees. Otter Tail provides no justification for its claim that it could ignore market forces and pay substantially below-market wages.

Otter Tail calculated an annual salary for OTRR T&E personnel based on 2002 BNSF Wage Form B reports produced in discovery and a "constructive allowance ratio" Otter Tail derived to account for constructive allowance payments it deemed relevant to the OTRR. Otter Tail did not base its wages on average total wages paid to BNSF T&E employees. Rather, Otter Tail calculated average base salaries using only that portion of total wages composed of straight and overtime compensation, then increased the base salary by adding only a fraction of the additional compensation reflected on Wage Form B using the constructive allowance ratio. Otter Tail's salary calculation is summarized in Table III.D.3-2:

Table III.D.3-2
Otter Tail Development of T&E
Average Annual Salary[47]

	2002 Straight Time Wages A	2002 Overtime B	Constructive Allowance Factor C	Employees Mid-Month D	2002 Salary Per Employee E = (A + B) / D	Wage Index 2002 F	Wage Index 1Q02 G	1Q02 Salary Per Employee H = (G / F) * E * (1 + I)
Engineer	${ }	${ }	{ }	{ }	${ }	316.7	316.3	${ }
Conductor	${ }	${ }	{ }	{ }	${ }	316.7	316.3	${ }
Average								${ }

To generate the total compensation paid to OTRR T&E employees, Otter Tail multiplied the total number of employees by the average base salary (augmented by the constructive allowance ratio) and added an additional { } percent to reflect benefits.[48]

(i) OTRR Crews Would Earn Less Than 80 Percent Of Total Actual Annual Compensation Paid BNSF Employees

Before calculating average salaries from BNSF Wage Form B Data, Otter Tail inappropriately excluded more than 20 percent of the compensation actually paid to BNSF T&E employees. Table III.D.3-3 shows the extent of Otter Tail's exclusion of actual income:

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[47] Otter Tail's data came from BNSF Form B, OTP.OP.WP.002885-2886. Otter Tail's calculations are reflected in OTP Errata Opening electronic workpapers "Ottertail Salaries.123," "Constructive Allowance Ratio.123," and "Otter Tail_Opr_Exp.123."

[48] *See* OTP Errata Opening electronic workpaper "Otter Tail_Opr_Exp.123." BNSF believes Otter Tail's use of an industry-wide average for Class I railroads is inappropriate and has instead used { } percent. This number reflects BNSF actual experience with crews and is calculated from the R-1 report for BNSF. *See* BNSF Reply electronic workpaper "fringe benefits.xls."

Table III.D.3-3
Otter Tail Exclusion of BNSF Employee Compensation[49]

	Straight & Overtime Wages Included by Otter Tail A	Constructive Allowance Compensation Included by Otter Tail B=A x .1972	Total Compensation Used by Otter Tail C=A+B	Total Compensation on Wage Form B D	% Total Compensation Excluded E=100-(D/E x 100)
Engineers	${ }	${ }	${ }	${ }	19.0%
Conductors	${ }	${ }	${ }	${ }	23.1%

In essence, Otter Tail argues that its exclusion of certain constructive allowance items as "irrelevant" is justified because those allowances are supposedly an artifact of the unionized status and merger and labor history of BNSF. *See* OTP Nar. at III-D-16. Otter Tail appears to believe that the categories associated with these "irrelevant" payments are irrational, and that a least cost, most efficient railroad could therefore ignore the "irrational" portion of an employee's compensation.

Such an assumption is misguided for several reasons. First, among the constructive allowances excluded by Otter Tail as irrelevant are payments for {

}[50] These are clearly activities engineers and conductors perform on the stand-alone railroad and for which they would expect to be compensated. Second, Otter Tail does not, and cannot, explain why OTRR employees would be willing to forego compensation they could and would earn at another railroad simply because Otter Tail believes the label attached to that compensation renders the compensation "irrelevant." As rational economic actors, OTRR's crew personnel will be concerned about their total

[49] Source: OTP.OP.WP.002885-2886.

[50] *See* OTP Opening electronic workpaper "Constructive Allowance Ratio.123."

compensation and the amount of work they must perform to earn it, not the categories into which that compensation falls.

Historically, constructive allowances have been an accounting device that tracks extra pay for extra work. Even if a non-union railroad chooses not to account for so-called constructive allowance dollars separately when calculating how much it pays its employees, it will still need to compensate them somehow for the activities covered by "constructive allowances."

(ii) Otter Tail Inappropriately Assumes OTRR Crews Would Perform More Work For Less Pay

Otter Tail also asserts, again without support, that the OTRR could pay its crew personnel much less than an average BNSF engineer or conductor earns even though OTRR employees would be expected to perform much more work than that average BNSF employee. Otter Tail has specified that OTRR T&E employees would average 270 crew starts every year. By contrast, compensation data for { } full-year BNSF employees who served as engineers or conductors on trains included in the SARR traffic group reveal that the average number of crew starts in 2002 for these BNSF engineers and conductors was { }, { } percent less than the 270 starts Otter Tail says its crew personnel will perform.[51] Out of the { } employees, only { }, or 6 percent, performed 270 crew starts or more in 2002.

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[51] *See* BNSF Reply electronic "All Wages.xls," worksheet "Eng_Cond Combo." The wage data used for BNSF's T&E salary analysis is contained in BNSF Reply electronic workpaper "All wages.zip". To develop this data, BNSF consultants FTI identified { } relevant train symbols from those contained in the Otter Tail traffic group. The included trains were the coal trains actually modeled by Otter Tail and the most frequent non-coal trains for each segment of the OTRR route. The subset of employees who worked these trains in the appropriate geographic regions were then identified and full wage data was collected by unique social security number from

Given the small proportion of BNSF employees who averaged 270 crew starts per year, it appears unreasonable for Otter Tail to assume that its entire work force would be able to average 270 starts per year. Otter Tail has specified, however, that OTRR's work force will be composed only of employees who are willing to work at the same level as the hardest-working 6 percent of BNSF crew personnel. In the remote event that such a work force could be developed, OTRR would unquestionably need to pay its particularly hard-working employees more than an "average" wage. In the railroad world as elsewhere, employees who work more shifts and more hours in a year are better compensated than those who work fewer shifts and fewer hours. Indeed, the small proportion of BNSF T&E personnel who performed at this level were much more highly compensated that the "average" employee who performed only { }crew starts per year.

Appropriate compensation levels for T&E employees who perform the same amount and type of work as the 6 percent hardest-working BNSF engineers and conductors cannot be calculated from Wage Form B. Wage Form B contains aggregate data for all BNSF engineers and conductors. Dividing aggregate wages by the number of employees, as Otter Tail has done, necessarily produces what the *average* BNSF employee earns, not what members of the hardest-working, highest-compensated group earn.

BNSF's 2002 payroll tapes. An employee was counted as "full-year" if that employee had at least one crew start in each month. Only individual payment records that showed an employee actually worked a train on a shift (because the record contained a positive amount in the straight pay (STAmnt column) were used.

(iii) Otter Tail Would Need to Pay Market Rates For Engineers And Conductors

Absent compelling evidence to the contrary, there is no basis for Otter Tail to arbitrarily reduce crew compensation below what is being paid in the marketplace today for work of similar type and quantity. Allowing proponents of stand-alone railroads to ignore fundamental economic principles would violate the stand-alone concept. Simply put, the stand-alone railroad must pay the market rate for its T&E employees. If the OTRR expects its T&E employees to average 270 crew starts per year, it must expect to pay the market rate for such highly-compensated employees.

The best evidence of what the OTRR would need to pay its 270-shift-per-year crew personnel is actual data that demonstrates what an employee who performed the required amount and type of work would earn at BNSF. That actual data already reflects the fact that BNSF must compete with UP and other railroads for T&E personnel. Like BNSF, the OTRR would need to compensate its T&E employees at a level sufficient to prevent them from leaving to work for UP or other railroads. In addition, the OTRR will face competition from the residual BNSF for its T&E employees. Competition from these railroads will dictate the market wage the OTRR must pay. Train crew personnel will look at the total compensation being paid crews at BNSF, UP, and other railroads who engage in similar work, *e.g.*, 270 starts a year working long, unscheduled shifts, and compare their own compensation. The fact that total compensation at BNSF and other railroads may be calculated using a base salary and constructive allowances will not be a relevant consideration. The OTRR engineer or conductor will only be interested in the bottom line: what he could earn for the same work at another railroad.

BNSF calculated average annual compensation for BNSF engineers and conductors from the actual 2002 wage data for { } BNSF full-year BNSF employees who served as engineers or conductors on trains included in the Otter Tail traffic group. As did Otter Tail, BNSF calculated an average engineer wage and an average conductor wage.[52] BNSF calculated separately what an engineer or conductor who performed an average of 270 engineer or conductor crew starts would have been paid for those starts.[53] BNSF then averaged the engineer and conductor salaries, just as Otter Tail did, to derive an overall average wage for T&E employees (de-escalated to a 1Q2002 level) of ${ }. This average figure derived from compensation actually paid by BNSF to engineers and conductors who perform the same type and amount of work posited by Otter Tail – a figure that exceeds that proffered by Otter Tail by more than { } percent – is the best evidence of what the OTRR would need to pay. BNSF used this number in its DCF analysis.

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[52] Derivation of the source wage data used in these calculations is described in Section III.D.3.a.(2).(a).(ii) above. Calculation of the engineer average salary is contained in BNSF Reply electronic workpaper "Engineers.xls," worksheet "Summary" and calculation of the conductor average salary is contained in BNSF Reply electronic workpaper "Conductors.xls," work sheet "Summary."

[53] For this calculation, BNSF used, respectively, the group of engineers or group of conductors with annual starts in the range between 255 and 284. When de-escalated to the 1Q2002 level, an average 270-start engineer salary was ${ } and an average 270-start conductor salary was ${ }. *See* BNSF Reply electronic workpaper "Salary Summary.xls." Calculation of separate averages for engineers and conductors was necessary to eliminate bias in the underlying data, which contained significantly more payments for crew performing as engineers than for crew performing as conductors. Otter Tail performed this same exercise with respect to its Wage Form B data when it calculated separate averages for engineers and conductors.

(iv) Otter Tail Cannot Justify Lower Wages by Comparisons To Regional Or Short-Line Railroad

Otter Tail cannot justify its understated T&E wages by claiming that the appropriate reference point is wages allegedly paid at much smaller regional or short-line railroads. By definition, the largest Class II railroad generates no more than $272 million in annual revenue while Otter Tail asserts its SARR would earn revenues of $877 million in 2002. There is no basis, therefore, to consider the OTRR comparable to a regional or short-line railroad.

More importantly, Otter Tail has not and can not make the only showing that would make compensation levels at short line and regional railroads pertinent to this case. What a Class II or Class III railroad might pay is relevant only if the pay is for the same type and quantity of work that the OTRR will require. As described above, Otter Tail expects its T&E personnel to be particularly hard working. Only a small proportion of OTRR crews would perform yard and switching activities with predictable work schedules and regular work hours. Most OTRR crews would work unscheduled unit coal and freight trains with long shifts that might start at any time of day or night. OTRR crews, therefore, would face both erratic work requirements and the necessity of fitting in many more shifts than the average BNSF employee engaged in the same type of work. The consequences of such demanding work requirements and the need to be persistently on-call for the non-work life of crew personnel are obvious.

Crew personnel at short-line and regional railroads typically do not perform the quantity and type of work that OTRR will demand of its own T&E employees. The nature of the work performed by smaller railroads often contributes to a better quality of life than would be possible at a Class I railroad and therefore justifies lower monetary

compensation. Smaller railroads typically engage in proportionately more yard work and have fewer long-distance hauls than Class I railroads. Crew assignments therefore tend to be much more predictable with respect to hours and days of operation at the smaller railroads. Crews, in turn, work more regular hours, have more predictable schedules, and enjoy a better quality of life. Given the difference in work demands placed on T&E employees at typical smaller railroads, there is simply no basis for comparing compensation at such railroads to what the OTRR would need to pay.[54]

(b) Summary Of Operating Personnel Compensation

The employees who comprise the OTRR transportation organization are identified in Section III.D.3.a.(1) above. The table below compares operating personnel wage costs sponsored by BNSF to those developed by Otter Tail. The derivation of T&E employee salaries is described in detail in Section III.D.3.a.(2)(a). For all other employees, BNSF 2002 Wage Form A and B average annual salaries were calculated and indexed to first quarter 2002 levels by using the AAR first quarter wage index (316.3) and the average of the four quarterly indexes (318.4).

[54] Indeed, recent filings with the Board by smaller railroads confirm the differences between the nature and level of work Otter Tail expects compared to what crew personnel actually do for smaller railroads. *See, e.g.*, Verified Notice of Exemption of Iowa, Chicago & E.R.R. Corp., *Iowa, Chicago & E.R.R. Corp. – Acquisition & Operation Exemption – Lines of I&M Rail Link, LLC*, STB Fin. Docket No. 34177 (filed June 7, 2002).

Table III.D.3-4
Comparison of Otter Tail and BNSF
Operating Personnel Compensation

Position	Otter Tail			BNSF			
	Personnel	Salary	Total	Personnel	Salary	Total	Total Difference
Vice President - Transportation	1	{ }	{ }	1	{ }	{ }	$57,546
Administrative Assistant	1	{ }	{ }	1	{ }	{ }	$25,838
Director Safety, Rules and Training	1	{ }	{ }	1	{ }	{ }	($514)
Manager-Safety, Rules and Training	2	{ }	{ }	2	{ }	{ }	($859)
Director-Operations Control	1	{ }	{ }	1	{ }	{ }	($514)
Manager-Operations Control	5	{ }	{ }	5	{ }	{ }	($2,147)
Dispatchers	14	{ }	{ }	14	{ }	{ }	($5,096)
Manager Crew Calling	1	{ }	{ }	1	{ }	{ }	($401)
Crew Caller	9	{ }	{ }	9	{ }	{ }	($3,021)
Yard Masters	0	{ }	{ }	10	{ }	{ }	$589,858
Director-Train and Locomotive Operations	1	{ }	{ }	1	{ }	{ }	$5,117
Manager Train Operations	6	{ }	{ }	5	{ }	{ }	$82,625
Asst. Manager-Train and Locomotive Ops	10	{ }	{ }	11	{ }	{ }	$141,642
Director - Customer Service	1	{ }	{ }	1	{ }	{ }	$1,088
Manager - Customer Service	5	{ }	{ }	5	{ }	{ }	$47,507
Crew Haulers	0	{ }	{ }	40	{ }	{ }	$1,532,604
Train Crew Personnel	525	{ }	{ }	664	{ }	{ }	$16,074,297
Total Transportation Department Personnel	**583**	**$1,318,457**	**$33,711,065**	772	**$1,530,333**	**$52,091,387**	**$18,380,322**

(3) Materials, Supplies And Equipment

Otter Tail assumed a 2002 annual expense of $767,905 for materials, supplies and equipment (including office furniture and equipment, office supplies, safety equipment, EOTD devices, two-way radios and batteries, tools, vehicles, etc.) for operating personnel. BNSF reviewed the individual item unit costs that make up the overall material and expense costs; in general, BNSF accepts those item unit costs, though BNSF

does change vehicle selection in some cases and alters Otter Tail's estimate of unidentified safety equipment in the amount of $27.50 per train crew employee to reflect more realistic prices. All costs are applied to the correct number of non-train operating personnel as determined by Mr. McCarren. Where Mr. McCarren has identified specific requirements for the OTRR that were not included by Otter Tail, they have been added.

b. Non-Operating Personnel

(1) Staffing Requirements

Non-operating staff consists of engineering and MOW staff and mechanical staff. BNSF addresses these issues separately. Engineering Department staffing, compensation and allowances for materials and supplies are discussed in III.D.4.b. Engineering Department maintenance of way operating expense equipment is discussed in III.D.4.b.

As to the remaining mechanical staff, Mr. Mueller agrees with the mechanical staffing proposed by Otter Tail, with one exception. Otter Tail has provided one inspector at Converse on a round-the-clock basis. Mr. Mueller has added a second mechanical inspector position at Converse in light of the empty coal train inspections at the yard. These inspectors can make minor repairs to bad-order cars at Converse when not performing inspections. He has provided four people to staff the additional mechanical inspector position at Converse.[55]

The table below compares the mechanical staffing for the OTRR proposed by Otter Tail and BNSF:

[55] A truck with welding equipment should be provided at each of the Donkey Creek and Glendive Yards to facilitate in-train repairs by the existing mechanical forces.

TABLE III.D.3-5

Position	OTRR	BNSF	DIFFERENCE
Vice President Engineering and Mechanical	1	1	-
Administrative Assistant	0	1	1
Director - Safety, Rules and Training	1	1	-
Manager - Safety, Rules and Training	2	2	-
Director - Mechanical Operations	1	1	-
Manager - Mechanical Operations	2	2	-
Mechanical Inspectors	50	54	4
Total	57	62	5

(2) Compensation

Table III.D.3-6
Comparison of Otter Tail and BNSF
Mechanical/Engineering Department Personnel Compensation

	Otter Tail			BNSF			
Position	Personnel	Salary	Total	Personnel	Salary	Total	Total Difference
Vice President E&M	1	{ }	{ }	1	{ }	{ }	$57,546
Administrative Assistant	0		{ }	1	{ }	{ }	$69,071
Director Safety, Rules and Training	1	{ }	{ }	1	{ }	{ }	($514)
Manager-Safety, Rules and Training	2	{ }	{ }	2	{ }	{ }	($859)
Director of Mechanical Operations	1	{ }	{ }	1	{ }	{ }	($514)
Manager-Mechanical Operations	2	{ }	{ }	2	{ }	{ }	($18,410)
Equipment Inspectors	50	{ }	{ }	54	{ }	{ }	$171,227
Total Mechanical Department Personnel	**57**	**$639,908**	**$3,061,185**	**62**	**$755,617**	**$3,338,732**	**$277,547**

(3) Materials, Supplies And Equipment

Materials, equipment and supplies for mechanical non-operating personnel are included in the consideration of materials, equipment and supplies for operating personnel in Section III.D.3.a.(3) above.[56]

(4) Other

c. General and Administrative Expense

OTRR as envisioned by Otter Tail will be a multi-commodity, Class I railroad of substantial scope. In its first year of operations, it will:

- Handle 2.2 million carloads;
- Earn $878 million in revenue;
- Operate and maintain 1,287 route miles;
- Operate in five states; and
- Employ 904 people.

OTRR comfortably exceeds the size of the smallest independent Class I carrier, Kansas City Southern ("KCS") (with 2002 revenues of $566 million), and is vastly larger than any regional carrier. In fact, OTRR has more than twice the revenue of Wisconsin Central System ("WCS" – the North American operations of Wisconsin Central Transportation Company ("WCTC")), the nation's largest regional carrier prior to its merger into Canadian National ("CN") in 2001. While BNSF believes that Otter Tail has overstated OTRR tonnage and revenue considerably, even with all of BNSF's revisions OTRR still earns almost $499.3 million in revenue in 2002 and grows to $649.9 million by 2021.

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[56] BNSF Reply electronic workpaper "OPR_EXP.xls," worksheets "Safety Gear" and "Summary."

Despite its size, Otter Tail proposes that OTRR will require a general and administrative ("G&A") staff of only 43 employees and a G&A budget of a mere $11 million, excluding insurance, depreciation and property taxes. This figure is astoundingly low, and implies that OTRR can operate at a level of administrative efficiency never approached by other North American rail carriers of similar scope. Otter Tail supplies scant justification for such an aggressive assertion. Otter Tail's foundation for its unprecedentedly low cost level rests primarily on two factors: (1) OTRR will have a less complex traffic base than most railroads, requiring less effort for marketing and billing; and (2) OTRR will establish an aggressive outsourcing strategy that eliminates company staff.

The only real-world railroad examples mentioned in defense of OTRR's G&A claims are the South Central Florida Express ("SCFE"), a Class III short-line subsidiary of U.S. Sugar, and Emons Corp., a former small railroad holding company purchased by Genesee and Wyoming, Industries ("G&W").[57] Neither of those examples comes close in size, scope or complexity to the proposed OTRR. Emons, the larger of the two, had 2001 revenues of only $25.4 million; less than 3% those of OTRR.[58] SCFE reported revenues of only $8.4 million in 1998,[59] less than 1% those of OTRR. SCFE's 54,000 carloads are less than 3% of OTRR's.[60] These are glaring disparities and Otter Tail offers little data about these companies that would support any comparison of them to the

[57] In response to workpaper requests, Otter Tail refused to provide more specifics about how its witnesses arrived at their G&A staffing levels and other assumptions. See BNSF Reply electronic workpaper "OTP_G&A_Workpaper_Responses.pdf."

[58] Emons Transportation Group Inc. Fiscal Year 2001 Form 10-K.

[59] *See* Railway Age, August Highlights (9/99) at http://207.252.75.134/aug99/shortline_awards.html.

[60] *Id.*

proposed OTRR. These examples do not provide credible models for the close to $1 billion OTRR Otter Tail proposes.

Otter Tail proposes to operate a far more complex rail undertaking in the OTRR than it would have the Board believe. Not only does OTRR anticipate handling 1.6 million carloads of coal annually, it also plans to handle 0.6 million units of non-coal traffic (1.0 million and 0.5 million, respectively, with BNSF's revisions). Although this traffic has many competitive alternatives to service involving the OTRR, Otter Tail makes no provision for marketing OTRR's services in a competitive environment and assumes that OTRR's connecting railroads will undertake almost the entire customer billing and marketing functions for the benefit of OTRR.

Otter Tail's claims of expense reductions through outsourcing go far beyond the benefits realized by railroads using these strategies. The railroad industry already makes substantial use of outsourcing non-critical functions, and has increased its use in the past decade. While some Class I railroads are restrained by labor contracts from outsourcing all possible functions, the regional carriers formed since deregulation have suffered from no such constraint. Those carriers also outsource many of their G&A functions, but none has achieved the extraordinary levels of efficiency claimed by Otter Tail. A stand-alone railroad is permitted to base cost assessments on an assumption that it will operate efficiently, but it must demonstrate where it will achieve those efficiencies and prove that they are achievable. Otter Tail has not done that here.

BNSF's witness J. Reilly McCarren offers testimony on OTRR's G&A requirements. Mr. McCarren is the Chairman of the Arkansas and Missouri Railroad ("A&M"), a Class III railroad operating in its namesake states. Previously, Mr.

McCarren was President and CEO of WCS and directed those operations from 1996 to 2001. In 2000, its last full year of operations, WCS enjoyed $380 million in railway operating revenues, operated approximately 2,800 route miles, employed over 2,200 people and handled 562,000 of its own carloads, as well as 150,000 carloads of haulage traffic for CN. From 1998 to 2001, Mr. McCarren served as a board member of WCS' parent WCTC and in that role became familiar with railway operations overseas, where WCTC was an active player on the railway privatization front.

Mr. McCarren was President and CEO of Gateway Western Railway ("GWWR") a $40 million, 400 mile Class II carrier operating in Missouri and Illinois from 1990 to 1996. During 1991, Mr. McCarren also served as interim President and CEO of the Wheeling and Lake Erie Railway, a 900 mile Class II carrier operating in Ohio and Pennsylvania. Altogether Mr. McCarren has spent 25 years in the railroad industry.

Mr. McCarren has been active in railroad industry affairs since founding GWWR in 1990. He has served as vice-chairman of the Legislative Policy Council of the American Short Line and Regional Railroad Association and currently serves as co-chairman of the Industry Working Group. He is also a member of the Transportation Research Council, which directs the Transportation Research Forum. With a wealth of Class I, Class II and Class III railroad experience, Mr. McCarren is well-qualified to testify on the G&A requirements of the proposed OTRR.

OTRR Qualifies As A Class I Railroad

In order to evaluate OTRR's operations as compared to real-world railroads, it must first be placed in the proper context. Otter Tail's hypothetical OTRR substantially exceeds the STB threshold for Class I status. The STB classifies railroads by revenue.

Pursuant to STB regulations, 49 C.F.R. Part 1201, Section 1-1 of the General Instructions, the 2002 revenue threshold for Class I railroads is $272 million, which Otter Tail's OTRR substantially exceeds. Similarly, OTRR substantially exceeds the scale of the commonly referred to "local" or "regional" railroad. The Association of American Railroads ("AAR") defines a "regional" railroad as a non-Class I carrier with $40 million in revenue and at least 350 route miles, and a "local" railroad as one with revenue and miles less than a "regional" railroad. *Railroad Ten Year Trends,* AAR at 184, 185 (2001).

By most measures, Mr. McCarren notes that OTRR is substantially larger than all the publicly-traded regional railroads and short-line holding companies. In fact, based on OTRR's assumed 2002 operating revenues it is larger than Class I carriers such as the former Illinois Central ("IC") ($650.2 million), and Grand Trunk Western Railroad, Inc. ("GTW") ($359.2 million)[61] as well as the KCS ($566.2 million) and the Soo Line ($552.2 million). *See Railroad Ten Year Trends at* 34*; see also* the AAR "Greenbook" — Analysis of Class I Railroads 2002.

OTRR's Peer Railroad Group

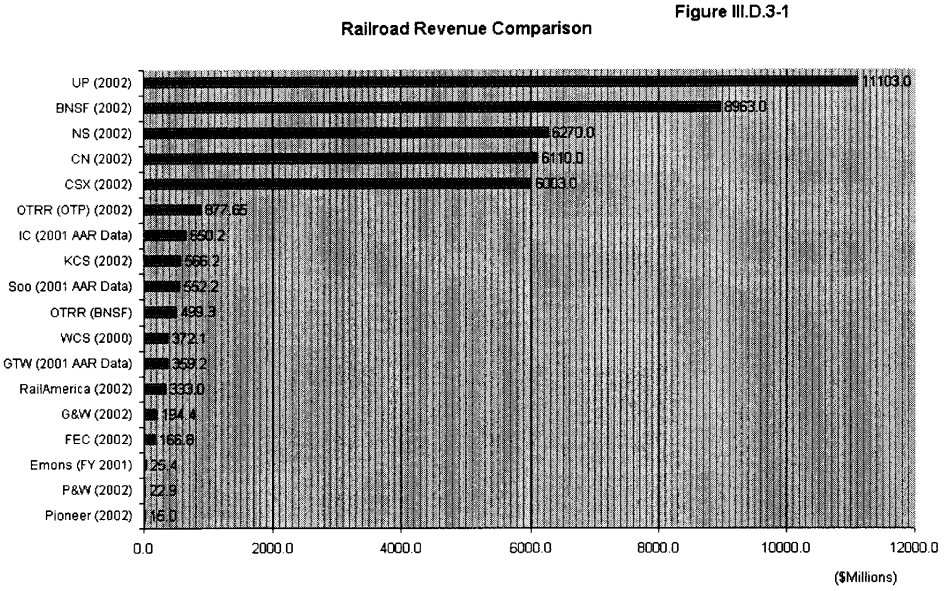
Annual gross revenues are the most commonly used basis for standardizing size in the railroad industry. Otter Tail estimates 2002 revenues of $878 million (BNSF has revised that downward to $499.3 million) for OTRR, which would place it as the sixth

[61] 2001 operating revenue data is used for IC and GTW because these railroads are combined in the 2002 AAR "Greenbook" report.

largest U.S. railroad of those currently operating independently. Figure III.D.3-1 shows OTRR revenue in relation to various other carriers.[62]

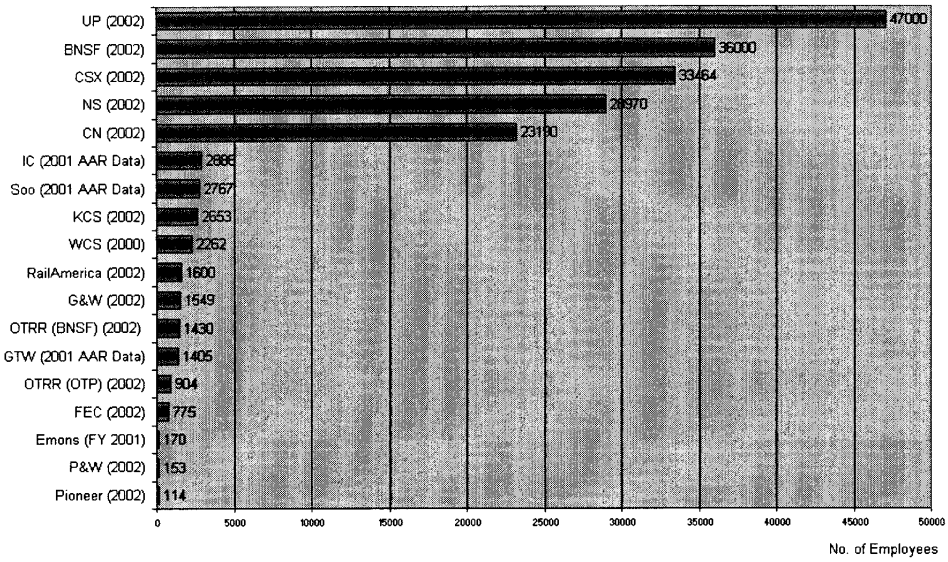
[62] The data in the figures that follow are derived from the companies most currently available data in their 10-Ks, 14As or AAR publications.

Figure III.D.3-1



OTRR, while sixth in rank, is well behind the first five carriers in revenue. A better basis of comparison to OTRR are five carriers: IC, KCS, Soo, WCS, and GTW. CNW, which had slightly more revenue than OTRR in 1994 (*i.e.*, $1.1 billion), would have been a good match, but it has been gone from the scene for too long to make a meaningful comparison. RailAmerica, which has slightly less revenue than the five carriers chosen, is a multi-carrier holding company (comprised of 50 North American railroads, one in Australia and one in Chile) with totally different characteristics from a large single system railroad and, therefore, is not comparable to the proposed OTRR.

Figure III.D.3-2

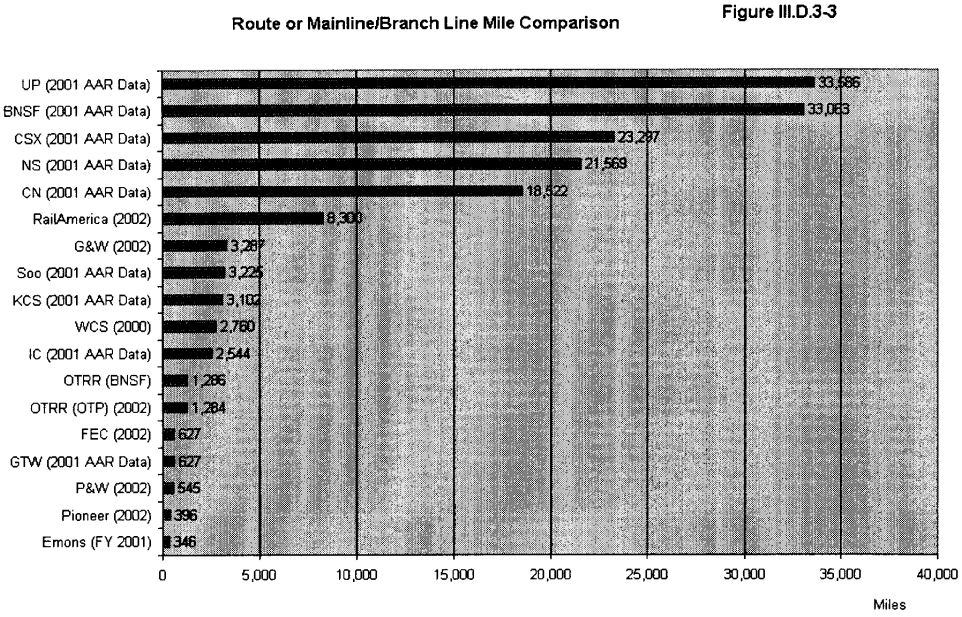


Employment levels are also a good indication of the size and scope of a rail operation. Comparison of overall employment levels with other carriers of similar scale can indicate which real-world carriers constitute the best models for the proposed OTRR. Comparative railroad employment levels are shown in Figure III.D.3-2.

With a proposed 904 employees, OTRR clearly falls within the mid-size railroad group. Excluding multi-railroad holding companies (RailAmerica and G&W), good comparison carriers appear to be the same group of five carriers identified above and the Florida East Coast ("FEC") railroad.

Operating mileage is another measure of comparability. OTRR plans to operate 1,287 miles of railroad, again placing it in a middle class of carriers as shown in Figure III.D.3-3.

Figure III.D.3-3

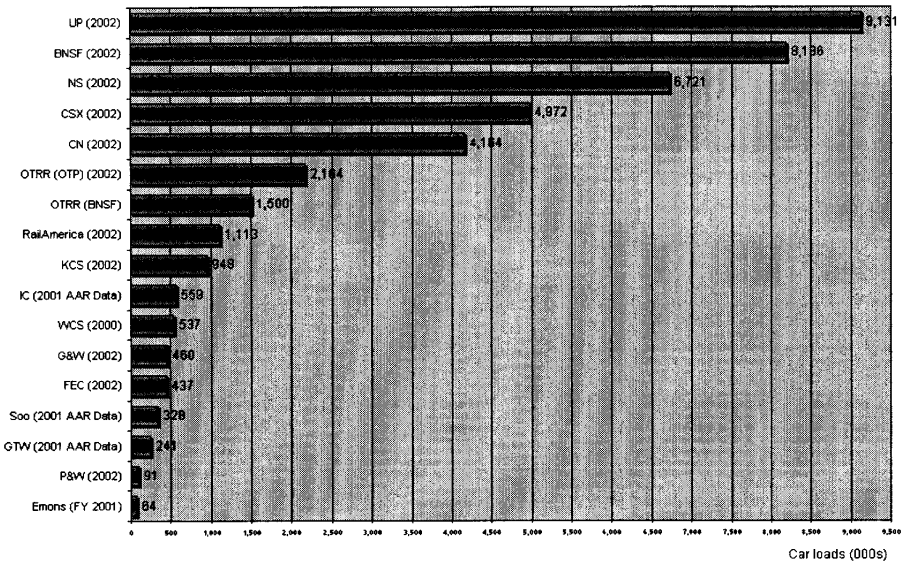


Good comparison carriers to OTRR, again excluding non-contiguous multi-carrier holding companies, include the six carriers identified above and the Providence and Worcester ("P&W").

Finally, total carloads is another statistic commonly used to compare railroad companies. Figure III.D.3-4 shows how OTRR's projection of 2.2 million carloads (BNSF revised 1.5 million) compares with other carriers.

Railroad Carload Comparison

Figure III.D.3-4



Again we see that OTRR is best measured against three of the seven mid-level carriers (IC, KCS and WCS), all of which have been previously identified as comparable carriers under the comparative factors mentioned above.

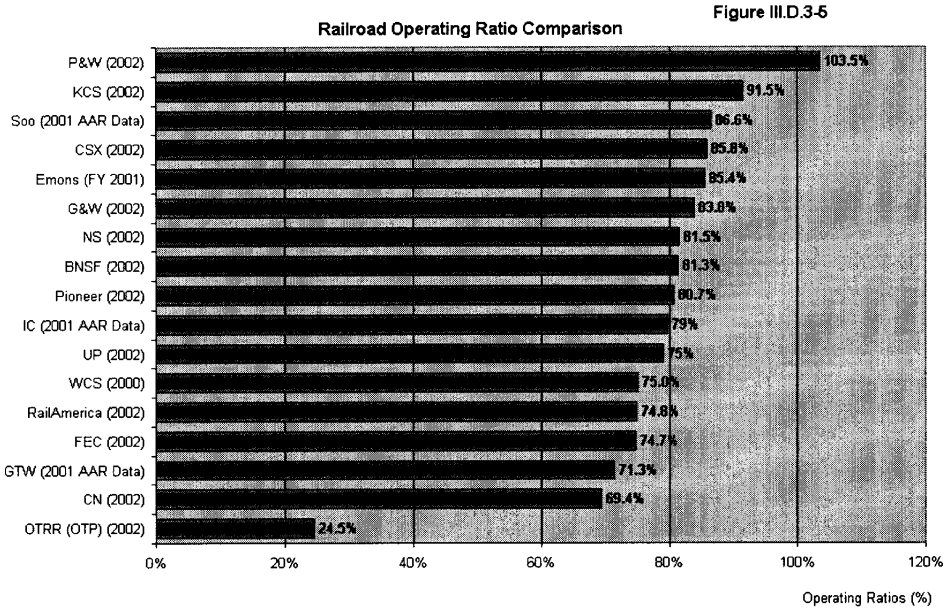
Overall we can see that based on these four measures FEC, GTW, IC, KCS, Soo and WCS are the best real-world carriers with which to compare OTRR. Of those, IC, KCS and WCS have the most comparable operations.

Comparison Of OTRR's Performance To Peer Group

Having identified OTRR's relevant real world peer group, Mr. McCarren considers how it measures up to that group. He determines that OTRR claims a level of efficiency not achieved by any operating railroad of its class. Railroad operating efficiency is judged predominantly by operating ratios. The operating ratio represents a carrier's ratio of operating expenses to operating revenues. The railroad industry has long recognized that the lower the operating ratio, the more efficient the carrier.

Preliminary AAR statistics show that the Class I operating ratio for 2002 was 83.8%.[63] The Class I railroad with the lowest operating ratio for the past several years has been CN, posting a 69% mark in 2002. Otter Tail proposes that OTRR will operate with an operating ratio of ***24.5%***, well outside the range of reported operating ratios as shown in Figure III.D.3-5. This is far better than its comparison group of KCS (92% in 2002), IC

Figure III.D.3-5



(80% in 2001) and WCS (75% in 2000). Figure III.D.3-5 shows that OTRR's proposed operations will yield an operating ratio well *less than half the best mark* posted by an independent U.S. railroad in modern times – IC in 1998 at 64%. From a historical perspective, the AAR reported that Class I's as a group enjoyed an operating ratio of 80.28% in their best year over the past decade.

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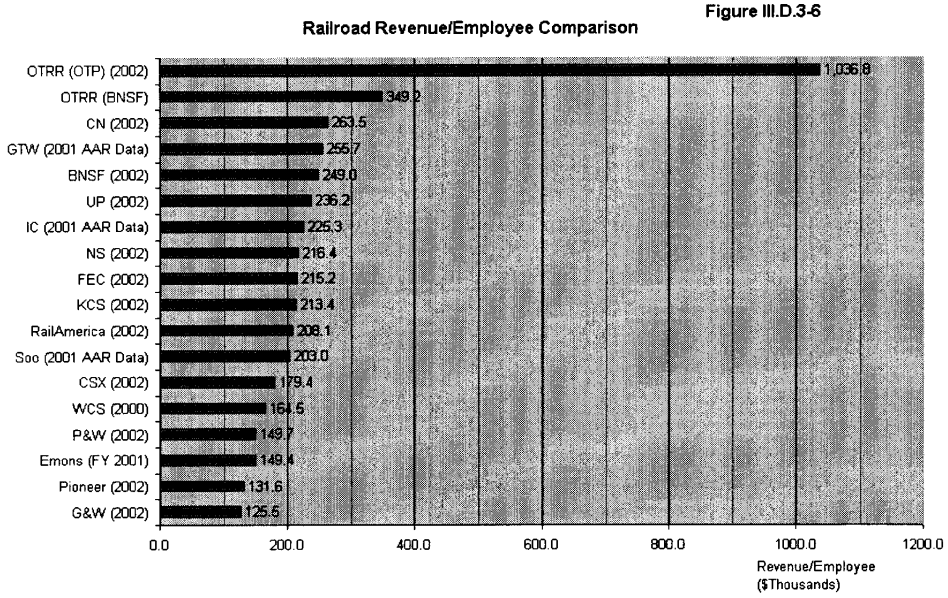
[63] "Class I Railroad Statistics," AAR, May 14, 2003, page 2, published at http://www.aar.org/PubCommon/documents/AboutTheIndustry/Statistics.pdf.

Another key measure of efficiency is labor productivity. While measured in many ways, the most common standard is revenue per employee. OTRR anticipates earning over $1 million in revenue per employee. This measure is also "off the charts" when compared to recent railroad experience as shown in Figure III.D.3-6.

Figure III.D.3-6



Not only does OTRR operate completely outside the normal range for this measure, it also defies the prevailing trend. As can be seen in Figure III.D.3-6, larger railroads generally outperform smaller ones in this measure, because of returns on scale. When compared to the group of its peer railroads (IC-KCS-WCS), with revenue per employee in the $165-225 million range, the anomalous results predicted for OTRR stand out in even greater contrast. Indeed, even as revised by BNSF, OTRR produces more revenue per employee than its peer group.

Taken together, these two measures of operating performance strongly indicate that the structure and economics proposed for OTRR are unrealistic. This overall result

undermines the credibility and reliability of Otter Tail's G&A projections (indeed all its operating expense projections) for OTRR, which fails to comport with the experience of existing players in the industry.

Comparison To WCS

Otter Tail projects operating expenses (less depreciation) of $233.3 million;[64] this is very comparable to the $244.1 million in operating expenses spent by WCS in 2000, making WCS an ideal basis to use to evaluate OTRR's proposed operations. BNSF's witness McCarren notes that in 2000, WCS enjoyed the second-lowest operating ratio of all major, independently-operated North American railroads and was widely regarded as particularly strong with respect to administrative cost containment. Therefore, he uses it as a basis to evaluate Otter Tail's G&A evidence.

Otter Tail proffers an OTRR than employs 43 G&A personnel with G&A expense (excluding depreciation, property/ad valorem taxes and insurance costs) that totals $11,228,000.[65] By comparison, Mr. McCarren's former employer, WCS employed 152 people in comparable areas in 2000, its last full year of independent operation, and its G&A expense including marketing staff costs totaled almost $31 million, excluding depreciation, insurance and property taxes. This expense accounted for 8.3% of WCS' revenue. Otter Tail's OTRR G&A expense amounts to a miniscule 1.3% of revenue. Such a result is infeasible. By comparison, BNSF's G&A expense for OTRR of 4.5% is quite reasonable.

Another useful alternative comparison measure for G&A expenses is the ratio of such expenses to overall operating expenses, less depreciation. Depreciation varies

[64] *Id.*

[65] *See* OTP Nar. Table III-D-9 at III-D-65.

considerably based on the timing of investments and accounting policies and is best excluded for these purposes. WCS' G&A expenses represented over 12.6% of operating expenses (less depreciation). OTRR's projected G&A expenses amount to only 4.8% of OTRR's total operating expenses (and even less if understatements in other expense categories are made).

Otter Tail provides scant rationale for why it would be able to operate such a complex rail system with little more than a third of the G&A expense incurred by one of the industry's most efficient operators. Its filing ignores the anomalous results of its cost calculations, preferring to make vague generalizations about a simplified traffic base, modest route structure and extensive outsourcing. Nothing, however, is simple, modest or unassuming about a railroad that has revenues approaching $1 billion. Absent a convincing explanation for results far outside industry experience, Otter Tail's assumptions are unsupportable.

Since Otter Tail's assumptions are infeasible, Mr. McCarren undertook an independent analysis of the OTRR's G&A costs. Mr. McCarren examines the individual areas that make up G&A expense and identifies where the proposed OTRR operation diverges from normal practice and industry experience.

(1) Staffing Requirements

OTRR proposes a staffing level of 43 G&A employees broken down in departments as follows:

Table III.D.3-7 Otter Tail's G&A Proposal	Employees
President's Office	2
Finance and Accounting Department	20
Information Technology	9
Legal Affairs	3
Human Resources	6
Marketing	3
Total	43

As Mr. McCarren demonstrated earlier, WCS provides a good basis for comparison to OTRR in several respects. WCS employed 152 people in comparable areas, as detailed below:

Table III.D.3-8

Category	Otter Tail's OTRR Staffing	WCS 2000 Staffing	Difference
President's Office	2	2[66]	0
Finance and Accounting	20	64[67]	44
Information Technology	9	17	8
Materials & Purchasing	0	3[68]	3
Legal Affairs	3	4	1
Human Resources	6	21	15
Marketing	3	37	34
Real Estate	0	4[69]	4
Total	43	152	109

[66] WCS was a subsidiary of WCTC; additional executive department personnel were part of the holding company payroll and are excluded here.

[67] Includes Treasury Department personnel organized under WCTC but performing duties principally for WCS.

[68] WCS employed 25 people in materials and purchasing; however, all but 3 are considered to be more appropriately assigned to operating departments and are therefore excluded here.

[69] WCS organized real estate functions in its Engineering Department. OTRR makes no provision for this function.

Another railroad worth examining by way of comparison is the Montana Rail Link ("MRL"), which operates 600 miles of mainline rail from Huntley, Montana to Spokane, Washington. While considerably smaller than the proposed OTRR (MRL had only { } million in projected operating revenues for 2002), MRL's operations bear some similarity to OTRR's in that it serves as a bridge carrier for BNSF (for approximately { } million in revenues). MRL employs about { } employees, { }.[70] Of those, there are { } in non-operating positions, despite operating expenses well below the amount projected for OTRR and revenues of not even { } of OTRR's. Another comparison from the regional railroad arena is G&W, although it is also considerably smaller than OTRR. In 2001, G&W, with North American revenues of only $140 million, employed a G&A staff of { }.

Otter Tail implies that it will operate far more efficiently than the (presumed) inefficient Class I railroads, through its aggressive outsourcing of G&A functions. Yet, as these examples demonstrate, it projects a dramatically lower level of G&A staffing than experienced by regional carriers substantially smaller in size and scope of operations than OTRR. These carriers also make extensive use of outsourcing where it provides financial benefits just as Otter Tail proposes. For example, WCS outsourced all of its revenue accounting and operations support information technology to UP Technologies.

Despite these real world examples, OTRR proposes that it will operate with a fraction of the staffing required by real operating railroads. Using WCS as a basis of comparison, Otter Tail estimates that OTRR can operate with roughly forty percent of the

[70] *See* BNSF Reply electronic workpaper "MRL_Info.doc."

staff, while handling three times the number of carloads and enjoying more than twice the revenue. Otter Tail makes no credible argument for the dramatic difference between its projections and the results achieved by those who actually operate railroads.

In order to achieve the vast improvement in operating efficiency that Otter Tail proposes Mr. McCarren testifies that OTRR would have to benefit from unique strategic advantages, new technologies or ways of doing business. However, he believes nothing could be further from the case. Otter Tail proposes to utilize standard North American railroad operating methods, with just a few changes at the margins. For example, track construction and maintenance will be done with standard AREMA specification materials and using standard methods used by virtually all railroads. Trains will be manned by industry-standard two person crews. Standard issue locomotives will be employed, exactly the same type of locomotives currently purchased by the incumbent BNSF. Otter Tail proposes to utilize a third party information system for railroad operations already used by hundreds of North American railroads. The service provided by OTRR to its customers will generally mimic that provided by BNSF today. In Mr. McCarren's opinion, nowhere in the Otter Tail proposal is there a unique idea, plan or proposal that could give rise to a fundamental change in railroad economics. Yet Mr. McCarren states that the results contemplated by Otter Tail would only happen if railroad economics were changed in such a manner.

Mr. McCarren concludes such bizarre results stem instead from erroneous assumptions and the failure to acknowledge important areas of expense. Otter Tail has the burden to show that all its operating costs are verifiable. *Coal Guidelines*, 1 I.C.C. 2d at 543. It has not done so here.

BNSF's Proposal

Mr. McCarren concludes that it would be necessary to increase OTRR's staffing substantially to operate the proposed rail system in a responsible manner. To determine a credible G&A staff, Mr. McCarren presents a detailed, bottom up review of OTRR functions and identifies staff and compensation costs that OTRR would experience in order to operate. As Mr. McCarren explains, the operations of OTRR are comparable to those of small Class I carriers and large regionals such as WCS. He assumes that OTRR, although officially a Class I carrier as defined by the STB, could feasibly operate at the levels of WCS or other mid-sized regional carriers. In other words, he makes the *very conservative* assumption that OTRR can operate more efficiently than all its Class I peers currently do. This assumption results in a redesigned OTRR that is the least cost, efficient SARR that is feasible rather than the infeasible OTRR that Otter Tail posits.

Mr. McCarren makes several staffing and costing recommendations that he states will bring OTRR to the minimum G&A staffing levels necessary to make its operations feasible. First, he examines the specific G&A staffing requirements and expenses for each Department of the OTRR and compares Otter Tail's assumptions with the minimum requirements for a railroad of the size and complexity of OTRR. Second, Mr. McCarren examines the compensation levels for OTRR's executives. Finally, he identifies certain necessary start-up costs for the new railroad, which are addressed below and in Section III.D.3.c.(4).

Otter Tail proposes a G&A staff of 43 for the OTRR headquartered in Donkey Creek, Wyoming. The OTRR staff will either perform G&A functions themselves or oversee the functions that are contracted out to third parties. The proposed staff is

insufficient to accomplish the mission with which it is charged. Mr. McCarren has redesigned the organization to accomplish the tasks required. That redesigned organization is set forth in Table III.D.3-9 and contrasted with the proposed OTRR organization. The individual positions are then described in the narrative that follows.

Table III.D.3-9

General & Aadministrative Department/Position	Otter Tail's Employee Count	BNSF's Employee Count	Difference
1. President's Office			
a. President	1	1	0
b. Administrative Assistant	1	1	0
c. Corporate Secretary	0	1	1
Subtotal – President's Office	2	3	1
2. Finance and Administration			
a. Vice President – Finance	1	1	0
b. Secretary	1	1	0
c. Vice President – Treasurer	1	1	0
i) Assistant Treasurer	0	1	1
d. Cash Manager	1	2	1
e. Controller	1	1	0
f. Assistant Controller - Revenue	1	1	0
i) Manager - Revenue	0	2	2
g. Director - Taxes	1	1	0
i) Director – Financial Reporting	0	1	1
h. Manger Financial Reporting	1	1	0
i) Property Accounting Analyst	0	1	1
ii) Sr. Financial Analyst	0	3	3
iii) Manager – Accounting	0	1	1
i. Staff Accountant	1	0	(1)
j. Revenue Accounting Clerk	3	8	5
k. Assistant Controller – Disbursements	1	1	0
i) Manager – Accounts Payable	0	1	1
ii) Manager - Payroll	0	1	1
l. Director Revenue Accountants	0	1	1
m. Manager Revenue Analysis	0	1	1
n. Revenue Analysts	0	2	2
o. Manager Car Hire	1	1	0
p. Disbursement Clerks	2	2	0
q. Payroll Clerks	2	1	(1)
i) Manager Misc. Billing	0	1	1
r. Costs and Budget Clerk	0	1	0
s. Secretary	1	0	(1)
i) Director – Internal Audit	0	1	1
Subtotal – Finance and Accounting	20	40	20

General & Aadministrative Department/Position	Otter Tail's Employee Count	BNSF's Employee Count	Difference
4. Information Technology			
AVP – Information Technology	0	1	1
a. Director	1	1	0
b. IT Specialists	8	10	2
Subtotal – Information Technology	9	12	3
5. Legal Affairs Department			
a. General Counsel	1	1	0
b. Staff Attorney	1	1	0
c. Secretary/Paralegal	1	1	0
Subtotal – Legal Affairs Department	3	3	0
6. Human Resources Department			
a. Vice President – HR	1	1	0
b. AVP – Safety & Claims	0	1	1
c. Director – Safety & Loss Control	0	1	1
i) Manager - Security	0	1	1
d. Director – Recruitment	1	1	0
e. Director – Personnel	1	1	0
i) Human Resources Coordinator	0	3	3
f. Director – Compensation & Benefits	0	1	1
g. Analyst	1	1	0
h. Claims Manager	1	1	0
i. Secretary/Administrative Assistant	1	1	0
Subtotal – Human Resources	6	13	7
6. Marketing Department	0		
a. Vice President - Marketing	1	1	0
i) Secretary	0	1	1
b. AVP – Coal Marketing	0	1	1
c. Director – Coal Marketing	0	1	1
d. Manager – Coal Marketing	0	3	3
e. Marketing Analyst (Coal)	2	1	(1)
i) AVP – Merchandise Marketing	0	1	1
ii) Director Forest Products	0	1	1
i) Market Mgr. – Forest Products	0	1	2
iii) Director Industrial Products	0	1	1
i) Market Mgr. – Industrial Products	0	3	5

General & Aadministrative Department/Position	Otter Tail's Employee Count	BNSF's Employee Count	Difference
iv) Director Agricultural/Food Products	0	1	1
i) Market Mgr. – Ag/Food Products	0	2	3
v) Director Intermodal/Automotive	0	1	1
i) Market Mgr – Intermodal/Auto.	0	2	2
vi) Director of Marketing Adm.	0	1	1
i) Tariff Administrator	0	1	1
Subtotal – Marketing	3	23	20
7. Materials and Purchasing Department			
a. Director of Purchasing	0	1	1
i) Manager of Purchasing	0	2	2
Subtotal – Purchasing	0	3	3
8. Real Estate Department			
a. Director of Real Estate	0	1	1
b. Manager of Real Estate	0	1	1
Subtotal – Real Estate	0	2	2
Total – G&A	43	99	56

(a) President's Office

Otter Tail proposes that the OTRR President's office contain a President and an administrative assistant. Under its proposal, the President will have each OTRR Vice President reporting to him/her. That person will also chair a five person board consisting of him/herself, two other inside Directors, a customer group Director and a single outside Director representing investors. The two outside Directors would each receive $30,000 annually in compensation.

Mr. McCarren agrees with the functions set forth by Otter Tail for the President; however, he concludes that the President's office must also have an additional person to act as corporate secretary and director of corporate relations. OTRR, while conceived as a private corporation, will nonetheless be a company of substantial size. Organizations of this size and scope typically have an individual assigned to insure that the needs of the Directors are met, proper corporate records are kept, and that the company operates within the laws of corporate governance. In the current corporate environment, such attention to detail is all the more important. The Board has previously found such a position to be appropriate in *TMPA*, slip op. at 95. Mr. McCarren adds such an employee to the OTRR organization.

Mr. McCarren disagrees with Otter Tail regarding the appropriate size, composition and compensation of OTRR's Board of Directors. As several recent corporate scandals have proven, protecting stakeholders' interests has become increasingly more complex and important. While not a public company, OTRR will be of a substantial size and require significant financing. Its investors will require a board that accurately reflects their interests and stake in the company. Since OTRR plans to incur a significant amount of debt, lenders will likewise insist that it employ corporate governance requirements commensurate with an enterprise of its size. Moreover, they will insist that the board have sufficient competence and experience to properly oversee the activities of management. The board proposed by Otter Tail does not come close to meeting these requirements.

Mr. McCarren has reviewed information on publicly-traded Class I, regional and short-line railroads. The boards of the 15 railroads whose information he reviewed

ranged from 5 to 15 Directors (or on average 9.3 Directors), including from 2 to 13 outside Directors (or on average 7.7 outside Directors). A summary of those Boards appears below:

Table III.D.3-10

Board of Directors
Railroads

Railroad	Total No.	Outside No.	Compensation
BNSF	12	11	$40,000/yr; add'l $5,000 for Comm Chair $1,000/mtg (Board or Comm)
			3,000 BNSF Shares each election; 1,000 Restricted Stock Units for new Board members
			(Only outside directors receive compensation)
CN	15	13 12 (unrelated)	In CAD: $44,000 (fee); including in CAD: 15,700 in retainer fees and either 400 common shares of the Company purchased by it on the open market or 400 restricted shares
			$1,570 per day for each board mtg, add'l $1,570
			if travel to meetings (the Directors received an additional comm. member; $1,570/comm. Mtg; $5,500 for
			comm. member; $1,570/comm. Mtg; $5,500 for
			comm. chair
			The above applies to 12 unrelated directors
			Chairman of board rec'd $296,000 (including retain fee of $141,000& 2,000 common stock shares)
			2 Officers rec'd no comp for board membership
CSX	12	10	$40,000/yr to non-employees; $5,000/yr for Comm Chair; $1,000/mtg (Board & Comm); 2000 shares to
			non-employees
			Stock grants and options
IC	9	8	$170,000 Chairman $20,000 Outside Directors
			$3,000/Comm. Chair (Outside Directors)
			$2,000/mtg Attendance (Outside Directors)
			2,250 Stock Options
			Retirement Plan
KCS	8	7	$4k/Bd mtg in person $2k/Bd mtg via phone
			$2k/Comm mtg in person
			$1k/Comm mtg via phone
			Addl $500/Comm mtg to Comm Chair
			Awards and options
			(Only outside directors receive compensation)
NS	9	8	$32,000 retainer
			$4,500/qtr/comm served
			3,000 restricted stock shares 1st time elected
			4,000 stock units
			(Only outside directors receive compensation
UP	11	9	Eff. 01/03: $90,000/yr; add'l $15,000 for Comm Chair
			Liability insurance, pension, other stock awards
			(Only outside directors receive compensation)

WCTC	9	6	6,000 share stock option and either (1) $30,000 in phantom stock; or (2) $15,000 cash and $15,000 phantom stock Chairman also receives $120,000.00
FEC	10	9	$30,000 Retainer; $5,000 for Comm. Chair $2,000/mtg Attendance (Board & Comm.) $50,000 restricted stock upon election/reelection (Only outside directors receive compensation)
Emons	7	5	$10,000 each Director; $500/Bd or Comm. mtg in person; $250/Bd of Comm. mtg by phone (Only non-employee directors receive compensation)
G & W	9	8	$15,000 each Director; $1,500/Bd mtg; $500/Comm. Mtg $250/Bd or comm. mtg by phone Stock Options (Only outside directors receive compensation)
Pioneer	5	2	$5,000/Director
P & W	9	7	$500/Bd + $50 per mtg for each year as Director $300/Comm. Mtg, $350/Comm. Mtg for Comm. Chair 100 shares stock option (Only outside directors receive compensation)
R A	8	6	$36,000/yr; $1,000 per Brd mtg $1,000 per comm. Mtg, $1,500 for Comm. Chair 50,000 shares stock option upon initial election 5,000 options (Only outside directors receive compensation)
CNW	7	6 (1994 Data)	$50,000/non-employee Director

BNSF Sources: 03/11/03 Proxy Statement
CN Sources: 03/04/03 Proxy Statement
CSX Sources: 03/21/03 Proxy Statement
IC Sources: Year 1996 Schedule 14-A
KCS Sources: 04/04/03 Proxy Statement
NS Sources: 03/17/03 Proxy Statement
UP Sources: 03/06/03 Proxy Statement
WCTC Sources: Year 2000 Schedule 14-A
FERC Sources: Florida East Coast Industries 04/28/03 Proxy Statement
Emons Source: Fiscal Year 2001 Schedule 14-A
G&W Source: 04/21/03 Proxy Statement
Pioneer Source: 05/12/03 Proxy Statement
P&W Source: 03/28/03 Proxy Statement
RailAmerica Source: 04/30/03 Proxy Statement
CNW Source: Year 1994 Schedule 14-A

Based on his experience with non-public small railroads and the public WCTC, Mr. McCarren concludes that a company of OTRR's size should have a minimum of 7 Directors with at least 5 outside Directors, 4 of whom should be independent of any dealings with the company exclusive of ownership interest. The inside Directors should include the President/CEO and the Vice President of Finance/CFO as Otter Tail proposes. Given the prominence of outside equity capital and the private nature of the firm, the board should have a non-executive Chairman drawn from the ranks of outside Directors. At least one of the other outside Directors should have sufficient financial expertise to serve as Chairman of the Audit Committee.

The only railroad in the table above with fewer than 7 Directors is Pioneer Railcorp, a small railroad holding company with approximately $15 million in revenue and a market capitalization of $10 million. All of the railroads above have between 1-3 inside Directors, with 13 of the 15 having 2 or fewer inside Directors.

While inside board members will serve without compensation beyond their normal salary, outside board members will need to be compensated commensurate with their service. For a company of this size, an annual fee of $40,000, including travel and expenses, is reasonable. Since OTRR is a private company, with no public market for its securities, such compensation should be in cash. With no opportunity to profit from increasing share prices, such a compensation scheme is conservative in today's world. Additionally, Mr. McCarren notes that OTRR would pay approximately $750,000 for Directors' and Officers' Insurance.

(b) Finance And Accounting

Otter Tail proposes that OTRR can handle its finance and accounting requirements with a mere 20 people. The justification for such a small number is

predicated on relying on connecting carriers to bill customers and outsourcing functions frequently performed in-house by Class I railroads. Otter Tail ignores the fact that it plans to handle over 600,000 units of general freight traffic, the large majority needing to be billed, if not to customers then settled with other rail carriers. Moreover, Otter Tail does not provide sufficient staff in other areas to track expenses properly, pay invoices and conduct the other functions expected of the finance department of such a large company.

In comparison to OTRR, WCS had 64 people in its Finance and Accounting Department, exclusive of information technology and materials and purchasing. The much smaller IMRL, with revenues of approximately $130 million in its last year of operations, had 34 non-information systems employees in its finance and accounting department.[71] MRL, with revenues of { } million, has { }employees in its accounting department.[72]

Mr. McCarren estimates that OTRR will require a minimum of 40 finance and accounting employees, double that projected by Otter Tail but still far less than WCS. This number takes into account the functions outsourced by Otter Tail and does not reflect returning any of those functions to the company, but simply insuring that the outsourced functions have appropriate oversight.

Both Otter Tail and Mr. McCarren provide for a Vice President – Finance and an administrative assistant. In the Treasury area, Otter Tail provides for a Vice President – Treasurer and a single "cash manager." Based on his experience at WCS and other regional companies, Mr. McCarren provides for an Assistant Treasurer and a second

[71] BNSF Reply electronic workpaper "IMRL_Admin_org.xls."

[72] BNSF Reply electronic workpaper "MRL_Info.doc."

Cash Manager. This staff is considerably smaller than the seven person Treasury area at WCS; however, it does take into account the fact that OTRR is not a public company. It is still, though, a company that claims to average more than $1 billion in revenues over the study period (half a billion under BNSF's revision). With operations that substantial, and with the complexities inherent in running a modern railway network, more resources in this area are required.

Otter Tail provides for a Controller and three clerks in the revenue accounting area, relying on limited customer billings to justify a force dramatically smaller than the 19 employed by WCS in this area. OTRR is not a simple, one-commodity railroad, however. With a diverse traffic mix, significant effort will be required to settle interline revenues with other railroads, even if other carriers handle the customer billing. Otter Tail has undoubtedly underestimated its requirement for customer billing as well, since many of the non-coal shipments will likely move on a "Rule 11" basis where each carrier in the route bills the customer for its portion. Intermediate carriers such as OTRR trying to entice customers to use their services frequently employ Rule 11 billing to conceal their rate from competitors and take advantage of proportional rates to interchange gateways. Even where interline rates apply, settlement in the railroad industry is far from straightforward, and a substantial number of interline bills require adjustment between carriers. Mr. McCarren provides for a Controller, two Revenue Accounting Managers and eight clerks, for a total of 11 in this important area.

Both Otter Tail and Mr. McCarren agree that a single tax expert will suffice for a railroad the size of OTRR. The increased staffing he proposes in other areas can support the tax effort where specialized subject matter knowledge is not required.

In the financial reporting area, Otter Tail provides a single Manager, assisted by a staff accountant. This is insufficient to generate the quantity and quality of financial information required by such a large company. Mr. McCarren employed seven people in this function at WCS. He believes that six would be required to staff the area at OTRR adequately, reducing one position due to the reduction in regulatory reporting required as a result of OTRR's private status and simpler corporate structure. This level of staffing is necessary because OTRR has virtually the same level of operating expense as WCS, and its overall spending exceeds that of WCS. OTRR should provide the same level of financial information to its management, board and investors as WCS did.

In the disbursements area, Otter Tail provides an Assistant Controller, two payroll clerks and two disbursement clerks for a total of five. Exclusive of payroll, Mr. McCarren finds this staffing level insufficient compared with his experience at WCS and elsewhere. WCS employed a Manager of Accounts Payable and 3 analysts (clerks) in this area. Given the probable reduced level of capital expenditures for OTRR, because the plant and equipment are new, the two clerks cited by Otter Tail will likely be sufficient; however, a Manager will be required. Mr. McCarren notes that WCS and OTRR operating expenses are almost identical, so their accounts payable requirements should be quite similar as well. Regarding payroll, given the outsourcing of paycheck preparation embraced by OTRR, Mr. McCarren agrees that two positions is sufficient, but one should be a manager's position to supervise properly this important area. After all, OTRR employs over 900 people.

WCS employed a sub-group in finance and accounting responsible for analyzing revenue issues and trends and resolving substantive disputes that could not be quickly

settled by revenue accountants. Otter Tail fails to provide for such a function at OTRR. While in an ideal world, most of this work would not be required, the real world of railroading includes overcharges and undercharges, systems issues, miscoding of bills and a host of problems that need to be resolved. Even if OTRR's employees perform flawlessly and its systems work to perfection, it has positioned itself as an interline carrier in a imperfect world. With half a billion in revenue, Mr. McCarren finds that OTRR has too much at stake to leave this area unprotected. He has provided a staff consisting of a Director, a Manager and two analysts. The Director will also supervise the Manager of Car Hire and the budget clerk where Otter Tail and Mr. McCarren agree on employee counts. Mr. McCarren has also added a Manager of Miscellaneous Billing in this area, to handle billing of non-freight items such as joint facilities, real estate leases and easements, locomotive and freight car repairs, *etc.* Otter Tail has not provided for a Manager of Car Repair Billing in the Engineering/Mechanical department so Finance will need to provide this function. Car repair billing is a specialty area that requires specific training and experience. Depending on the quantity of foreign car repairs performed, a second person may well be required. Otter Tail has provided no information on projected car repair activity, but with 50 car inspectors, a significant repair volume would normally be expected.

Otter Tail also provides a general secretary for the finance and accounting department. Given his specific development of sub-department staffing and modern business practice, Mr. McCarren has eliminated that position.

Mr. McCarren has also provided a Director of Internal Audit. While Otter Tail provides for "internal systems review" as part of their projected auditing expense, a

company this size should not operate without an internal auditor. There is a frequent misperception that internal auditors spend all their time investigating possible improprieties or engaged in forensic accounting. Most companies use their internal auditors primarily to ensure that their system of controls remains appropriate and that the relationship between operating organizations and the finance group enhances overall effectiveness. No matter how well structured an organization may be at startup, it needs to evolve over time and a good internal auditor helps ensure that this evolution does not compromise the essential system of checks and balances in a large organization.

(i) Materials And Purchasing

BNSF's reply leaves material handling personnel in the Engineering Department, as proposed by Otter Tail. However, Otter Tail does not provide for a centralized purchasing authority, which would be required for an enterprise of this size. OTRR will have substantial purchasing requirements, well in excess of $3 to $4 million annually. While low unit cost, routine items can be purchased directly by the operating departments, larger purchases will need review and approval at headquarters. Therefore, Mr. McCarren proposes a Director of Purchasing, reporting to the Vice President - Finance. Under the Director would be two Purchasing Managers working directly with vendors and the operating departments.

(ii) Real Estate

Otter Tail does not provide any personnel to handle the real estate function. With 1287 route miles, OTRR will of necessity have a number of real estate issues. Most of these will take the form of crossings, licenses and easements for utility lines, cable TV and the like. Dealings with state departments of transportation on highway crossings and replacement of existing crossings will take considerable time. Municipal authorities seek new road crossings from time-to-time as well. While OTRR is custom-designed for the traffic at hand, over time operations and facilities will change and some land will no longer be required while OTRR will need to acquire additional property for new facilities. Mr. McCarren proposes a real estate department of two individuals; a Director and a Manager. This is half the force employed at WCS, which had about twice the road mileage proposed for OTRR. While WCS organized these individuals in the engineering

department, they can be equally well situated in the finance department, and here report to the VP – Finance.

(iii) Outsourced Expenses

Otter Tail includes a cost of $200,000 for its annual audit, citing the experience of U. S. Sugar Corporation owned SCFE, an enterprise significantly smaller than OTRR. WCTC's audit fees in 2000 and 1999 were $264,000, and $240,000 in 1998. Given the increased scrutiny of corporate auditing in recent years, auditing fees have increased since 2000. Another comparable railroad, KCS, had audit fees of $555,633 in 2002.[73] While OTRR would not have the auditing fees associated with a public company, it would have fees associated with preparing R-1 financials for the STB. WCS, which was divided into Class II and III railroads for classification purposes, did not prepare an R-1. As a result, Mr. McCarren estimates that an appropriate annual audit fee for OTRR in 2002 would be $275,000.

The $60,000 that OTRR plans to pay for outside tax services also appears to be understated. Mr. McCarren believes that a company the size of OTRR, operating in five states would likely pay at $70,000 for those services, based on consultation with WCS' auditors, KPMG. In addition, startup tax consultation would likely total an additional $10,000.

(c) Information Technology Department

Otter Tail proposes staffing its information technology ("IT") department with one Director and eight specialists. Operating systems would be built around RMI's RailConnect operating and revenue accounting systems, which are web-based and allow

[73] *See* KCS Proxy Statement (Apr. 4, 2003) and Fiscal Year 2002 Form 10-K.

all back-office work to be done by RMI in Atlanta on an ASP basis. BNSF witness McCarren is very familiar with the RailConnect product as the A&M recently installed RailConnect to replace an older RMI product.

Mr. McCarren agrees that the RailConnect product will support the necessary car movement and billing functions required by OTRR, but cautions that it lacks many of the management functions that enable enhanced utilization of rolling stock and physical plant assets. WCS, which considered the RailConnect product as a less-costly outsourcing alternative, elected to stay with UP Technologies due to the benefits provided by the greater breadth of the UP Transportation Control System. These benefits included locomotive maintenance systems, enhanced customer service support, and transportation reports that allowed terminal supervisors to anticipate yard and train loadings. One system that OTRR will require that has not been enumerated in Otter Tail's filing is a car repair billing system. A suitable system is also available from RMI. This system is priced on a transaction basis, $0.15 per repair line item. BNSF assumes that OTRR will recover the transaction-based charges in its car repair billing, which Otter Tail has not discussed. However, based on discussion with RMI, there will be a one-time training expense of approximately $10,000 to get OTRR up and running on the system.

Based on his experience at WCS, Mr. McCarren finds the proposed staffing levels insufficient for a company of the size and scale of OTRR. WCS operated with an IT staff of 17 in a similarly outsourced environment, albeit with a larger network than proposed for OTRR. WCS also employed outside consultants on a continuing basis to augment its work force – often as many as 6. Otter Tail does not make clear in their filing who will be responsible for the voice communication network – there appear to be no

communication technicians provided in the Engineering Department, yet no one in the IT department is specifically assigned these duties (the network engineers are tasked to handle "telecommunications issues which may occur"). The management of the voice communication network will be a considerable task, given the number of communication devices required and the pace of technology change in this area. Mr. McCarren has placed this responsibility in the Engineering Department, which will be addressed by Mr. Walton in Section III.F.6. In addition, he has augmented the force of IT specialists by two. One additional PC technician will be necessary to handle the increased number of PC's that the company will require once the G&A force is adjusted to realistic levels. The second is an Applications Programmer for financial software applications. WCS employed 3 people in this area, despite the fact that it used a general accounting system called MAS 90, the precursor to the MAS 200 envisioned for OTRR.

In addition, Mr. McCarren adds an Assistant Vice President to run the Department, as was the practice at WCS. IT is simply too important a function to be headed by a Director. The Director's position will still be very much required, given the number of staff and varied responsibilities. With these additions, the total IT staff numbers only 12, less than the WCS IT staff of 17 and communications staff of 4.

(d) Legal Affairs Department

Otter Tail proposes a Legal Affairs Department staffed by a General Counsel, a staff attorney and a paralegal. Mr. McCarren notes that while WCS operated with this staff plus an Assistant General Counsel for most of his five-year tenure at the company, during the final six months of operation the company was able to operate without the Assistant General Counsel, through increased use of outside legal services. Therefore he concurs with the smaller staffing proposed by Otter Tail.

The proposed outside legal budget of $250,000 is substantially below that required for a railroad of this size and scope. Otter Tail offers no justification for this number. WCS paid legal fees of $821,000 in 2000, $1.8 million in 1999 and $1.6 million in 1998; and average of $1.4 million. Another regional carrier, MRL, reports spending in excess of { } million in 2001 alone.[74] While some reduction in legal expense can be expected for OTRR due to its smaller number of employees, a reduction of 82% from the WCS level is not credible. Mr. McCarren believes that outside legal expenses should be conservatively budgeted at $1 million.

(i) Environmental

Another important function that Otter Tail has failed to staff is environmental engineering and compliance. Many railroads organize this function within their engineering department; however, it can be equally well situated under the General Counsel's office. BNSF witness McCarren suggests that this function be addressed by Mr. Albin in the Engineering Department.

(e) Human Resources Department

Otter Tail proposes to staff the OTRR Human Resources ("HR") Department with 5 staff reporting to a Vice President, for a total of six people. One of the six is a Claims Manager, although most claims work is outsourced. WCS also organized its claims function as a part of HR, and utilized outsourcing as well, although not to the extent projected by OTRR. WCS employed a total of 21 personnel in HR. OTRR employs 904 in 2002, whereas WCS employed an average of 2239 in 2000, meaning OTRR has 40% of the employee force of WCS. In reply, BNSF determines that OTRR will require 1,430

[74] BNSF Reply electronic workpaper "MRL_Info.doc."

employees in 2002, raising OTRR's percentage in comparison to WCS to 64%, which equates to 13 HR personnel.

OTRR is configured as a non-union company. WCS was also predominantly non-union – over 70% of its workers were not represented. Of all the mid-sized carriers, WCS was the only one with such a low level of union representation. Mr. McCarren notes that preservation of a non-union environment requires a more substantial and active HR department than at a traditional, unionized railroad. Sufficient HR employees need to be available to resolve employee issues that would otherwise be resolved through a grievance procedure in a union shop. Notwithstanding that, there are economies of scale in HR administration; specialized functions such as benefits administration do not increase proportionately with the work force. Therefore, to provide HR coverage equal to WCS, and remain non-union, OTRR will require a ratio of human resources professionals to overall employment similar to or greater than that of WCS. OTRR has only one position, the Director - Personnel assigned to directly interface with employees. That is clearly inadequate.

WCS had nine people, exclusive of compensation and benefits personnel, directly assigned to support a larger workforce. Proportionately, OTRR would require four to achieve the same level of coverage. Mr. McCarren adds three HR Coordinators reporting to the Director – Personnel to handle this task. OTRR does not designate anyone to handle compensation and benefits, a key HR responsibility, although Otter Tail provides for a single analyst position without specific responsibilities. Mr. McCarren adds a Director – Compensation and Benefits. The analyst will report to this individual and

assist in the recruitment effort as well, which will include analysis of competitive labor market conditions in order to determine appropriate wage and benefit offerings.

Otter Tail makes no mention of outsourcing or material costs for HR other than training expenses. WCS found outsourcing the preferred route for applicant pre-employment testing (both attitude and aptitude). These tests greatly improved the quality of new-hires and reduced the percentage that failed to develop into successful employees or dropped out of training. *See* recruitment discussion at III.D.3.c.(4)(b). The expense of testing hourly employees is largely represented by the time and effort of HR professionals included in the proposed staffing levels. For supervisory and managerial hires, more expensive outside testing will be appropriate. WCS spent approximately $125 per finalist for these positions. Assuming three finalists per position, that represents an outsourced expense of $375 per position. Mr. McCarren has estimated testing costs at $100 per hired employee. In addition, HR at WCS administered a program of safety awards and incentives. Most companies in the railroad industry operate such programs in an effort to keep safety "top of mind" in their employees. At WCS, such programs cost approximately $70 per employee annually. Mr. McCarren adopts that unit cost for OTRR.

In the Claims area, Otter Tail provides a single Manager of Claims and provides a $125,000 annual budget for claims services. No centralized safety management is anticipated. Again, Mr. McCarren's real world experience at WCS indicates that more resources will be required. Prudent and proactive management of safety, claims and loss control for such a substantial company requires more internal staffing than a single Manager's position. As a standard of comparison, WCS employed 8 people in this area;

MRL, with a much smaller operation employs { }.[75] Both use outsourced claims services to handle major claims events.

Acknowledging that the Manager and outsourced staff can handle the routine claims items, Mr. McCarren determines that more senior management will be required. He adds an Assistant Vice President – Safety and Claims to supervise the group, reporting to the Vice President – Human Resources. Under that individual he adds a Director – Safety and Loss Control, who will be responsible for coordinating the OTRR safety effort company-wide, keeping abreast of industry best practices and ensuring that OTRR policies minimize the probability of loss in a cost-effective manner. A modest corporate safety effort as outlined here is entirely consistent with and a necessary complement to the safety and training positions in the operating departments. Reporting to him will be a Manager of Security, who will function principally as a liaison with local law enforcement personnel. Again, this reflects common industry practice among smaller carriers (larger carriers have their own police forces). A close working relationship with local law enforcement is a key element to an effective loss control strategy, especially in the area of grade crossing safety and trespasser issues.

The result of these additions is a Safety and Claims group of four individuals that continues to employ the outsourcing budget of $125,000 submitted by Otter Tail. Including the three additional HR personnel, this brings the total Human Resources Department to 13, compared to the six proposed by Otter Tail.

[75] *See* BNSF Reply electronic workpaper "MRL_Info.doc."

(f) Marketing

Otter Tail proposes a marketing staff of three to handle the sales and marketing needs of the OTRR. As proposed by Otter Tail, OTRR begins operating with $878 million in revenues, growing to $1.3 billion over twenty years. BNSF witness McCarren finds this department to be so woefully understaffed that OTRR could not even begin to participate in handling the traffic it claims to handle.

Otter Trail purports to justify the OTTR's miniscule marketing department on several premises:

- A high proportion of coal traffic concentrated among a modest number of customers;
- No change in customer or traffic base over a twenty year period; and
- Customers automatically use OTRR because it is "the low cost alternative."

Only the first of these premises makes any difference in the railroad marketplace and even that does not justify OTRR's low staffing level. It is true that coal traffic will account for the vast majority of OTRR's business 77% in 2002 and 84% in 2021. In 2002 and 2021, this amounts to $675 million and $1.151 billion in revenue, respectively ($364.3 million and $500.7 million as revised by BNSF). Yet Otter Tail proposes to handle the coal business with a single vice president (who also oversees non-coal traffic) aided by a single analyst. No large corporation would condone this situation. Simple prudence dictates that the lifeblood of the company be protected and close relationships with key customers maintained and nurtured. Indeed, OTRR will need to know all it can about its large coal customers, and others that might be candidates for future solicitation.

OTRR plans to handle 75% of the coal tons currently handled by BNSF, while its 2002 revenues amount to 33% of total BNSF coal revenues. BNSF currently staffs its coal marketing group with 15 people. Even with 15 (excluding customer service) the BNSF marketing group is smaller than its principal competitor, UP, and the 39 people employed by NS. Simple logic would indicate that OTRR should field, at a minimum somewhere between 33% and 75% of the BNSF group, based on carloads and revenues. The midpoint of this range is 54%, and Mr. McCarren believes that a staff of eight would be appropriate for the coal marketing effort under Otter Tail's proposal. To retain and expand the coal traffic it projects, OTRR will need to do at least as much marketing as BNSF currently performs to retain and expand this business. Nothing in SAC principles suggest otherwise. Indeed, SAC precedent supports Mr. McCarren's conclusions. In *FMC*, slip op. at 166, the Board noted that in a SAC case "any business plan that assumes, . . ., that it would retain all of its customers must devote resources to all those customers." Otter Tail assumes not only that OTRR will retain BNSF's customers, but that it will attract many of them to use a different route.

The coal marketing staff is to be headed by an Assistant Vice President, and consists of a Director, four Managers and two analysts. The Director and three of the Managers would have the principal account responsibility. The other Manager would be charged with market analysis, inter-carrier issues and equipment issues. The two analysts would be assigned to this area, but made available to support the market managers as needed. Under BNSF's revised configuration, OTRR will handle significantly less coal tonnage than Otter Tail. Mr. McCarren concludes, using the BNSF tonnage estimates,

that the initial coal marketing staff would need to be only six, eliminating one Manager and one analyst.

The second major assumption made by Otter Tail is the absence of any change in the marketplace over a twenty year period. This is patently absurd. Industries, customers and traffic change continually. While the utility coal business may be more stable than others, even it will change considerably over a twenty year time horizon. The change in the non-coal traffic will be much more dramatic. Railroads need to replace traffic lost to attrition continually. In many cases, the attrition has little or nothing to do with the railroads' own actions. The decline of the domestic integrated steel industry, for example, has had major impacts on the railroad industry. While railroads have not been able to recoup all their losses due to this decline, they have been able to offset them to some extent by gaining new traffic from mini-mills and steel importers. Without a marketing staff, railroads would have simply watched their traffic disappear.

Related to this assumption is Otter Tail's assertion that OTRR is the low cost alternative for current users of rail transportation. But circumstances change and railroads need to adapt constantly. For example, some of the subject non-coal traffic involves double stack containers moving from U. S. Pacific Northwest ports to points in the U.S. Midwest and East Coast. While import containers have generally been a growth business for U.S. railroads, over the past few years, a significant volume of traffic destined for U.S. points has entered North America through the Port of Vancouver. This trend has favored Canadian railroads and caused some loss of business for BNSF and UP, even in a buoyant market. This diversion of traffic had little to do with the cost-

effectiveness of U.S. railroads compared with Canadian carriers; it was far more closely related to shipping and stevedoring costs and U.S. port labor issues.

Given the diversity of customers, commodities and service types found in the non-coal traffic base of OTRR, the idea of operating without a Marketing Department is an idea that can only be justified as an "end justifies the means" exercise of a rate case. No real world railroad the size of OTRR could ever succeed with such a strategy and no prudent manager of a large enterprise would even entertain the idea.

In the real world, OTRR will have to work hard to attract business to BNSF-OTRR-BNSF routes. Even assuming no competition from a BNSF routing via Minot, North Dakota, OTRR will face competition from UP, CN and CP, as well as motor carriers. After excluding the "Z Train" intermodal services, which BNSF contends cannot be diverted to the SARR from the Minot route for service considerations (see III.A.1.c.), OTRR will continue to handle $135 million of non-coal traffic in 2002. Of that total, 63% is Snowden – Fargo traffic currently using the route via Minot. Much of that traffic is open to strong competition from UP, CN and CP, since the origins and destinations are competitive points (such as gateways with eastern carriers and PNW ports). In the real world if not this hypothetical one, for all of the Snowden – Fargo traffic OTRR would also have to compete with the all-BNSF routing via Minot.

Otter Tail has postulated that the marketing effort required by OTRR will be minimized by excluding all originating and terminating traffic from the SARR, including traffic that originates or terminates on the line today. In the marketing world, however, the overhead traffic that OTRR has selected is the most difficult traffic to obtain and retain. This was not always the case, but since the Staggers Act partially deregulated the

railroad industry, railroads and their customers have expressed a strong preference to avoid routes involving additional carriers. Mr. McCarren's experience at both WCS and GWWR has demonstrated that carriers participating in overhead traffic need to mount an intensive marketing campaign and provide customers with ample reason and financial incentive to utilize their services. The SAC conclusions set forth by the ICC with respect to marketing in *Nevada Power II* support Mr. McCarren's approach. In *Nevada Power II*, 10 I.C.C.2d at 301, the ICC found that "because most of the traffic now included in the SARR model would originate or terminate off the SARR system, and much of this traffic is highly competitive in nature, it is unreasonable to assume that all this traffic would move on the SARR without some off-line marketing." Therefore, Mr. McCarren's conclusion that a marketing force more substantial than Otter Tail has proposed for OTRR's non-coal traffic is well justified.

Having demonstrated that OTRR will require a real marketing effort, BNSF witness McCarren has staffed the department to reflect the commodities and customers that OTRR proposes to handle. While Otter Tail has attempted to design the non-coal operations of the OTRR to be operationally simple, the marketing challenge is quite substantial. Analyzing the non-coal traffic that OTRR proposes to handle, BNSF has identified 79 shippers/customers each individually accounting for 500 units or more annually. These shippers/customers comprise 75% of the non-coal traffic on the OTRR. OTRR will need to provide specific account coverage for these customers and make sales calls upon them. There are at least 1,500 shippers and receiver overall in the OTRR traffic base. While most of these represent smaller volumes, they will still need to be handled by OTRR marketing.

To further illustrate the marketing challenge, the traffic base is quite diverse. Intermodal traffic accounts for 24% of the non-coal traffic. The carload traffic records indicate that 692 individual commodities (five-digit STCC level) were handled; of these, 155 had significant volumes (over 100 units/year). The major commodity groups of non-coal carloads handled include:

- Farm Products (STCC 01) - 30.7%
- Lumber & Wood Products (STCC 24) - 13.7%
- Food & Kindred Products (STCC 20) – 7.7%
- Transportation Equipment (STCC 37) - 5.3%
- Pulp, Paper & Allied Products (STCC 26) - 4.0%
- Chemicals & Allied Products (STCC 28) - 3.7%
- Stone, Clay & Glass Products (STCC 32) - 3.1%
- Primary Metal Products (STCC 33) - 2.7%
- Petroleum & Coal Products (STCC 29) - 2.3%
- Nonmetallic Minerals (STCC 14) – 0.8%
- Waste & Scrap Material (STCC 40) - 0.7%

As can be easily seen, OTRR will need marketing expertise across a wide variety of commodities along with the ability to service a significant number of major accounts, in order to participate in overhead, non-coal traffic to the extent contemplated. To further underscore the complexity of the non-coal traffic flows, an analysis of the data shows that there are 521 unique origin-destination pairs with more than 100 annual revenue units. In all, 10,214 origin-destination pairs (freight station accounting code basis) are represented

in the OTRR traffic mix. It is abundantly clear that the OTRR marketing challenge will be quite demanding.

Mr. McCarren proposes to staff the non-coal portion of the OTRR marketing department with 15 people, headed by an Assistant Vice President. The group would be divided along major commodity lines, under Directors of Forest Products, Industrial Products, Agricultural/Food Products and Intermodal/Automotive. Market Managers are assigned to these groups based on an average of one marketing person for each $10 million of revenue. Mr. McCarren finds that to have been a good rule of thumb applicable at WCS and the medium-sized railroads he has run since 1990 (even GTWWR with $40 million in revenue, employed more marketing personnel than contemplated by Otter Tail). The intermodal business on the OTRR is generally marketed on a wholesale basis to other transportation providers and requires less sales and marketing effort on a revenue basis. Therefore only two Marketing Managers, one for intermodal and one for automotive traffic are provided. In addition a Director of Marketing Administration and a Rate Administrator are provided to take care of the essential back office support functions for the customer interfacing activities.

OTRR will not be able to manage efficiently a significant marketing effort from Donkey Creek, WY. Very few of OTRR's non-coal customers are located in close proximity to Donkey Creek, and the location does not have convenient air service to a large number of U.S. destinations. Mr. McCarren proposes that the OTRR marketing staff be headquartered in the Minneapolis – St. Paul area, with a second office in Portland, OR to serve West Coast customers, and in particular, the forest products companies headquartered in the Pacific Northwest. Multiple sales offices are

commonplace in the railroad industry as a method to increase customer contact and reduce the expense of and time lost to travel. Even A&M, with less than { } million in revenues, has a local sales presence in Portland to better serve its forest products customers. The associated annual costs of leased office space, travel and entertainment are summarized in workpapers.[76] At WCS, business & travel expenses in Marketing ran about 12% of salaries, and "other," which included some entertainment, ran about 4%. BNSF's reply evidence incorporates a reasonable 15% additive to marketing salaries for such activities.

Combining both the coal and non-coal areas provides OTRR with a marketing staff of 23; 6 in the coal area, 15 in the non-coal commodities, and a Vice President and secretary. While substantially larger than the infeasible department proposed by Otter Tail, BNSF's proposed department achieves substantial productivity: $21.7 million in revenue per marketing department employee, even with BNSF's traffic reductions. The department is smaller in absolute numbers than that of WCS, even though OTRR enjoys more than twice WCS' revenue in 2002.

(2) Compensation

Regarding compensation for executive level employees, Mr. McCarren recommends salary levels based on a survey of salaries at public railroads. For non-executive level salaries, Mr. McCarren relies upon 2002 BNSF Wage Form A and B average annual salaries calculated and indexed to first quarter 2002 levels as discussed in Section III.D.3.a.(2)(b), above. The compensation for OTRR operating and transportation personnel was discussed in detail. The compensation for the OTRR

[76] BNSF Reply electronic workpaper "OPR_EXP.xls," worksheet "Summary."

Engineering and Mechanical personnel is discussed in Section III.D.4, below. The salaries and benefits for the OTRR executives and G&A personnel Mr. McCarren recommends are summarized in Table III.D.3-12.

Mr. McCarren has surveyed publicly available information on executive level compensation at Class I, II and III railroads. That analysis, summarized in Table III.D.3-11 below, shows salaries and bonuses for several railroad executives.

Table III.D.3-11

		Annual Compensation		
Railroad	**Executive Position**	**Salary**	**Bonus**	**Other**
BNSF	Chairman, President & CEO	$805,996	$312,228	
	EVP & COO	$359,750	$420,489	
	EVP	$341,900	$309,143	
	EVP & CFO	$304,875		
	EVP Law & Gov. Affairs, Sec.	$220,900		
CN	President & CEO	$1,100,000	$401,000	$42,166
	EVP & COO	$935,000	$238,600	$100,122
	EVP Sales & Mktg	$425,000	$90,000	
	EVP & CFO	$425,000	$90,000	
	SVP Operations	$276,964	$61,386	
CNW	Chairman, President & CEO	$445,000	$324,850	
	EVP - Operations	$157,913	$253,447	
	SVP - Sales & Marketing	$276,140	$201,582	
	SVP - GC & Secretary	$232,824	$169,961	
	SVP - Administration	$227,409	$166,009	
CSX	Retired Chairman & CEO	$1,250,000	$810,000	$340,958
	Chairman, President & CEO	$579,167	$312,750	$123,229
	Vice Chairman & CFO	$545,833	$265,000	$99,322
	Pres. & CEO CSX Lines LLC	$306,667	$441,600	$58,190
	Pres. & CEO CSX World	$365,000	$252,945	$49,526
	Terminals LLC			
IC	President & CEO	$500,000	$387,500	$18,615
(1998 10-K)	Senior VP - Operations	$217,420	$130,920	$71,522
	Senior VP - Marketing & Sales	$188,674	$113,620	$11,657
	VP & GC & Secretary	$173,982	$96,710	$12,676
	VP & CFO	$188,674	$104,880	$10,808

		Annual Compensation		
Railroad	**Executive Position**	**Salary**	**Bonus**	**Other**
KCS	Chairman, President & CEO	$620,004		
	Executive VP & COO	$312,108		
	Former VP and Gen Counsel	$195,792		
	Senior VP Operations - KCSR	$176,623		
	VP & Comptroller	$164,004		
	EVP & CFO	$128,338		
	Former SVP & CFO	$166,887		
NS	Chairman, President & CEO	$970,833	$883,944	$932,322
	V Chairman & Chief Mktg Officer	$481,250	$292,119	$287,313
	V Chairman & COO	$545,833	$331,321	$376,781
	V Chairman & CFO	$545,833	$331,321	$407,412
	SVP - Administration	$292,500	$150,930	$154,205
UP	Chairman & CEO Corp.	$1,187,500		$79,204
	President & COO RR	$723,339		$91,507
	EVP - Finance	$441,668	$450,000	$191
	EVP - RR Ops	$441,668	$90,000	$330
	SVP, Gen Counsel and Sec	$430,187	$800,000	$634
WCTC	President & CEO	$551,250	$104,462	
	President & CEO (N.Am.)	$300,000	$58,590	
	Executive VP & CFO	$200,000	$31,580	
	Executive VP - Corp. Dev.	$200,000	$31,580	
	VP & Chief Accounting Officer	$160,260	$32,613	
Emons	Chairman, President & CEO	$250,000	$69,672	
	SVP, CFO & Secretary	$144,815	$34,139	
	VP	$130,000		$2,224
	VP	$112,400	$36,228	
FEC	Chairman, President & CEO	$521,250	$370,035	
	Vice Chairman	$325,000	$192,265	
	Executive VP, Pres. Florida East Coast Railway, LLC	$312,750	$182,626	
	Exec VP, Secretary & CFO	$275,000	$162,685	
	Exec VP, Secretary, & GC	$250,000	$172,896	
G&W	CEO & Chairman	$560,000	$119,174	
	President & COO (manages N.Am. Ops.)	$309,000	$22,284	
	President - Mktg & Dev.	$314,000		
	Exec. VP - Corp. Dev.	$247,000	$37,455	
	CFO	$240,000	$37,145	

		Annual Compensation		
Railroad	**Executive Position**	**Salary**	**Bonus**	**Other**
Pioneer	Chairman, President & CEO	$648,952		
Railcorp				
P&W	Chairman & CEO	$358,655		$2,638
	President & COO	$308,250		
	Treasurer	$125,578		
	VP Engineering	$144,618		
	Secretary & General Counsel	$116,352		
RailAmerica	Chairman, President & CEO	$750,000	$254,125	$65,595
	EVP, CAO, Sec, Director	$375,000	$85,375	$46,931
	EVP & COO N. American Rail	$375,000	$160,375	$45,979
	CEO - Freight Australia	$220,597		
	SVP & Gen Counsel	$181,715	$31,292	$202
	SVP & CFO	$170,000	$23,950	$604
	Former EVP & CFO	$275,000		$12,462
	BNSF Sources: 03/11/03 Proxy Statement; 2002 Form 10-K			
	CN Sources: 03/04/03 Proxy Statement; 2002 Form 6-K; CN Website			
	CNW Source: Year 1994 Schedule 14-A; 1994 Form 10-K			
	CSX Sources:03/21/03 Proxy Statement; 2002 Form 10-K			
	IC Sources: Year 1996 Schedule 14-A; 1998 Form 10-K;			
	KCS Sources: 04/04/03 Proxy Statement; 2002 Form 10-K			
	NS Sources: 03/17/03 Proxy Statement; 2002 Form 10-K			
	UP Sources: 03/06/03 Proxy Statement; 2002 Form 10-K			
	WCTC Sources: Year 2000 Schedule 14-A; 2000 Form 10-K			
	Emons Source: Fiscal Year 2001 (6/30/00-6/30/01) Schedule 14-A; Fiscal Year 2001 Form 10			
	FEC Sources: Florida East Coast Industries 04/28/03 Proxy Statement; 2002 Form 10-K			
	G&W Source: 04/21/03 Proxy Statement; 2002 Form 10-K			
	Pioneer Source: 05/12/03 Proxy Statement; 2002 Form 10-K			
	P&W Source: 03/28/03 Proxy Statement; 2002 Form 10-K			
	RailAmerica Source: 04/30/03 Proxy Statement; 2002 Form 10-K			

As a preliminary matter, Mr. McCarren notes that the location of OTRR's headquarters in Donkey Creek, Wyoming would not justify lower executive salaries than the salaries of railroads set out in the prior table. On the contrary, if anything, Mr. McCarren believes that OTRR salaries would need to be increased because of the need to attract qualified employees to Donkey Creek, Wyoming. Nonetheless, he does not

assume that the OTRR would have to pay higher salaries as a result of the location of OTRR headquarters and sets executive level salaries based on comparable railroads.

(a) President/CEO

The salary that Otter Tail proposes for the President CEO is based on the supposed 2000 salary level of the President/CEO of WCS. That person at the time was Mr. McCarren, BNSF's witness with respect to G&A costs in this proceeding. Mr. McCarren testifies that Otter Tail's purported compensation figure for him is wrong because it does not include all his compensation. In 2000, as WCS President, Mr. McCarren received total compensation (salary and bonus) of $358,590 plus 40,000 stock options for WCTC shares at a strike price of $13, which had a current value of $520,000. OTRR, as a private company, has no such stock option offering. Otter Tail's salary for the CEO/President must be rejected because it fails to account for important elements of compensation.

The survey presented in Table III.D.3-11 shows a salary range of $250,000 to $1,250,000 for railroad CEO's. Bonuses for those same employees ranged up to $884,000, excluding stock options and other compensation. Stock options were granted to almost all those executives, ranging from thousands to hundreds of thousands of shares. Many received restricted stock as well, ranging in value to over $11 million in the case of the largest railroad. In addition, other annual compensation for those individuals went as high as $974,000. Otter Tail significantly understates the comparable level of compensation for railroad industry chief executives.

The currently operating railroads with revenues closest to — but lower than — that projected for OTRR are RailAmerica ($333 million), KCS ($566 million) and G&W ($194 million). The RailAmerica CEO received total compensation of $1.07 million plus

350,000 stock options (at a July 1, 2002 stock price of $10.80 per share or $3.8 million). The KCS CEO received total compensation of $709,000 plus 13,207 stock options (at a July 1, 2002 stock price of $17.26 per share or $227,953). The G&W CEO received total compensation of $760,000 plus 42,500 stock options (at a July 1, 2002 stock price of $21.24 per share or $902,700). Mr. McCarren has chosen KCS as the best model for OTRR. KCS has the lowest compensation and therefore provides the most conservative comparison. KCS is also one of the railroads that Mr. McCarren determined earlier was most comparable to OTRR. Unlike RailAmerica and G&W, KCS operates a contiguous North American railroad of comparable size to OTRR.

KCS' CEO's compensation in 2001 was quite similar to 2002, ($540,000 in compensation and 12,363 option shares), further strengthening the case for using KCS as a model. KCS and OTRR arguably present different types of management challenges but the level of management skills required is similar. Mr. McCarren acknowledges that without the opportunity for equity compensation a candidate for the job might seek more cash compensation, but based on his knowledge of the industry he believes that a compensation level of $700,000 would attract a qualified individual to the job.

(b) Vice Presidents

Using the same survey, Mr. McCarren notes that compensation for senior level vice presidents varies widely with the type of company and organizational structure. Many companies have chief operating officers responsible for a significant section of their network, but OTRR's structure is simplified and features strong department heads reporting directly to the President and CEO. Several similar jobs to the Otter Tail department heads at mid-sized railroads can, however, be identified:

- IC (1998) Sr. VP – Operations ($450,000)
- IC (1998) Sr. VP – Marketing & Sales ($313,951)
- IC (1998) Sr. VP – VP & GC ($283,368)
- IC (1998) - VP & CFO ($304,359)
- WCTC (2000) – Exec. VP & CFO ($231,580)
- WCTC (2000) – Exec. VP – Corp. Devp. ($231,580)
- RA – Former Exec. VP & CFO ($332,837)

Without exception, these individuals all received significant stock option grants along with their cash compensation; such equity compensation will not be possible at the privately-held OTRR.

OTRR plans to set in place a salary plan compensating vice presidents of major departments at $240,000 and vice presidents of minor departments $200,000. Transportation, Engineering/Mechanical and Finance are paid at the higher level; Legal Affairs, Human Resources and Marketing at the lower. The Vice President – Treasurer and Vice President – Controller in the Finance department are compensated at the $200,000 level as well.

As set forth above, when stock option consideration is included, competitive market compensation for the major department head positions is well above the levels proposed by Otter Tail. Nonetheless, Mr. McCarren believes that qualified individuals could be attracted to these positions if the compensation were raised modestly, to $300,000. The Marketing Vice President position will require this pay level as well, given the degree of marketing challenge and the increased department size recommended

by BNSF. Mr. McCarren recommends that the minor department vice presidents salary and bonus compensation be raised commensurately to $250,000.

Table III.D.3-12 below, summarizes the G&A Compensation used in BNSF's Reply Evidence:

Table III.D.3-12

Comparison of Otter Tail and BNSF G&A Personnel Compensation

	Otter Tail			BNSF			
Position	Personnel	Salary	Total	Personnel	Salary	Total	Total Difference
President and CEO	1	{ }	{ }	1	{ }	{ }	$323,019
Administrative Assistant	1	{ }	{ }	1	{ }	{ }	$27,227
Director Corporate Relations			{ }	1	{ }	{ }	$94,462
Vice President Finance & Accounting	1	{ }	{ }	1	{ }	{ }	$57,546
Administrative Assistant	1	{ }	{ }	1	{ }	{ }	$25,839
Vice President Treasurer	1	{ }	{ }	1	{ }	{ }	$48,070
Assistant Treasurer			{ }	1	{ }	{ }	$94,462
Cash Manager	1	{ }	{ }	2	{ }	{ }	$75,513
Controller	1	{ }	{ }	1	{ }	{ }	48,070
Assistant Controller Revenue	1	{ }	{ }	1	{ }	{ }	13,984
Manager - Revenue			{ }	2	{ }	{ }	$155,991
Director Tax	1	{ }	{ }	1	{ }	{ }	($1,711)
Director Financial Reporting			{ }	1	{ }	{ }	$94,462
Manager Financial Reporting	1	{ }	{ }	1	{ }	{ }	($2,483)
Property Accounting Analyst		{ }	{ }	1	{ }	{ }	$77,996
Sr. Financial Analyst			{ }	3	{ }	{ }	$233,987
Manager Accounting	1		{ }	1	{ }	{ }	$77,996
Revenue Accounting Clerk	3	{ }	{ }	8	{ }	{ }	$433,975
Assistant Controller Disbursements	1	{ }	{ }	1	{ }	{ }	($2,483)
Manager Accounts Payable			{ }	1	{ }	{ }	$77,996
Manager Payroll			{ }	1	{ }	{ }	$77,996
Director Revenue Accountants			{ }	1	{ }	{ }	$94,462
Manager Revenue Analysis			{ }	1	{ }	{ }	$77,996
Revenue Analysts			{ }	2	{ }	{ }	$155,991
Manager Car Hire	1	{ }	{ }	1	{ }	{ }	($2,483)
Disbursement Clerks	4	{ }	{ }	2	{ }	{ }	($39,508)
Payroll Clerks			{ }	1	{ }	{ }	$70,459
Manager Miscellaneous Billing			{ }	1	{ }	{ }	$77,996
Costs and Budget Clerk	1	{ }	{ }	1	{ }	{ }	$25,353
Director Internal Audit			{ }	1	{ }	{ }	$94,462
AVP Information Technology			{ }	1	{ }	{ }	$199,070

	Otter Tail			BNSF			
Position	Personnel	Salary	Total	Personnel	Salary	Total	Total Difference
Director of Information Technology	1	{ }	{ }	1	{ }	{ }	$16,048
IT Specialists	8	{ }	{ }	10	{ }	{ }	$137,892
General Counsel	1	{ }	{ }	1	{ }	{ }	$48,070
Staff Attorney	1	{ }	{ }	1	{ }	{ }	$17,246
Secretary/Paralegal	1	{ }	{ }	1	{ }	{ }	($378)
Vice President HR	1	{ }	{ }	1	{ }	{ }	$48,070
AVP Safety & Claims			{ }	1	{ }	{ }	$199,070
Director Safety & Loss Control			{ }	1	{ }	{ }	$94,462
Manager Security			{ }	1	{ }	{ }	$77,996
Director Recruitment	1	{ }	{ }	1	{ }	{ }	($1,711)
Director Personnel	1	{ }	{ }	1	{ }	{ }	($1,711)
Human Resources Coordinator			{ }	3	{ }	{ }	$233,987
Director Compensation & Benefits			{ }	1	{ }	{ }	$94,462
Analyst	1	{ }	{ }	1	{ }	{ }	($378)
Claims Manager	1	{ }	{ }	1	{ }	{ }	($6,125)
Secretary/Administrative Assistant	1	{ }	{ }	1	{ }	{ }	$25,839
Vice President Marketing	1	{ }	{ }	1	{ }	{ }	$97,740
Secretary	1	{ }	{ }	1	{ }	{ }	$25,839
AVP Coal Marketing			{ }	1	{ }	{ }	$199,070
Director Coal Marketing			{ }	1	{ }	{ }	$94,462
Manager Coal Marketing			{ }	3	{ }	{ }	$278,625
Marketing Analyst Coal	2	{ }	{ }	1	{ }	{ }	($71,215)
AVP Merchandise Marketing			{ }	1	{ }	{ }	$199,070
Director Forest Products			{ }	1	{ }	{ }	$94,462
Market Manager Forest Products			{ }	1	{ }	{ }	$92,875
Director Industrial Products			{ }	1	{ }	{ }	$94,462
Market Manager Industrial Products			{ }	3	{ }	{ }	$278,626
Director Agricultural/Food Products			{ }	1	{ }	{ }	$94,462
Market Manager Agricultural/Food Products			{ }	2	{ }	{ }	$185,751
Director Intermodal/Automotive			{ }	1	{ }	{ }	$94,462
Market Manager Intermodal/Automotive			{ }	2	{ }	{ }	$185,751
Director of Marketing Administration			{ }	1	{ }	{ }	$94,462
Tariff Administrator			{ }	1	{ }	{ }	$70,459
Director of Purchasing			{ }	1	{ }	{ }	$94,462
Manager of Purchasing			{ }	2	{ }	{ }	$155,991
Director of Real Estate			{ }	1	{ }	{ }	$94,462

	Otter Tail			BNSF			
Position	Personnel	Salary	Total	Personnel	Salary	Total	Total Difference
Manager of Real Estate			{ }	1	{ }	{ }	$77,996
Total	**43**	**$3,214,247**	**$3,924,316**	**99**	**$7,846,122**	**$10,225,143**	**$6,300,827**

(3) Materials, Supplies & Equipment

BNSF has reviewed the individual item unit costs that make up the overall material and expense costs for OTRR G&A personnel. In general, BNSF accepts those items unit costs, but applies them to the correct number of G&A personnel as determined by Mr. McCarren. Where Mr. McCarren has identified specific requirements for the OTRR that were not included by Otter Tail, they have been added.

(4) Other General and Administrative Expense

(a) Professional And Outside Services

As explained in detail above, Otter Tail proposes to outsource many OTRR functions. As Mr. McCarren notes, Otter Tail offers no indication of the source of its estimates for most of these costs, such as legal expenses and claims services. Mr. McCarren has provided an estimate of legal expenses based on his experience at WCS that should be adopted in lieu of Otter Tail's figure. BNSF is willing to accept Otter Tail's estimate of claims service expenses, with the proviso that proper internal staffing, as outlined by Mr. McCarren is provided. BNSF also has submitted revisions for audit and tax services, which are discussed under Finance and Accounting. A major area of outsourcing for OTRR is initial training of operating employees, which is discussed in the following section.

(b) Start-Up And Training

Otter Tail's assumptions that 60% of employees will be hired by word of mouth may be realistic once the railroad is established but is hardly likely to be correct for initial staffing. In fact, in order to ensure the largest scope of applicants and therefore the highest-quality of new hires, the company would likely advertise broadly in areas where it will have a concentration of employees. Unlike most start-up railroads developed in the past 20 years, OTRR is not purchasing a line of railroad from BNSF with a pre-existing employment base. Thus the recruitment task will be considerably greater than normally faced by new railroad companies.

Mr. McCarren feels it reasonable that for start-up, the company advertise 100% of the hourly and first-level supervisory workforce. For hourly workers, this would focus on local media and internet services, supervisory and higher positions would likely also be advertised in trade publications.

The use of headhunters as proposed by Otter Tail does not comport with Mr. McCarren's experience. He finds it very unusual to use headhunters to staff hourly positions; generally only high-skill, specialty positions such as communications technicians, signal maintainers or dispatchers would be placed through recruitment firms and then only rarely. On the other hand, headhunters are commonly used for placing executives, especially where a start-up of this magnitude is envisioned. Mr. McCarren believes that the President, and 50% of the Assistant Vice President and Vice President positions would likely be filled through executive search. According to Mr. McCarren, the normal fee for these services is 33% of the first year salary and bonus, not 10% as used by Otter Tail. Such searches are normally done on a retained basis, where the

search firm is paid whether or not they produce the successful candidate.[77] Nonetheless, BNSF assumes a fee of 25% of the first year salary for all OTRR's executive management.

OTRR's expenses also need to reflect recruitment costs on an ongoing basis. These are normally organized under the Human Relations Department. BNSF attrition of { } is close to what Mr. McCarren experienced at WCS and appears to be an appropriate level to use for replacement. While many of the hourly employees lost to attrition will be replaced through word-of-mouth, periodically OTRR will need to advertise and use other means of recruitment. Other than executive and specialty positions, Mr. McCarren expects that some of these positions will be filled through advertisement and others through word-of-mouth. Many manager and supervisory positions will be filled through promotion, but at the AVP and above levels, recruitment firms will be used, in Mr. McCarren's estimation, for 25% of these hires on an ongoing basis.

Otter Tail proposes using AMDG and Keeping Track Company for T&E employee training. While the third party training costs may well reflect the charges of those two companies, BNSF witness McCarren finds that the total cost of training the initial work force and subsequent replacement training will be far higher than estimated by Otter Tail.

Mr. McCarren testifies that the largest portion of training expense is not the cost of the classroom training, but the wage costs for the employees undergoing that training and the subsequent on-the-job training. Typical training periods at many large carriers

---

[77] *Topgrading,* by Bradford D. Smart, at 80 (1999).

run four months for conductor training and six months for engineer training (assuming the engineers are already conductors). Not all carriers pay employees during outside conductor training and at some carriers, such as WCS, the engineer training may be shortened to some extent based on candidate performance. To be conservative, Mr. McCarren suggests that OTRR's costs include 80 percent payment of wages, plus full fringes during the training period for engineers and conductors.

In addition to the training cost and associated wages, there is a drop-out factor to be considered. Mr. McCarren has found 20% to be an appropriate drop-out rate for trainee conductors and 10% for conductors training to become engineers. Given this attrition, carriers must over-hire and over train to achieve their personnel requirements. For example, when WCS needed 10 conductors, it hired 12 assuming that two would drop out before matriculating. These drop-outs consume training expenses and will generally go through about half the training period before falling out. In order to hire the 12, of course, the OTRR would interview and test far more, perhaps 30, to find acceptable candidates. Nevertheless, to be conservative, BNSF has assumed that once an engineer or conductor candidate entered the program that person would graduate.

All of these factors work in concert to increase the cost of hiring and training T&E personnel quite substantially over Otter Tail's estimate. Rather than the $7.9 million estimated by Otter Tail, Mr. McCarren believes that start-up T&E hiring and training will total $34.6 million.[78]

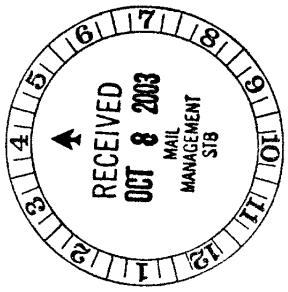
Finally, Mr. McCarren notes that Otter Tail has not provided for initial costs associated with financing the construction of OTRR. The I.C.C. specifically

[78] *See* BNSF Reply electronic workpaper "Opr_Exp.xls."

contemplated shippers using the "prevailing market cost" for the cost of raising capital in stand-alone cases. *Coal Guidelines*, 1 I.C.C.2d at 545. The cost to construct the OTRR is discussed in Section III.F below. OTRR will have a capital structure employing 54.3% common equity, 2.4% preferred equity and 43.3% debt at the commencement of operations. Raising capital, particularly in the amounts contemplated here, is not cost free. Based on discussions he had with Peter Gilbertson, the President and CEO of Anacostia & Pacific, an expert in railroad startups, Mr. McCarren believes that OTRR would need to employ investment bankers to raise this equity capital and it will cost approximately 4% of face value.

d. Other — IT Requirements

BNSF accepts Otter Tail's IT capital and operating unit expenses, adjusted to reflect the additional personnel as required, in order to narrow the points of disagreement between the parties.



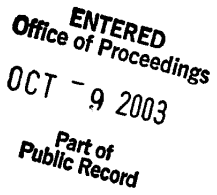
PUBLIC VERSION

BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Docket No. 42071

OTTER TAIL POWER COMPANY
v.
THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Reply Evidence of
The Burlington Northern and Santa Fe Railway Company



NARRATIVE

Volume II of II

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October 8, 2003

Public Version

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ABBREVIATIONS

Terms:

AAR	Association of American Railroads
AEI	Automatic Equipment Identification
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARN	Administration Radio Network
ATSF	The Atchison Topeka & Santa Fe Railway Company
BN	Burlington Northern Railroad Company
BNSF	The Burlington Northern and Santa Fe Railway Company
CARDS	Computer Aided Railway Design System
CMP	Constrained Market Pricing
CP	Signal Control Point
CTC	Centralized Traffic Control System
DARA	Density Adjusted Revenue Allocation
DCF	Discounted Cash Flow
DED	Defective Equipment Detector
DEM	Digital Elevation Model
EOTD	End-of-Train Device
FTI	FTI Consulting, Inc.
G&A	General and Administrative
HBD	Hot Bearing Detector
HOTB	Head-of-Train Device
ICC	Interstate Commerce Commission

MMP	Modified Mileage Prorate
MOW	Maintenance of Way
OTM	Other Track Materials
OTP Errata	Complainant's Errata Evidence (filed on July 14, 2003)
OTP Opening	Complainant's Opening Evidence (filed on June 13, 2003)
PRB	Powder River Basin
RCAF-A	Rail Cost Adjustment Factor - Adjusted
RCAF-U	Rail Cost Adjustment Factor - Unadjusted
RFP	Request for Production
RTC Model	Rail Traffic Controller Model
RRVW	Red River Valley Western Railroad
RWA	Ralph Whitehead Associates
SAC	Stand-Alone Cost
SARR	Stand-Alone Railroad
SSAC	Simplified Stand-Alone Cost Model
STB	Surface Transportation Board
UBC	Uniform Building Code
USGS	United States Geological Survey
WP	Workpaper
WRPI	Western Rail Properties, Inc.

ICC or STB Proceedings:

APS	*Arizona Public Serv. Co. v. The Atchison, Topeka & Santa Fe Ry.*, 2 S.T.B. 367 (1997).
Coal Rate Guidelines or Guidelines	*Coal Rate Guidelines, Nationwide*, 1 I.C.C.2d 520 (1985).
Conrail	*Potomac Electric Power Co. v. Consolidated Rail Corp.*, 367 I.C.C. 532 (1983).
Conrail II	*National Railroad Passenger Corp. and Consolidated Rail Corp.--Application under Section 402(a) of the Rail Passenger Service Act For an Order Fixing Just Compensation 10 I.C.C. 2nd 863 (1996)*
FMC	*FMC Wyoming Corp. v. Union Pacific R.R.*, STB Docket No. 42022 (STB served May 12, 2000).
General Procedures	*General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*, STB Ex Parte No. 347 (Sub-No. 3) (STB served Mar. 12, 2001).
Georgia Power	*Georgia Power Co., Southern Co. Servs., Inc., Oglethorpe Power Corp., Municipal Auth. of Georgia, & City of Dalton v. Southern Ry. Co. & Norfolk Southern Corp.*, ICC Docket No. 40581 (ICC served Nov. 8, 1993).
McCarty	*McCarty Farms, Inc. v. Burlington Northern Inc.*, 2 S.T.B. 460 (1997).
Nevada Power I	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 6 I.C.C.2d 1 (1989).
Nevada Power II	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 10 I.C.C.2d 259 (1994).
Non-Coal Guidelines	*Rate Guidelines - Non-Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2) (STB served May 8, 2002).
OPPD	*Omaha Public Power Dist. v. Burlington Northern R.R.*, 3 I.C.C.2d 853 (1987).
PPL	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served Aug. 19, 2002).
PPL II	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served March 24, 2003)

D. OPERATING EXPENSES

4. Maintenance-Of-Way

BNSF's evidence on maintenance of way was developed by witness Gerald G. Albin of TranSystems Corporation. Mr. Albin has many years of experience constructing and maintaining rail lines subject to heavy tonnage and time sensitive freight. From 1970 through 1995, he held various management positions in maintenance and engineering in the Montana-Wyoming Region of the Burlington Northern Railroad Company (BNRR), which includes a large portion of the route of the proposed OTRR, as well as positions as Director of Maintenance Planning and Director of Engineering for the entire BNRR system. He was project manager for the construction of 37 miles of coal track from Hysham, Montana to Sarpy Creek Mine, Montana, which included the design and construction of the grading, drainage structures, track and signal work. His responsibilities over the years included the supervision of maintenance activities on the very lines replicated by OTRR in various departments, including track, bridge, signal and telecommunications. He recently has been involved in BNSF stabilization projects along the Yellowstone River, which areas constitute part of the proposed OTRR route. Thus, he is well positioned and highly qualified to critique Otter Tail's evidence and opine on the actual maintenance requirements for these lines.

BNSF's evidence on maintenance of way (MOW) costs is organized as follows: First, BNSF adds a new subsection III.D.4.a to the Board's format to present a detailed critique of Otter Tail's development of MOW costs. New **Section III.D.4.a (Critique of Otter Tail's Approach)** is required because of the numerous flaws in Otter Tail's methodology for determining MOW operating expenses (OE).

Section III.D.4.b (Maintenance-of-Way Operating Expenses) sets forth Mr. Albin's estimate of the OTRR MOW operating expenses. This section is subdivided into subsections (1) OTRR OE Personnel Requirements; (2) OTRR OE Track Maintenance Equipment, and (3) OTRR OE Contract Expenses.

Section III.D.4.c (Maintenance-of-Way Capital Expenses) sets forth Mr. Albin's estimate of the capital expenditures for OTRR. Although these capital expenditures are, for the most part, captured in the DCF analysis through the inherent depreciation assumptions and will not be added to the stand-alone costs, it is important to develop this section in order to demonstrate that Otter Tail's total annual MOW costs are understated and, therefore, by extension, the percentage-based portions of these costs that Otter Tail allocates to OE clearly are also understated. This would be true even if the percentages that Otter Tail applied were valid; but as BNSF's evidence demonstrates there is no basis for those percentages, and Otter Tail's OE evidence is therefore totally arbitrary and unsupported. Section III.D.4.c is divided into subsections (1) OTRR Capital Replacement Programs and (2) OTRR Capital Maintenance Equipment (including capital work train requirements).

Section III.D.4.d (Total Annual Maintenance-of-Way Budget) compares Otter Tail's estimate of the total annual MOW costs to BNSF's estimate. In this section, Mr. Albin demonstrates that Otter Tail's arbitrary percentage-based allocation of costs to OE fails to capture the myriad of OE expenses that, according to Otter Tail's own definition of OE expenses, are "required to keep the railroad in operation on a day-to-day basis." OTP Nar. at III-D-57.

Section III.D.4.e (Work Windows) discusses the track time (windows) that must be scheduled to ensure that maintenance crews have ready opportunities to access the track when necessary to respond to emergency and other unplanned maintenance calls.

a. Critique Of Otter Tail's Approach

For purposes of a SAC analysis, it is important to develop that portion of the costs of maintaining the railroad that are attributable to the daily operating expenses (OE) of the railroad. As explained above, the program replacement of capital assets (or the capital portion of MOW expenditures) is already accounted for in the DCF analysis through the inherent depreciation assumptions.

Otter Tail's development of MOW operating expenses for the OTRR is arbitrary and unsupported by any evidence. Rather than identify and quantify the actual activities and personnel associated with MOW operating expenses, Otter Tail focuses on developing what it alleges are *total* MOW costs for the OTRR and then simply applies an arbitrary percentage to certain categories of those costs to derive the railroad's MOW operating expenses. Otter Tail's approach can be summarized as follows.

First, Otter Tail develops the annual normalized maintenance of way costs for the replacement of capital assets by dividing the total investment in each asset category (*e.g.*, rails, ties, turnouts, crossings, bridges, culverts, etc.) by that category's purported asset life.[79]

Second, based on its assumption that the program replacement of rail, ties and resurfacing are the major components of the MOW budget, Otter Tail attempts to develop a contract cost for the labor associated with those activities. However, the unit costs used

[79] Mr. Albin's critique of certain of the asset lives used by Mr. McDonald is set forth in section III.D.4.c.

to develop that contract cost are inappropriate because they apply to the replacement of limited sections of line or side track and not to a major capital replacement of mainline segments.[80]

Third, having developed a labor contract cost for rail/tie/resurfacing, Otter Tail then arbitrarily allocates to OE an amount equal to ten (10%) percent of that cost and ten (10%) of the annual track material cost. Otter Tail offers no explanation for its selection of ten (10%) percent.

Fourth, Otter Tail develops contract costs for certain maintenance activities that are typically contracted out by most railroads (*e.g.*, weed spraying, rail grinding, rail testing, etc.) and correctly classifies them as OE. However, as described more fully in section III.D.4.b.(3), in some instances, the unit costs, quantities and/or frequencies of service are understated.

Finally, Otter Tail develops a skeletal staff to handle all remaining non-contract maintenance and provides a meager assortment of light-duty equipment for that staff's

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[80] Otter Tail used a unit cost of $44.00 per linear foot from RS Means "Site Demolition" construction costs to "remove and reinstall ties and track using new bolts and spikes." The cost was based on a B-14 crew, which is a 4-man crew, an equipment operator and a backhoe. This is not the operation that would be used for a major rail or tie replacement program, but rather that used to remove and replace a small segment of track. The production rate for such a procedure is only 50 linear feet per day, which is totally unrealistic. Major rail and tie replacement programs are conducted separately from each other using highly sophisticated machinery. The modern tracklaying and tie replacement equipment is not reflected in the RS Means cost. Likewise the unit cost for resurfacing used by Otter Tail is from RS Mean costs for "Rail Sidings" to "resurface and realign existing track" – not for the major replacement of miles of mainline ballast. BNSF's restatement includes the cost for more efficient operations. BNSF.RP.WP.III.D.4-0002 to 0003.

use.[81] Otter Tail arbitrarily asserts that thirty-five (35%) percent of *all* labor (not just management and supervisory personnel) and thirty-five (35%) percent of *all* equipment costs are incurred as capital expenses although Otter Tail has not identified any particular capital projects to be performed by the internal workforce or provided any justification for that percentage. The remaining sixty-five (65%) percent of the already understated labor and equipment costs, by default, are attributed to OE.

The MOW operating costs developed by Otter Tail do not reflect the real-world costs associated with the normal performance of routine inspections, daily maintenance, and rapid response to unplanned occurrences that are characteristic of a high tonnage railroad. Indeed, Otter Tail does not even attempt to address the particular geographical areas on the OTRR route that pose unique challenges to both construction and maintenance on the OTRR. These include:

- The Powder River Basin where the Reno and Orin Subdivisions require special maintenance near the mine connections to clean coal dust blown off of heavy coal trains that fouls the ballast and blocks drainage leading to subgrade problems;

- The track along the Yellowstone River, particularly on the Forsyth subdivision, which has serious stabilization problems as a result of erosion of the embankment caused by the river's continually changing channel and which also encounters rock slides on the embankment between the river and the rock bluffs;

- The Jamestown Subdivision in North Dakota where heavy rainfalls over the past several years have caused lakes and sloughs traversed by the railroad to rise several feet, thus requiring substantial efforts to raise track grades and stabilize embankments;

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[81] As discussed in section III.D.4.c, there is no provision in Otter Tail's costs – or in its contract cost for rail/tie and surfacing -- for the heavier equipment that would be used on major MOW projects, whether classified as OE or capital projects. Moreover, there is no discussion of what capital projects relate to the percentage of personnel and equipment allocated to the capital budget.

- Eastern Montana, North Dakota and Minnesota where the severe winters require special track maintenance (*i.e.*, ballast cleaning with spot undercutting) to avoid frost heaves in the track and ice build up between the base of the rail and tie plates causing the rail to lift out of the plates.

In light of these and other omissions, Otter Tail has not presented a maintenance-of-way plan for OTRR that would support the operating requirements needed to provide the necessary level of service to its customers. Its MOW evidence is seriously flawed because it fails to identify all of the activities and costs associated with the maintenance of a high tonnage railroad, and particularly those expenses that are typically characterized as operating expenses. Based on its underestimation of the work to be done, Otter Tail developed a MOW workforce that is too inadequate and poorly equipped to handle the maintenance that actually would be required on the OTRR. Moreover, in addition to understating the MOW activities and costs, Otter Tail's percentage-based methodology for estimating OE costs is purely arbitrary.

(1) Otter Tail Totally Ignored The Costs Associated With Real-World Maintenance Activities Including Random Failures And Other Unexpected Problems

Otter Tail has designed a high density railroad serving both coal and non-coal shippers, including extremely time-sensitive intermodal shippers, that demand consistent and reliable service. The terms of service are set out in detail in transportation contracts that would bind OTRR just as they bind the incumbent. To be feasible, OTRR must be able to provide at least the same level of service to these shippers as the incumbent provides.

A well-maintained railroad is critical to meeting these service levels. Inadequate maintenance leads to slow orders, track outages, decreased life of track structure and components, and, ultimately, reduced reliability of train transit times and degraded

service. Otter Tail cannot posit a railroad that would have higher incidents of MOW outages as a result of an artificial attempt to reduce maintenance costs and still expect to retain its customers, particularly those requiring reliable cycle times or engaged in time-sensitive shipments in the highly competitive intermodal and stack train markets.

As explained below, Otter Tail has dramatically understated the level of day-to-day maintenance spending that would be required to provide the necessary level of service to the OTRR shipper group. Otter Tail ignores the real-world evidence that the continuous movement of heavy loads at high speeds takes a toll on a railroad's physical plant through the myriad of relatively small localized infrastructure failures (*e.g.*, broken rail, surface and alignment defects) that require immediate response to keep the traffic flowing. It also ignores the extraordinary and unplanned repairs that inevitably arise when the rail infrastructure is subjected to the continuous pounding of high tonnage, high speed freight trains and the ravages of excessive heat, wind, rain, snow, ice, and other elements of nature.

Otter Tail proposes to maintain OTRR's track to FRA Class 4 minimum standards to permit the movement of 286,000 GWR cars at the maximum authorized train speeds (60 miles per hour) (OTP Nar. at III-B-4). However, it fails to account for the magnitude of the maintenance required to maintain a railroad of OTRR's size to these standards. The combination of mixed traffic and continuously cycling unit coal trains of up to 135 cars loaded to 286,000 pounds will subject OTRR's track structure to tremendous pressures, requiring a far more extensive and sophisticated maintenance program than that proposed by Otter Tail.

Industry publications have devoted volumes to discussion of the impact of increasingly heavy tonnages on the railroads' track structures, and the increased maintenance -- both remedial and preventive -- that has resulted from such loadings. As one article notes, the increases in heavy axle load traffic over the past years "have led many railroads, and especially track and structure managers, to a growing interest in the area of track maintenance in relation to heavy haul loads."[82] Heavy tonnage railroads became concerned with the ever increasing train lengths and tonnages as they observed and were forced to react to the increased stress and fatigue of track components caused by these loads. *Id.* After years of analyzing heavy axle load traffic, and implementing substantial improvements in maintenance methods and materials[83] the railroads have concluded that, although preventive measures are of tremendous value, they do not eliminate the need for constant vigilance and frequent repair to the track structure. With the traffic levels assumed for the OTRR, it is important not only to maintain the railroad to the most up-to-date standards, but to explore additional testing to address new problems and challenges brought about by the increased loadings.

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[82] "Heavy Haul Loads Require Top-Notch Track Maintenance," Rail Track & Structures, December 1998 at 21. BNSF.RP.WP.III.D.4-0004 to 0006.

[83] BNSF and UP both upgraded their track standard to 136-pound rail and more recently have begun using 141-pound rail. They also began using concrete ties in heavy haul areas, in sharp curvature and heavy grade areas and in most new construction areas. Ballast specifications were upgraded to require exclusive use of granite or similar material as lesser materials repeatedly broke down under the load. Rail grinding frequencies and techniques were improved. Switch (turnout) maintenance, including programmed switch grinding, and materials were upgraded. Rail lubrication was upgraded and tie/rail fastening systems were tested and improved. Techniques and technology for testing rail for internal defects also have improved, and greater emphasis has been placed on strengthening and protecting the subgrade and subballast.

Weather conditions compound the engineering challenges on heavy load lines. As Canadian Pacific discovered, "[d]espite the number of premium components used on the line, wear and degradation -- and the high level of maintenance associated with them -- persist."[84] Mr. Albin knows from his own experience that OTRR's track structure across the northern Great Plains states will be subjected not only to enormous forces from the heavy unit coal trains, grain trains, and other traffic it is assumed to carry, but also the forces of snow and ice from the severe winters in those areas. Because moisture in the ballast in cold weather can cause frost heaves in the track, maintenance is important both before and after the cold weather sets in in order to ensure that there is proper drainage and that moisture is not allowed to build up in the ballast. Without proper maintenance, the cold weather problems will be exacerbated creating slow orders throughout the winter. Wet rainy seasons that erode the soil and ballast and cause subgrade failures, periodic floods and snow storms also will wreak havoc on the track structure.

All of these factors result in frequent occurrences of unscheduled maintenance and the need for continuing repairs. Otter Tail, however, refuses to even acknowledge the existence of these heavy daily maintenance requirements, let alone account for them in its MOW plan. In fact, even though a large percentage of most railroads' MOW operating budget is spent on maintaining switches and curves, Otter Tail makes no provision for the special mobile welder/grinder and switch maintenance crews typically assigned to these tasks and does not even mention these activities in its Narrative or workpapers.

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[84] "Optimizing the System on CPR's BC South Line," Railway Track & Structures, July 2001 at 25. BNSF.RP.WP.III.D.4-0007 to 0009.

As BNSF's witness, Mr. David Wheeler describes in Section III.C.2(ii), unplanned occurrences or random failures have a substantial impact on the railroad's operations. If the railroad's MOW plan does not take these events into account, it will not be able to meet its operating requirements. BNSF's Random Failures Reports record the daily instances of unplanned occurrences on BNSF lines that cause track outages, and thus disruption to traffic flows. These are *in addition* to mechanical *train* problems. The Report includes only those failures that the dispatcher's office records as a result of track/signal failures, *i.e.,* broken rail, signal failure, and hot box detector alarms. It does not include train delays due to faulty rear-end devices, locomotive failures, cars requiring set out, or other mechanical failures. Similarly, it may not include failures cause by events such as embankment failures, plugged culverts, low bridge end, switch maintenance (points not matching, frog low), reported tight rail during hot weather and frost heaves during winter weather in North Dakota. Furthermore, the duration of the failures in the Random Failure Report does not include all time necessary to correct the failure. For example, in the case of a broken rail, the time included in the Random Failure Report concludes when the rail is temporarily repaired by being angle barred and trains begin running again. It does not include the subsequent track time to make permanent repairs, *i.e.,* removing the angle bars and welding the rail joint, grinding the rail to match, and tamping the area of the joint to allow trains to proceed at track speed.

The total number of occurrences on the BNSF line segments replicated by OTRR, according to BNSF's Random Failure Reports for 2002, was 2,840 occurrences with a total duration of 454,126 minutes, or an average of 20.7 hours per day for the combined outages on all line segments of the OTRR replicated railroad system. The table below shows the

occurrences by subdivision for the five major subdivisions on the OTRR. In its opening evidence, Otter Tail proposed tonnage on the Glendive to Fargo line (the Dickinson and Jamestown Subdivisions) that was nearly double BNSF's existing tonnage,[85] so the occurrences in the table below are not fully representative of the incidents that OTRR could expect to have at the tonnages proposed by Otter Tail. In fact, the tonnages that Otter Tail had proposed would mean that the OTRR could expect outages more akin to those on the Orin subdivision than to those presently experienced on the Dickinson and Jamestown subdivisions.

Table III.D.4-1
Summary Of Random Failure Occurrences
On OTRR Line Segments (2002)

SUB-DIVISION	TOTAL NUMBER OF OCCURRENCES (2002)	TOTAL DURATION (Minutes)	AVERAGE PER OCCURRENCE (Minutes)
FORSYTH	532	75,717	142
ORIN	847	124,593	147
BIG HORN	550	91,717	167
DICKINSON	473	89,340	188
JAMESTOWN	438	72,759	166
TOTAL	2,840	454,126	160

Source: BNSF Reply electronic workpaper "Random Failures 2002.xls."

The table above shows the annual random failure occurrences. During the month of November 2002, which BNSF witnesses analyzing Otter Tail's string diagram found was the actual peak period for OTRR, there was a total of 232 outages on the five major BNSF subdivisions included in the OTRR. That equates to an average of eight outages per day. The average duration per outage was 2.8 hours. Several days during that month

[85] OTP Errata Opening electronic workpaper "Density v4.0.xls."

experienced as many as 19 outages on those line segments.[86] On the heavily-traveled Orin Subdivision for that month, there were 79 occurrences resulting in an average outage of 2.4 hours. On the Forsyth, Dickinson and Jamestown Subdivisions across the Great Plains states, there were 121 occurrences during the month of November 2002 resulting in average outages of 2.6 hours. These "trouble ticket" calls include signal, track, and mechanical problems ranging from track outages, signal failures, and broken rail to delays from hot bearing detectors or switches out of adjustment. These are not items that can be temporarily deferred or put aside for a more convenient time -- they must be inspected and repaired immediately.

When a signal indication appears on the dispatcher's board, for safety reasons a train must stop and wait for clearance to proceed. The indication may be a problem either with the train, the signals system, or the track structure. Even relatively simple problems that could be easily corrected when first identified would cause rapid deterioration of the track if unheeded, leading to track outages or even derailments.

An effective and efficient MOW plan must include adequate staff and equipment to handle these problems expeditiously and with as little disruption to traffic as possible. For example, the highly traveled coal lines on the relatively short BNSF Orin Subdivision experienced an average of three (3) unplanned occurrences per day in 2002, with an average duration of 2.5 hours per outage. Given the amount of traffic on these lines, it

[86] BNSF 2002 Random Failure Reports for the line segments replicated by OTRR in five subdivisions are included in electronic workpaper "Random Failures 2002.xls." Summaries of the November Peak Period outages are included in BNSF Reply Exh. III.D.4-2.

would be foolish not to have sufficient resources to handle these emergencies and keep the trains running.

Attending to these occurrences is in addition to the internal staff's regular duties performing the FRA required inspections and the routine daily repairs that also must be performed diligently. The routine inspections and repairs cover hundreds of activities, including routine inspection of track, bridges, culverts, and other structures on the railroad; routine repairs to broken or defective rail, ties, or other track materials found during inspection; routine servicing of switch machines, wayside signals, crossing signals, and rail lubricators to keep them in good operating condition; snow and ice removal from switch points and other critical areas; intermediate rail grinding; restoring track to proper geometry through spot lining and surfacing; repairing short areas of fouled ballast; replacement of cross ties and switch ties that have failed in pockets and thus fail to meet FRA standards; gauging track that may be in violation of FRA standards due to broken spikes or deteriorated ties; repairing or replacing damaged or missing right-of-way items such as fences and signs; maintaining mechanical facilities, particularly the fueling facilities; compliance with environmental laws regarding disposal of materials and operation of sewer plants and fueling facilities; controlling vegetation between chemical spraying activities; repairing properties and facilities damaged by floods or snow; maintaining lighting in yards; maintaining buildings and grounds; and countless other tasks that arise on a property that extends nearly 1,300 miles and covers territory in five states.

Otter Tail's maintenance plan as set out in its evidence fails to recognize the magnitude and importance of these tasks. As discussed above, it omits entirely any

discussion of coal spills or coal dust cleanup, stabilization projects along the Yellowstone River and Jamestown Subdivision, or protecting track from frost heaves in the northern states. Implicit in Otter Tail's off-hand treatment of MOW expenditures is an assumption that its railroad would not experience the track degrading impacts of heavily-loaded trains or adverse geological and weather conditions that affect real-world railroads. Such an assumption is totally unsupported and any calculation of MOW OE resting on such an assumption must be rejected out of hand.

(2) Otter Tail's Proposed MOW Staff Would Not Be Adequate To Handle Either Routine Or Extraordinary Maintenance Occurrences

Because it ignores critical OE activities, the internal workforce that Otter Tail proposes is patently inadequate. As discussed more fully below, while Otter Tail's skeletal MOW workforce may look efficient on paper and/or in the hypothetical world of SARR, in the real world, it is too sparse to handle even the routine MOW work, let alone unplanned emergencies. As a result, Otter Tail has developed an OE MOW budget insufficient to maintain the railroad at levels needed to maintain high quality service for mixed types of traffic moving over high density lines.

As described in Section III.A above, for its proposed SARR, Otter Tail took all of BNSF's non-local traffic that today traverses the Glendive-Fargo line replicated by the OTRR. In addition, it rerouted to the Glendive-Fargo line BNSF coal traffic that generally moves over other BNSF lines and BNSF intermodal, grain, automotive, and merchandise traffic that today moves over BNSF's northern line between Minot, North Dakota and Havre, Montana. As a result, Otter Tail's opening evidence proposed OTRR

tonnages of up to 137 MGT[87] on the line segments between Glendive and Fargo in 2021 compared to BNSF's current (2002) tonnage of approximately 58 MGT over that line.[88] In other words, for the year 2021 – the year upon which Otter Tail allegedly based its personnel count – the OTRR would experience more than double the existing tonnage on those segments. On the Sidney subdivision, Otter Tail's opening evidence showed that the OTRR would experience tonnages of 48 MGT compared to BNSF's current level of less than one MGT. In fact, as shown in the table below, Otter Tail's opening evidence showed tonnages in excess of BNSF's current tonnages on 1,002 (or 78%) of the OTRR's 1,284 route miles.

[87] OTP Errata Opening electronic workpaper "Density v4.0.xls."

[88] BNSF Reply electronic workpaper "2002 System Traffic Density Map.pdf."

Table III.D.4-2
Comparison of Otter Tail Proposed Tonnage with BNSF Actual Tonnage
On BNSF Line Segments Replicated by the OTRR

Segment	Miles	Otter Tail Op. Evidence Proposed Tonnage 2021 MGT/Mi.	BNSF Actual 2002 MGT/Mi
Glendive – Fargo	407.97	137.22	56-60
Campbell – Moran Jct.	240.84	79.65	45-58
Jones Jct. – Glendive	211.23	88.24	54-67
Fargo – Benson	115.71	18.99	23
Glendive – Snowden	79.47	48.73	1
Reno-W. Donkey Creek	46.73	70.68	100-176
Benson – Big Stone	45.73	3.38	6
Sarpy – Kuehn	35.86	8.96	7
Nichols – Big Sky	33.67	5.25	6
Converse Jct. - Reno Jct.	27.88	143.75	262-364
Dutch - Spring Creek	16.53	40.60	28
Campbell – Eagle Butte	11.43	31.20	78
Reno-Jacobs Jct.	5.76	77.28	19
Donkey Creek – Campbell	0.49	104.38	104

Source: OTP Errata Opening electronic workpaper "Density v4.0.xls;" BNSF Reply electronic workpaper "2002 System Traffic Density Map.pdf."

One would expect that the substantial increases in traffic levels over most of these line segments would result in some increase in maintenance costs, including increased staffing and equipment. In fact, Otter Tail not only accepts this intuitive assumption, but actually goes beyond that in its opening evidence to imply that there is a direct

relationship between tonnage and maintenance staffing.[89] Otter Tail asserts that its MOW costs, including personnel, were based on total GTMs in its peak year 2021, (although there is no explanation in either the Narrative or the workpapers of how those tonnages were applied to development of the MOW workforce or why costs for items such as weed spraying or snow removal would vary at all with tonnage levels). To derive the annual 2002 MOW OE costs for use in the DCF analysis, Otter Tail adjusted the total costs (including personnel, materials, equipment, and contract costs) by the ratio of 2002 GTMs divided by the 2021 GTMs.

Despite Otter Tail's theoretical adherence to a direct relationship between tonnage and staffing levels, Otter Tail's hypothetical railroad miraculously manages to increase substantially the tonnage over these lines while significantly *reducing* maintenance staff far below that which BNSF currently has on the replicated lines. For example, BNSF's staffing in 2002 for the 408–mile Glendive-Fargo line included 127 field crew members. Otter Tail's proposed MOW staff for those same line segments -- but with double the tonnage -- is 64 field workers.

Otter Tail's entire Engineering Department has only eight maintenance supervisors and 204 maintenance crew and structure crew workers to maintain 1,771 miles of track, nine yards, and all the buildings, facilities and structures proposed by Otter Tail on the OTRR. As designed by Otter Tail, the OTRR has 14 crews of 14

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[89] OTP Errata Opening electronic workpaper "Otrr_MOW.123." Otter Tail first calculates the total maintenance costs as $99,788,375. It then reduces that amount by 2002GTMS/2021GTMs to arrive at a 2002 total MOW cost of $85,531,482 of which $18,740,636 is OE. In its response to a workpaper request regarding this adjustment, Otter Tail states that it has "assumed that all maintenance of way costs vary with the level of traffic." Otter Tail Power Company's Response to Defendant's First Request for Workpapers, dated July 14, 2003, at 9. BNSF.RP.WP.III.D.4-0010 to 0018.

members each. OTP Nar. at III-D-22. That means each crew of 14 is expected to handle all of the routine FRA required inspections of track, bridges, and signals, all of the routine daily maintenance of tracks, buildings, all electrical maintenance, masonry and carpentry, as well as all emergency maintenance for a territory of approximately 90-100 miles. With crews spread out that far, travel time alone – especially during the winter months of ice and snow – will preclude rapid response even to normal signal indications and calls from dispatchers to have signals cleared or track repaired to get the trains running. Failure to respond quickly to these and other calls with experienced personnel in the first instance and to provide prompt follow up can lead to deterioration, rather than "maxim[ization of] the life of materials" which Otter Tail recognizes (at least in its Narrative) as a critical component of MOW operating expenses. OTP Nar. at III-D-57. Deferral of regular daily maintenance inevitably will lead to deterioration of the track structure.

Otter Tail implicitly recognizes its crews will need reinforcement when it states that its two Directors of Maintenance Operations located at Donkey Creek and Glendive have authority to re-align personnel anywhere over the entire 1,284 mile system as necessary. OTP Nar. at III-D-21. That means that rather than having crews dedicated to specific territories, the OTRR will rely on mobilizing forces, taking them away from other important maintenance activities. Such an arrangement precludes efficient MOW operations, particularly under adverse conditions.

Also implicit in Otter Tail's development of personnel requirements is the assumption that contracting out certain activities such rail geometry testing, weed spraying, ultrasonic rail inspection, rail grinding, bridgework, building maintenance, and

snow removal means these activities will not be performed with any regularity by the internal workforce. This narrow view ignores the obvious need on a railroad of this size for internal staff to handle the day-to-day responsibilities to grind, weld and build up frogs and switches; to repair crossings; and to remove snow at switches and yards and other problem sites. For example, during the summer months, in compliance with state and local regulations, ten-to-twelve-foot wide swaths of ground on either side of the tracks must be plowed and maintained as fireguards to prevent any fires on the right-of-way from spreading to the property of adjacent landowners.

Otter Tail's proposed force of 204 field workers is too meager to keep trains moving regularly and efficiently under the engineering challenges and weather conditions described above. Otter Tail's meager internal force of 204 workers includes:

Gang foremen	14
Maintenance Workers (to handle all MOW activities for 1770+ miles of track, structures and facilities)	126
Track Inspectors	14
Signal Maintainers	42
Masons (for the entire railroad)	2
Electricians (for the entire railroad)	2
Water Service Employees	2
Carpenters/Helpers (for the entire railroad)	2
Total	204

The following comparison of Otter Tail's proposed staff with that of other real-world railroads demonstrates the inadequacy of Otter Tail's MOW evidence.

Table III.D.4-3
Comparison of MOW Staffing Levels

Railroad	Route Miles	Track Miles	Average Tonnage	MOW Mg/Sup.	Crew Members	Total
Otter Tail's OTRR	1284	1771	107 MGT	11	204	215
MRL	600	900	30 MGT	29	132 + seasonal gangs[90]	161 + seasonal gangs
FEC	360	500+	30 MGT	13	182 + seasonal gangs	195 + seasonal gangs
WC	1920	2870	0 to 40 MGT	40	708	748
BNSF (OTRR replicated lines)[91]	1284	1771	53 MGT	15	440 (including seasonal gangs)	455 (including seasonal gangs)

Source: Workpapers BNSF.RP.WP.III.D.4-0019 to 0028. An exact comparison with BNSF is not possible, since this is only one portion of a vast system for BNSF in contrast to being the entire systems of the other railroads in the table. BNSF's headquarters staff are not readily assignable to the line segments selected for OTRR and thus only field supervisors assigned directly to the lines are included in the management count. Likewise, seasonal MOW employees serve where needed, and given BNSF's lean MOW staff on the Glendive – Fargo segments, seasonal workers are used extensively in this area during good weather months in order to keep up with maintenance that cannot be done during the winter. Thus, they are included with BNSF's regular MOW staff rather than separately identified as for the other railroads. Nonetheless, this table shows that Otter Tail's reduced staffing levels make no sense, given the increased tonnages proposed for these lines.

[90] BNSF and other railroads employ part-time crews to assist the full-time staff with seasonal work such as plowing fireguards in the summer, snow removal in the winter, or stabilization and other special projects. These seasonal gangs are distinct from the system production gangs that handle the planned capital replacement projects (projects Otter Tail asserts are handled by contractors in its MOW program). Seasonal gangs are included in the OE staff counts, whereas production gangs are not. The production gangs are included in Mr. Albin's capital costs.

[91] BNSF.RP.WP.III.D.4-0029; BNSF Reply electronic workpaper "BNSF Existing MOW Force.xls."

The table above compares Otter Tail's proposed staffing for the OTRR with the staffing levels of three regional railroads, Montana Rail Link (MRL), Florida East Coast Railway (FEC) and Wisconsin Central (WC) and with the current BNSF staffing on the line segments replicated by the OTRR. The table shows that even though MRL and FEC are only one-half and one-third, respectively, the size of OTRR and handle only one-third of the tonnage (thus requiring less frequent tonnage-based maintenance), both railroads still maintain a much more robust internal workforce to handle their maintenance than Otter Tail posited for OTRR in its opening evidence. In fact, Otter Tail proposes a field staff that has only twenty-two (22) more field persons than FEC, even though OTRR covers 924 more route miles, 1,271 more track miles, and handles on average nearly 80 MGTs more than FEC. While Wisconsin Central (WC) has approximately 650 more route miles than the OTRR, it has only a maximum of 40 MGT on its lines. Nonetheless, it has more than three times the number of employees. BNSF's current staffing of field crew (440 including seasonal gangs) is more than double the staffing levels that were proposed by Otter Tail for these same line segments with significantly higher tonnage. Yet in the real world, BNSF's staffing for these lines is low compared to WC (708), and comparable on a proportional basis to MRL and FEC. The table clearly demonstrates that Otter Tail's proposed staffing levels are unrealistic.

In addition to being too sparse, Otter Tail's limited MOW crews are stretched too thin to be efficient and effective. Otter Tail's proposed crews are expected to cover 90-100 miles of territory. In addition, they are subject to being assigned anywhere on the

railroad as needed.[92] Under this MOW plan, crew members will not have the opportunity to develop the level of familiarity with all the facilities within an assigned territory that is critical to early detection of potential problems and rapid response to emergencies. Familiarity and proximity are crucial to an effective and efficient maintenance plan. As discussed in Section III.D.4.b below, to address this issue Mr. Albin stationed sufficient crews at significantly shorter intervals to enable them to know their territories well and to have sufficient crew and equipment accessible to respond within one to two hours to any point within their territories. In addition, to respond to off-hour emergencies, he assigned 2 each special night track men at Glendive and Donkey Creek, the two largest yards where most of OTRR's major facilities are located.

Many calls require response by personnel qualified in various skills, such as track, bridge, signals, communications, and electrical maintenance.[93] Otter Tail's MOW plan, with its limited employees, implicitly assumes its employees will be able to handle any tasks anywhere. While this may work on a small regional or short line railroad with limited train activity or low tonnages, it does not work on a major coal-hauling/intermodal railroad with the trains and tonnages assumed for OTRR. On a heavy tonnage railroad, all skills are occupied full time on their own projects and all workers must be fully skilled and qualified to perform the tasks they undertake. Even the larger

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[92] It is interesting to note here that although all OTRR field personnel will be subject to assignment anywhere on the system, as a cost saving measure Otter Tail proposes paying an allowance for travel, meals and accommodations *only* for bridge workers. This is discussed in section III.D.4.b. *infra*.

[93] Other than the railroad Chief Engineer, who typically gains his experience over the course of many years with the railroad, few railroad employees are qualified in more than one or two disciplines.

regional railroads employ crews that are skilled and specialized in individual maintenance activities, *i.e.,* track, bridge, signals. It is uncommon to find workers who are FRA-qualified in more than one or two skills, and extremely rare for persons to become and remain qualified in both track and signals, even though many calls require the expertise in both disciplines.

In addition to an inadequate field workforce, Otter Tail's supervisory staff of only 2 district managers and six supervisors is also spread too thin. Supervision and a chain of command are essential on a heavy tonnage railroad running as many as 50 trains a day over some 1,771 miles of track. There will always be a multitude of simultaneous activities that must be prioritized both over the long term and on a daily basis. Managers must make timely decisions as to the most efficient use of workforces and equipment, juggling the day-to-day maintenance activities with the unplanned emergencies. Supervisors and management level personnel must focus on the big picture to identify potential problems and take advantage of unexpected track opportunities for scheduling track inspections, rail testing and other activities. Supervisors must also be readily available to direct action in case of derailments, washouts, embankment failures, and other critical occurrences. Employees in the field, no matter how "empowered," cannot be expected to maintain their heavy workloads while simultaneously keeping abreast of events across the entire railroad. It takes a chain of command to coordinate activities and personnel, particularly for activities that involve more than one department.

As discussed more fully below, a combination of routine inspections by field workers and periodic inspection by highly experienced supervisors promotes early detection of minor defects that could develop into serious maintenance problems or

employee hazards over time. Safety is a high priority on the railroad, and all supervisors' responsibilities include ensuring that safety standards are met at all times, that safety issues are addressed promptly and appropriately, and that remedial action, if necessary, is taken promptly. Foremen, including gang foremen, also play a critical role in training, teaching, assisting, and working directly with crew members both to ensure that the work is performed properly and to develop an efficient, reliable, and capable workforce.

Otter Tail's opening evidence provides no support for its minimal staffing of both supervisory and field employees. Indeed, the OTRR as conceived by Otter Tail would not be able to provide anything near the level of service that BNSF provides today.

(3) Otter Tail's Proposed MOW Equipment For OTRR Is Inadequate

Otter Tail has provided only the bare minimum equipment for each of its crews. Each of the fourteen maintenance crews will have a hi-rail inspection vehicle, a hi-rail boom truck, a large hi-rail truck, two signal maintainer vans, an auxiliary van, and a welder's truck. Each of the six supervisors will have one ballast regulator/snow plow, one tamper/liner, and one backhoe to be shared by all crews within a particular district. This limited supply of equipment makes it difficult for crews to handle multiple simultaneous calls. The need to move equipment possibly more than 100 miles from one end of a district to another also needlessly increases the duration of delays and track outages.

An efficient and effective workforce *must* be properly equipped. For a high tonnage railroad such as OTRR, this means modern track and structure maintenance equipment (*i.e.*, switch/spot tampers, regulators, rail saws, drills, etc.). There must also be sufficient equipment so that crews and equipment are in close proximity to their

territories, and to each other, to be able to respond immediately to problems with track or other structures assigned to them. Mr. Albin knows from his own experience that the only way modern heavy tonnage railroads have been able to *reduce* forces efficiently (a feat that Otter Tail accomplishes with the mere stroke of pen) is through the use of *more* equipment, such as tampers, regulators, speed swings, and other state-of-the-art equipment capable of working efficiently within short track windows and between trains.[94] In stark contrast to a well-equipped railroad, Otter Tail's MOW crews do not have enough of even the most rudimentary vehicles, equipment, and tools to allow crew members to attend simultaneously to different tasks.

While much maintenance work is accomplished by heavy maintenance machinery, hand tools are needed to perform the day-to-day smaller maintenance work. Otter Tail provides a paltry $45,000 in its total annual budget for small tools for all crafts – of which only $29,250 is allocated to the operating budget.[95] It allocates only $58,500 to the operating budget "miscellaneous equipment" for all departments. Hand tools and miscellaneous equipment include impact and cutting tools such as spike mauls, sledge hammers, picks, tamping picks, chisels, track punches, tie adzes, and drift pins. There are also various leverage tools such as anchor wrenches, speed wrenches, rail forks, lining bars, and spike pullers. Other important tools such as tie and rail tongs or track

[94] Some of the state-of-the-art equipment needed includes tamping and track lining equipment (Jackson 6700 production tamper, switch tamper, junior tamper, and ballast regulator); rail change-out equipment (boom truck, speed swings, rail drills, rail expanders, rail heaters, rail saws, anchor machines, and bolt machines); rail maintenance equipment (rail grinders and rail welders); bridge maintenance equipment (bridge derricks, and small diesel cranes); track inspectors' equipment (hydraulic tools for hand tamping and bolt machines).

[95] Otter Tail electronic workpaper "OTRR_MOW.123."

jacks, ballast forks, and brooms, and measuring tools such as tapes, levels, and track and rail gages are mainstays of the railroad maintenance apparatus. These tools must be in adequate supply to allow crew members to work efficiently.

(4) Otter Tail's Method For Determining OE MOW is Arbitrary, Unsupported By Evidence, And Unsupportable

As discussed above, in addition to understating the *total* personnel and equipment needs of the OTRR, Otter Tail further understates the OE portion of those costs by applying arbitrary percentages. Otter Tail's method of determining what portion of total MOW costs is attributable to OE is simply to allocate a portion equal to ten (10%) percent of its contract cost for rail/tie/resurfacing programs to OE and sixty-five (65%) percent of total personnel and equipment to OE. Neither of these percentages is ever explained. The ten percent allocation apparently rests on an implicit assumption that daily track maintenance is minimal.

The sixty-five percent is not only unexplained, but inconsistent with both regular railroad practice and Otter Tail's assumption that programmed cyclical work is contracted out. Otter Tail asserts that thirty five (35%) percent of *every employee's time* is capital expense, although it does not identify any particular capital programs that these employees will undertake nor attempt to show that the percentage is related to actual time spent on such projects. The general railroad practice is to have capital replacement programs performed by system production gangs moving effectively across the railroad property equipped to perform a certain task such as rail and tie replacement, surfacing and undercutting efficiently and in assigned track windows that minimize train delays. These employees' times (or in Otter Tail's MOW plan, contractors) are treated as capital expenditures. Track section gang time of the regular MOW staff, including track inspectors,

district gangs, and switch maintenance gangs, is treated as operating expense. Otter Tail pays no attention to these criteria and its percentages appear to be taken out of thin air with no supporting rationale.

Otter Tail's assigned percentages and OE contract costs combined constitute a mere 21.9 percent of Otter Tail's total maintenance budget. As a reality check to Otter Tail's estimates, in section III.D.4.d, Mr. Albin demonstrates that Otter Tail's ratio of OE to total MOW costs is completely out of line with that of real-world railroads, as it is significantly lower than that of BNSF and three other real-world railroads.

(5) Outside Contractors Could Not Be Expected To Make Up For The Deficiencies In Otter Tail's In-House MOW Staff

Otter Tail claims that "[m]aintenance will, to the fullest extent possible, be performed on a cycle basis by which contract forces can perform it on an efficient basis." OTP Nar. at III-D-57. If this statement is supposed to reflect OTRR's approach to day-to-day maintenance, it is clearly inappropriate because it ignores completely the myriad of routine daily tasks and the need to respond promptly to unexpected events. Deferral of daily maintenance to save operating dollars is a prescription for disaster on a railroad with the traffic proposed for the OTRR.

There are various reasons why it would be imprudent for Otter Tail to rely on contractors for daily maintenance. First, unlike internal workforces, contractors cannot respond immediately, and waiting for them to become available means additional delays and interruption to traffic flows. Both scheduled program and routine daily maintenance must be performed during tight work windows to minimize disruption to train cycles and schedules. In addition to the planned MOW activities, emergency maintenance calls come in on a daily basis – and during periods of extreme cold weather or rainy seasons

on an hourly basis. Broken rail, irregularities in alignment and in the surface of track, fires on the right-of-way, signal failures, damaged structures, or other problems reported by inspectors or train crews require immediate attention. Failure to respond quickly leads to line outages and derailments.

Contractors, such as Hulcher Contracting, normally handle derailments, large washouts or embankment failures. Generally, their response time ranges anywhere from two to five hours. A response time of that length may be acceptable with these kinds of occurrences that arise only once every month or two, but it is unacceptable for the numerous day-to-day outages caused by broken rail and other problems where a response is needed in less than one hour and to have trains running within two to three hours.

Second, the workforce responding to emergency calls must be knowledgeable and dedicated to a particular skill, such as track work, signals, or structures, in order to respond promptly and efficiently. Well-trained maintenance workers are on call day and night and must be prepared to locate and fix a problem expediently, working in all kinds of inclement weather. Contract forces historically have a large turnover of employees, and therefore cannot guarantee that at any given time they will have workers familiar with the territory and properly qualified for the tasks to be performed. Even when contractors retain long-term employees, because they must respond to the needs of several clients, contractors cannot guarantee that the same employees familiar with the railroad's territory, maintenance problems and maintenance procedures will be available at any given time. An inexperienced workforce significantly increases the risk of errors

as well as the probability of injuries – areas of concern to railroads that are addressed most effectively through internal training and supervision.[96]

Third, short-term "band-aid" repairs by a contractor are both inadequate and inefficient. It is imprudent to put off or perform inadequate temporary maintenance on a high tonnage railroad because seemingly small problems exacerbate quickly. An internal force generally can respond within one or two hours of being notified of a problem and is fully equipped with the proper knowledge and training to assess and address it.

Fourth, there is no reason to believe that an outside contractor could perform the services for less than an internal workforce. There are no economies of scale that an outside contractor would be able to take advantage of any more than OTRR. In fact, it would be less efficient to rely on an outside contractor because a contractor cannot take immediate advantage of any unexpected maintenance window opportunities, which is critical to the scheduling of MOW track time. To provide responsiveness equivalent to that of an internal force, a contractor would have to maintain crews fully dedicated to the railroad and expend large sums to keep the force intact and properly qualified.

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[96] Railroad maintenance employees are generally required to have several years of education, training and even certification in their fields, as well as several years of experience. Training and staying qualified are on-going processes. An individual may have some knowledge in various areas, but it is rare to have persons who consistently maintain the required training and certifications for more than one field. Mr. Albin's workpapers include job descriptions for various positions similar to those proposed for OTRR. The job descriptions show that the level of experience and training required for those positions cannot be filled by inexperienced contract workers. For example, by FRA regulations, a track inspector must have at least one year experience in railroad track inspection or a combination of experience in track inspections and training from a course in track inspection or from a college level educational program related to track inspection. Most Class I railroads on lines handling the tonnage of the OTRR require this as a minimum, with most of their inspectors having much more than one year's experience. BNSF.RP.WP.III.D.4-0030 to 0059 (A) to (G). See Section III.D.3.c for training costs.

(6) In Contrast To Otter Tail's Approach, Mr. Albin Has a Principled Basis For His Development Of MOW Costs

In developing his annual MOW costs, Mr. Albin employed the procedures for separating expenditures into "expenses" and "capitalized" items in accordance with BNSF's capitalization criteria. High tonnage railroads, such as BNSF, UP and other Class I's comparable to OTRR, engage in two separate maintenance budgeting processes -- (a) an OE budget to cover the day-to-day activities needed to keep the railroad running and (b) a program of cyclical asset replacements. Railroads classify maintenance expenses as either operating expenses or capital expenditures based on guidelines consistent with the STB guidelines for allocating such expenses in the railroad R-1's. It is this classification -- based on whether the activity extends the asset life (capital replacement) or merely helps to maximize the asset life through maintenance and repair -- that is the basis for the depreciation rates found in the DCF analysis. Thus, by replicating these processes as closely as possible using OTRR's system and operating conditions, Mr. Albin has developed a maintenance budget that is consistent with both actual practice and the underlying assumptions in the DCF analysis.

Mr. Albin's OE budget covers the myriad day-to-day tasks associated with keeping OTRR operating and ensuring that OTRR's assets achieve their predicted lives. These tasks are classified as operating expenses on BNSF and other railroads. OTRR's internal forces would handle most of these activities, but some work would be performed by contract forces when it is cost-effective to do so or when specialized but infrequently used equipment is required.

Mr. Albin's capital budget includes the normalized schedules for performing, on a cyclical basis, the "programmed" maintenance needed to replace OTRR's assets as they

wear out. In developing OTRR's annualized programmed maintenance costs, he estimated the lives of the various components of the railroad (typically in terms of tonnage or years) and determined the frequency of maintenance cycles based on those lives. He calculated the costs of the labor and materials used in performing the program (capital) track work by developing the system production gangs needed to perform those projects.[97]

These two separate maintenance budgets largely reflect the allocation of OTRR's total maintenance costs into operating expenses and capital expenditures. Almost all of the costs associated with OTRR's daily maintenance force would be classified as operating expenses. The only exceptions are headquarters-level managers, who are responsible for designing, planning, and overseeing both the day-to-day OE maintenance as well as the programmed work carried out by system production gangs or contractors, and track Roadmasters and B&B, signal and electrical supervisors. Because some of these positions' time would be spent on program maintenance issues, Mr. Albin included them in the maintenance-of-way organization and split their time based on the amount of time spent on program and OE projects, respectively.

b. Maintenance-Of-Way Operating Expenses

Mr. Albin's estimate of OTRR's maintenance-of-way costs is based on a real-world view of the maintenance needs of a high tonnage railroad that is consistent with railroad practices. Mr. Albin built from the bottom up the equivalent of a real-world maintenance-of-way staff that would be needed on OTRR. Based on his experience as head of maintenance on the lines being replicated, interviews with BNSF Assistant Vice

[97] BNSF Reply Exh. III. D.4-1.

President Engineering Services and BNSF Division Engineers and Roadmasters, and his review of records of recently needed maintenance on these lines, Mr. Albin identified the projects and problem areas that would be replicated on OTRR and assigned work crews and dollars accordingly. The projects and workforce are based, to some extent, on BNSF current MOW staffing for these lines, but they do not simply replicate the BNSF organization. They are tailored to the proposed OTRR tonnages, train densities, plant size and facilities, weather conditions, and other unique situations on the OTRR route to provide as lean a maintenance team as possible and still cover all the required maintenance activities. His estimate of the number of people needed is based on existing positions tailored to OTRR needs and BNSF production rates for the completion of tasks based on the size of the task and the crew. The salaries for the internal workforce are based on BNSF Wage Rates for the particular maintenance-of-way positions selected.[98]

Mr. Albin analyzed the required OTRR MOW staffing and maintenance activities based on the OTRR tonnage determined by BNSF's traffic witnesses and the additional capacity requirements that BNSF's witnesses, Mr. Wheeler and Mr. Mueller, determined were necessary for OTRR to handle that traffic. Because BNSF traffic witnesses removed the time-sensitive "Z" trains and some coal traffic from the traffic group, the tonnages on some of the line segments are lower than Otter Tail proposed (and in some instances, lower than the current BNSF tonnages). Mr. Albin took these factors into consideration both in developing his crew territories and his calculations of tonnage-

[98] Wages, manpower and production rates backing up Mr. Albin's staffing calculations are included in his workpapers. BNSF.RP.WP.III.D.4-0060 to 0075.

based maintenance frequencies. He also took into account the countervailing additional capacity improvements in determining the mileage-based maintenance activities.

Mr. Albin's MOW Operating Expense Budget is discussed under the following headings: (1) OTRR OE Personnel Requirements and Compensation; (2) OTRR OE Track Maintenance Equipment; and (3) OTRR OE Contract Expenses.

(1) OTRR OE Personnel Requirements And Compensation

(a) Personnel Requirements

Otter Tail's entire OTRR Engineering Department (which is wrapped in with the OTRR Mechanical Department) consists of a Vice-President of Engineering/Mechanical,[99] eight maintenance supervisors, and 204 maintenance crew and structure crew workers. Otter Tail divided the railroad into six maintenance districts with a total of 14 crews assigned to the six MOW Supervisors. Each crew will have 14 people including a foreman, a track inspector, three signal maintainers and nine crewmen including a welder, helper and three machine operators. OTP Nar. at III-D-23. Each crew of 14 is expected to handle all of the routine FRA required inspections of track, bridges, and signals, all of the routine daily maintenance of tracks, buildings, all electrical maintenance, masonry and carpentry, as well as all emergency maintenance for a territory of 90-100 miles (although Otter Tail states that the OTRR's two Directors of Maintenance Operations located at Donkey Creek and Glendive have authority to re-align personnel anywhere over the entire 1,284 mile system as necessary). OTP Nar. at III-D-

[99] A critique of Otter Tail's mechanical maintenance is discussed in Section III.D 3.b.

23. Otter Tail provides no documentation supporting its staffing levels, nor does it explain the basis for its staffing.

In developing his restatement of workforces for OTRR, Mr. Albin took into consideration the way in which railroads classify projects as capital expenditures or operating expenses, and in the real world, allocate salaries into those budgets. In his analysis, Mr. Albin began with the actual BNSF MOW staffing levels for these line segments, the salaries and wages of these positions, and the production rates for maintenance-of-way activities on the line segments replicated by OTRR as a basis for his calculations. From these, he developed a MOW force that would meet the proven needs of a railroad carrying the tonnages and commodities selected for OTRR.

The use of the existing BNSF as a benchmark is an obvious choice given that Otter Tail is replicating these lines and, to a large extent, much of BNSF's existing traffic, although some line segments will experience greater tonnages due to Otter Tail's rerouting of BNSF traffic. However, Mr. Albin did not simply adopt BNSF's staff. Instead, he took into consideration the proposed tonnages for the OTRR as restated by BNSF witnesses and selected the least number of positions that could perform adequately the maintenance needed on these line segments and enable OTRR to meet its operating and service obligations.

Based on these criteria, Mr. Albin designed OTRR's Engineering Department with a Systems Engineering Office located at the railroad's headquarters in Donkey Creek and a field staff organized along departmental levels. The Systems Engineering Office includes 20 persons ranging from the Chief Engineer to the administrative clerks. The departmental offices are organized by skill (*e.g.*, track, bridge and buildings, signals,

communications, electrical). Each department has one or more supervisors, depending on the amount of work, and several field workers assigned specifically to the tasks associated with that department. The table below summarizes the departmental organization and staffs in Mr. Albin's restatement of OTRR's personnel requirements.

Table III.D.4-4
Mr. Albin's Restatement of OTRR Personnel Requirements
Organized Along Departmental Lines

Department	Management/Supervisors	Field Workers
Systems Engineering Office	20	
Track Department	8	236
Bridge & Building (B&B)	2	46
Signals Department	3	74
Communications Department	2	39
Electrical Department	1	10
Purchasing and Store Department	0	8
Total	36	413

Source: BNSF Reply Exh. III.D.4-1. Maintenance of Way Organization

In addition to the 36 supervisors and 413 full-time MOW field workers,[100] there will be 48 seasonal track employees who work approximately nine months of the year performing work that can be done only in good weather.[101] Thus, Mr. Albin concluded

[100] Comparable BNSF staffing on these same lines are as follows: Track (290), B&B (36), Signals (72), Communications (32), and Electrical (10) for a total of 440. BNSF.RP.WP.III.D.4-0029.

[101] Seasonal employees are employees who perform work that is most efficiently done in the months of good weather. Winter months historically have the lowest head count and these positions are only added back for specific jobs such as snow removal after a big snow storm. They are paid at the same rate as full-time employees doing similar work and with benefits, but they are employed only for an average of nine months.

that the total OE MOW workforce required to maintain the OTRR to the appropriate safety and operating standards is 497, including the seasonal track employees.[102]

The staff positions and responsibilities for the Systems Engineering Office and for each department are discussed under III.D.4.b.(1)(a)(i) and (ii) below. The compensation for these employees is discussed in III.D.4.b.(1)(b).

i) Systems Engineering General Office Requirements

The Systems Engineering General Office is responsible for the planning, budgeting, and supervision of the maintenance-of-way for all facilities – right-of-way, track structure, bridges, buildings, communications systems, signals, and electrical systems.

Otter Tail's total Mechanical/Engineering Department has a management staff of two high-level managers and eight supervisors, but no other administrative staff to handle the bookwork and other clerical tasks. Mr. Albin's restatement includes a Systems Engineering general office that has a staff of 20 persons as well as a group of 16 departmental supervisors. (The department supervisors are included as part of Mr. Albin's maintenance-of-way systems organization because a portion of each of their time will be spent dealing with program or capital replacement issues. These include eight roadmasters, three signals supervisors and two B&B supervisors, two communications supervisors and one electrical supervisor, as shown in Table III.D.4-4.).

[102] OTRR also would require 224 system production gang employees to perform the planned replacement of rail, ties, and other track materials. This is consistent with the way railroads staff programmed maintenance. Mr. Albin calculated the costs for these employees in order to demonstrate the minimum costs that OTRR would incur to contract out these activities and to make clear that there is no overlap between replacement costs and operating costs. The cost associated with the system production gangs are capital expenditures and are not included in Mr. Albin's OE costs.

The general office staff includes

- Chief Engineer,
- Director of Track,
- Director Engineering,
- Engineer Bridges & Buildings, and Electrical
- Engineer Signals,
- Engineer Communications,
- Field Engineer/Public Works Engineer,
- Environmental Engineer,
- Track Designer/Estimator,
- Supervisor Welding/Grinding,
- Manager of Rail,
- Manager of Programs and Budgets,
- Manager Track Gangs,
- Manager of Manpower Planning,
- Supervisor Work Equipment,
- Manager of Work Equipment, and
- Four Administrative Assistants.[103]

Each of these positions plays a vital role in establishing an efficient and safe maintenance program.

Although railroad systems groups generally spend more time on capital work projects than on day-to-day maintenance projects, a significant effort is expended by the

[103] In his workpapers, Mr. Albin includes an organizational chart of the Engineering Department. BNSF.RP.WP.III.D.4-0076.

Systems Engineering staff managing projects and budgets associated with operating expenses, as discussed in more detail below.

The system engineering department oversees both capital and OE maintenance operations, but at the higher management levels, the capital planning takes precedence. For the Chief Engineer and his or her direct reports (the Directors/Engineers, Field Engineer/Public Works, Environmental Engineer and Track Designer/Estimator), thirty-three (33%) percent of their time is classified as operating expense because of the lesser amount of time spent on managing operating budgets and dealing with operating spending and projects than on capital projects, as shown in the job descriptions below. Roadmasters and department supervisors' time, on the other hand, is classified as sixty-six (66%) percent OE because, although they are responsible for the planning and oversight of all work on their assigned territories, including capital replacement plans and projects, the largest share of their work involves supervising, planning and coordinating day-to-day maintenance and responding to emergency calls and problems. They are responsible for the daily decisions on work assignments, implementation of work plans, as well as making periodic inspections for quality control and overall effectiveness of the program, and safety implementation.

The following descriptions of the responsibilities of the management positions for the OTRR are based on actual job descriptions for BNSF employees with comparable positions.[104]

The Chief Engineer is responsible for planning, directing and controlling engineering and maintenance activities related to track, bridge, buildings, environmental

[104] BNSF.RP.WP.III.D.4-0030 to 0059.

and control systems facilities. His or her duties include developing and recommending plans and objectives for engineering and maintenance activities; developing and monitoring budgets; organizing staff; coordinating major facilities improvement and maintenance programs; directing engineering and maintenance personnel and activities to effect positive direction and compliance with approved safety practices; supervising bridge plan preparation; supervising signal plan preparation; supervising quality control program in track, bridge, and control systems departments; and supervising environmental engineering personnel.

The Director of Track is responsible for providing practical and technical leadership in track maintenance and improvement activities. His or her duties include reviewing information required for preparing the capital and operating budgets in line with current guidelines; evaluating the use of capital budget money; overseeing quality control of maintenance work; preparing short term and long term plans for maintenance of track and roadway equipment; developing improvement of facilities, maintenance of track and roadway equipment appurtenances; analyzing and investigating new and more functional equipment methods for maintenance; executing outside contracts; directing training programs; performing periodic inspection of track and right-of-way from geometry car, hi-rail and rail detector cars. He manages the capital program for ties, rail, and ballast. He also coordinates with the Program Engineer to schedule work gangs in conjunction with train movements to minimize the impact on train operations. This requires significant scheduling effort, as does the scheduling of efficient utilization of workers, work equipment, company service cars, and other work gang requirements. In

addition, he is responsible for management of slow orders and works closely with the operating department and dispatchers to identify track windows for MOW projects.

The Director Engineering is responsible for planning, directing, and controlling engineering activities related to the physical plant in the areas of field engineering, office planning, public works, and construction to ensure that the standards and quality of work of the OTRR are followed. He is also involved in furnishing professional engineering guidance; direct field and office planning for construction projects; direct design of track layouts for customer requirements; negotiating highway grade separation and yard right-of-way occupancy arrangements with utilities, highways, and other government agencies; review and approval of consultants plans; overseeing capital budget preparation; and analysis of actual charges to projects.

The Engineer Structures (Bridges and Buildings) is responsible for the management of engineering and inspection of bridge work and the maintenance and construction of railroad bridges and other railroad related structures. His or her duties include supervising the preparation of engineering plans and construction specifications for maintenance and replacement of existing structures and construction of new structures; reviewing, inspecting and prioritizing projects; making special bridge inspections as needed and making recommendations for improvements; meeting with other departments and outside agencies in matters related to bridge planning and design; reviewing routine bridge plans affecting the railroad's interest prepared by various governmental agencies and outside consulting firms; and arranging for distribution of plans and ordering of materials.

The Signals and Telecommunications Engineers are responsible for directing the engineering activities of electrical, communications and control systems personnel to effect the most economical programs for installation, inspection, maintenance and repair of those systems and facilities. Their duties include directing personnel responsible for providing the design and plans for installation of communication and controls systems and managing the CTC equipment and control centers; coordinating activities of railroad electrical, communications and control systems with internal and external agencies; effecting optimal performance and efficiency of the physical plant; researching and developing new ways or systems to improve services; and implementing proper budgetary controls for electrical, communications, and control systems forces. They also are responsible for improving engineering of electrical facilities and technical support to develop, install, monitor, and enforce compliance with standards and policies and for coordinating activities between the railroad and various power companies, cities, states and federal governmental agencies to ensure compliance with local codes and national electrical codes. Their duties with respect to the electrical department include defining problems and establishing solutions, estimates, plans, bills of materials and specifications; researching advances in technology and making economic analyses and recommendations; conducting performance audits in the field to ensure compliance with standards; providing training on electrical codes, safety rules, and standards pertaining to electrical systems; investigating code violations and electrical problems/failures; providing support to field personnel on both capital and operating projects; and maintaining up-to-date equipment unit inventories of various types and locations of electrical systems on the railroad.

The Field Engineer/Public Works Engineer is responsible for planning, directing, and controlling engineering activities related to the physical plant within the areas of field engineering, office planning, public works, and construction. His or her duties include working on many projects that would not involve construction by the railroad (such as mine spur track proposals) and thus would be classified as operating expense; directing negotiations of highway grade separations, and right-of-way occupancies of various utilities with governmental agencies; working with other railroads on track connections; overseeing capital budget preparation for such projects; and negotiating with respect to commercial, industrial, or residential properties that affect drainage and use of the railroad's right-of-way. He also manages consultants who deal with complex specialized engineering issues and larger projects.

Environmental Engineering is an important function in today's world. The Environmental Engineer is responsible for managing all environmental activities such as remediation efforts, disposal of batteries, and cleanup of fuel and chemical spills from derailments. An important aspect of the environmental engineer's job is to establish close working relationships with all federal, state, and local environmental agencies. Environmental engineers are essential; it would be unrealistic in today's world for Otter Tail to assume that OTRR would escape such critical assignments.

The Track Designer/Estimator is responsible for designing track for both capital and operating projects. He also functions as an Estimator. As such he is required to submit AFE documents as required by the STB and accounting rules and to prepare requisitions for all capital and some operating materials. The Track Designer/Estimator position spends at least thirty-three (33%) percent of his or her time on non-program

maintenance for OTRR, and therefore thirty- three (33%) percent of the time is conservatively attributed to operating expenses.

The same logic applies for the administrative staff reporting to these positions since they mainly support the upper engineering staff. Based on the volume of work actually performed by BNSF administrative staff, Mr. Albin estimated that OTRR would need four administrative assistants to perform support functions for the systems engineering staff. Two of these assistants handle correspondence for utility permits, track leases, right-of-way occupancies and other operating permits; human resources matters such as maintaining training and safety logs; scheduling safety training and rules testing; tracing company service cars that distribute and pick up materials and scrap; maintaining FRA and DOT records; word-processing activities and miscellaneous activities such as mailings, telecopying and other administrative work; and providing some database support services. The other two perform manpower planning functions. These positions' time is allocated thirty-three (33%) percent to operating projects. Otter Tail's MOW organization set out on page 3 of its electronic workpaper "OTRR. Mow.123" does not include any administrative staff to handle these essential matters.

In addition to these direct reports to the Chief Engineer, there are other important functions in the Engineering Department that are classified as operating expenses. The positions that handle these functions are described below.

The Welding/Grinding Supervisor manages track maintenance programs. All of the grinding and half of the welding projects supervised by this position are classified as operating expense projects. Therefore, sixty-six (66%) percent of this position's salary is attributed to operating expenses.

The Supervisor Welding and Grinding reports to the Welding/Grinding Manager and is responsible for direct oversight of the production and quality of the welding and grinding field operations on the various roadmaster districts. He is also responsible for oversight of welding and grinding work associated with production gangs for rail relay, contract out of face grinding, switch and crossing grinding and other types of welding and grinding. The Supervisor Welding and Grinding also oversees welding and grinding repair work to frogs, switch points and other rail joints. He also assists in the preparation of the welding and grinding capital and operating budgets.

The Manager of Programs and Budgets is responsible for developing the annual track maintenance programs. His or her duties include compiling recommendations for annual budget items and related track program work and prioritizing and scheduling the work; compiling statistics on track maintenance programs; developing software needed to keep records for such maintenance; and budget management for programmed and operating maintenance. Approximately thirty-three (33%) percent of that position's time is spent on OE projects.

The Manager Track Gangs is responsible for the planning, supervision, and quality control of the large production track gangs for rail, ties and surfacing as well as for quality control of smaller gangs. He or she works closely with operating department roadmasters, the bridge and building and signal departments to coordinate gang activity with train operations and other maintenance work. He or she works directly with the Director of Track on budgeting and scheduling gang activities and is directly responsible for meeting production and cost goals.

The Manager of Manpower Planning hires all MOW employees and deals with employee claims. BNSF presently has 39 people involved in this activity, so Mr. Albin's estimate of one manager and two assistants for OTRR is extremely conservative. The allocation of the manpower planner's time reflects the proportion of time spent on capital as opposed to operating projects. The capital projects are seasonal and require less of his or her time than that of handling these activities for the full-time staff. Thus, sixty-six (66%) percent is attributed to operating expenses.

A Work Equipment Manager manages the large amount of equipment that *must* be maintained on OTRR. The Manager is responsible for supervising the work of the mechanics maintaining this equipment (whether it be internal staff or contractors) and for maintaining an inventory of parts for all the different pieces of equipment. He or she is responsible for the timely dispatch of those parts to mechanics and to equipment in need of repair, to ensure that the internal works gangs are not impeded by the breakdown of a key piece of work equipment. Sixty-six (66%) percent of this position's time is attributed to operating expenses.

Supervisor Work Equipment reports to the Work Equipment Manager and is responsible for directly supervising the work of the mechanics repairing and maintaining work equipment. His or her responsibilities include the spot maintenance, production gang equipment and equipment used by the bridge and building, signal, communications, and electrical departments. This position must spend nearly 100 percent of his or her time in the field. The Work Equipment Manager and Supervisor jointly schedule equipment movements and assignments between roadmaster districts to ensure maximum utilization of equipment. Together they work on schedules for shopping equipment for

repairs and modifications and also recommend improved work methods for equipment repair and maintenance activities.

The Roadmasters[105] and other Departmental Supervisors are responsible for the planning, supervision, and oversight of the work of their departments. As noted above, sixty-six (66%) percent of their time is spent supervising OE maintenance projects.

All MOW supervisors, including Headquarters personnel, have as a top priority the preparation, implementation, and enforcement of an effective safety program. This is essential, because railroad activities can be very hazardous if safety precautions are not taken. Therefore, as much as twenty-five (25%) to thirty (30%) percent of a MOW supervisor's time can be spent on safety issues, including training, supervising, investigating, and reporting FRA reportable incidents. Follow-up after a serious accident or incident, whether a personal injury on the job or a derailment, is critical to ensure that, to the greatest extent possible, steps are taken to prevent a future occurrence.

ii) Departmental Maintenance-Of-Way

Consistent with railroad practice, Mr. Albin has determined his MOW staffing along departmental lines in order to provide a focused effort on major maintenance areas, such as Track, Bridge and Buildings, Signals, Communications, Electrical, and Stores. In doing so, he shows that even if all programmed maintenance were contracted out, that still does not account for a significant proportion of maintenance work to be done, and certainly does not obviate the necessity for a well-staffed maintenance force.

For each department, Mr. Albin determined the skills (positions) required to maintain the structures and activities assigned to that department. He determined the

[105] A Roadmaster is the equivalent of a departmental supervisor for track, but is assigned to a specific territory.

number of persons required on the basis of the actual number and kinds of structures on OTRR for which each group is responsible, the identification of the tasks and projects that the department would be responsible for, and BNSF production rates for accomplishing those tasks. The projects and individual responsibilities of the workforce for each department are described in detail in the subsections below.

An adequate internal maintenance force of well-trained individuals for each of these skill areas is critical to a good MOW plan. Department supervisors and workforces cannot rely solely upon program maintenance to replace damaged sections of rail or ties, turnouts, signal equipment, and electrical or microwave parts, because these components sometimes fail prematurely and must be fixed immediately.

Successful early detection of structural problems requires the combination of diligent oversight by supervisors and daily inspections by track/structure inspectors familiar with the territory. Many problems, however, are discovered only when a dispatcher receives a signal indication. A signal indication may require something as simple as a signal maintainer making an adjustment to a circuit at a switch point. On the other hand, it could require repair of a broken rail, which will require about two hours for a track crew with a boom truck to place new rail and joints and a three-hour track window the next day for a follow-up crew to replace the joints with welds and possibly even re-surface the joint areas. As such defects could cause a derailment, there must be an immediate response from experienced crews fully equipped to resolve the problem. Thus, a robust, fully trained maintenance force is essential to minimize disruption to traffic flows, which is especially critical for high density traffic with cycle time and schedule requirements, such as the coal and intermodal traffic on OTRR.

Each department is discussed below.

a) Track Maintenance Personnel

Otter Tail's MOW field personnel are not organized on a departmental basis. Rather, it has six district supervisors, and 14 crews of 14 crew members assigned to the six supervisors. Each crew has a foreman, a track inspector, three signal maintainers and nine unspecified maintenance crew workers. OTP Nar. at III-D-21-22.

Mr. Albin's restatement of OTRR personnel for the Track Department includes:

Roadmasters	8
Maintenance gang foremen and laborers	77
Welder/helpers/grinders	32
Track inspectors and	32
Mechanical machine operators	46
Truck Drivers	43
Work Equipment Mechanics	6
Total	236 + 48 seasonal = 284

The positions and salaries listed under Track Department in BNSF Reply Exh. III.D.4-1 are those for ongoing operating maintenance only and reflect the railroads' personnel requirements for the typical activities involved in the day-to-day inspection and repair of the track structure. Mr. Albin performed a separate analysis (under Program Gangs in BNSF Reply Exh. III-D.4.1) to determine the system production gangs that would be needed to accomplish the programmed maintenance-of-way.[106] This is the most reliable approach for two reasons. First, it recognizes that there is very little overlap between the work that is done by the system programmed capital replacement crews and

[106] The system production gang workforce for programmed maintenance is included in BNSF Reply Exh. III.D.4-1 under the heading "Program Gangs." As explained above, these gangs are not part of the internal OE workforce that handles day-to-day maintenance.

the work performed by the full-time maintenance crews who handle the daily maintenance for an assigned territory. Second, it ensures that all of the operating-related activities are adequately staffed and that no crucial maintenance activity is overlooked.

For OE track maintenance, Mr. Albin divided the railroad into 8 Roadmaster Districts (geographical segments) based at Donkey Creek, Sheridan, Hysham, Glendive (2), Mandan, Fargo, and Herman, each covering an average of 140-160 route miles. In doing so, he followed a system used on BNSF, and affirmed by other railroads, for determining the size of Roadmaster Districts, which takes account of the number of miles, the tonnage, track conditions, number of road crossings, turnouts, accessibility, and weather conditions. Generally Class I railroads with line segment tonnages in the range of 100 MGT to 200 MGT assign Roadmaster districts averaging 130 route miles/180 track miles. The average district on lighter tonnage lines (30 MGT) of Class I, regional and short line carriers is generally 160 to 200 route miles/220 to 250 track miles. For very light tonnage lines (less than 10 MGT) the average is 300+ route miles and 400+ track miles per Roadmaster.[107]

Each Roadmaster is responsible for all track maintenance within his or her territory, including planning, employee training, coordination with other internal departments, and interaction with outside agencies.

In Mr. Albin's restatement, the Roadmasters at Donkey Creek, Sheridan, Hysham, Glendive (2) and Mandan each oversee four section crews. The Roadmasters at Fargo and Herman each oversee three section crews. The heavy traffic districts have more crew members and more supervisors. The Roadmasters also have crews for switch

[107] BNSF.RP.WP.III.D.4.-0077.

maintenance for welding and grinding switch points and frogs. Maintenance crews consist of track workers, machine operators, track inspectors, welder/grinders/helpers, and mechanical machine operators.

There are also district gangs to respond to major derailments, washouts, and other larger track problems. Two each night duty crew members are assigned to Glendive and to Donkey Creek (where the main yards and facilities are located) to handle problems that arise during the off hours. Crews are on call 24 hours a day, seven days a week.

The section crews are required on a daily basis to handle approximately 35 to 50 route miles (depending on the traffic density in their assigned areas). The crews on the higher density lines have territories of 35 to 40 miles, while those on light density lines may have as many as 50 miles. Their responsibilities include replacing broken or defective track components. In addition, they repair track geometry defects as they are detected; repair and remove slow orders; make derailment and washout repairs; cut brush; make minor repairs to grade crossings; inspect track in accordance with FRA standards; clean up debris; maintain drainage facilities; maintain right-of-way fences; plow fireguards; regularly inspect, adjust, and lubricate all switches on the territory; replace damaged and missing signs; clean switches in the event of snow accumulation; spot raise bridge ends or areas of poor subgrade; maintain and service wayside curve lubricators and operate high-rail curve lubrication systems; maintain orderly material stock piles; maintain safe walkways in the vicinity of buildings, platforms, switching leads, and sidings; weld and repair frogs; grind switches and stock rails; slot rail ends where necessary; field weld rail joints created as a result of replacement of defective or broken

rail; replace defective insulated joints and joint plugs; maintain access roads; and gauge track, which is especially important on curves.

Welding crews are responsible for maintaining the condition of all frogs and switch points on the specified territory, and keeping the territory free of rail joints. On a high tonnage railroad, joints on welded rail cannot be tolerated because they become battered and chipped and result in broken rail. Therefore, where joints are created as a result of repairs to defective rail found by the detector cars,[108] welders must follow up immediately to weld all rail joints within 24 hours of the occurrence on high tonnage lines and as quickly as possible on other lines in order to avoid battered joints. Welding crews also provide the equipment to grind switches, frogs and crossings when thermite welding is not required. The maintenance gangs correct the major items that go beyond the scope of what the two-person track patrol crews can be expected to accomplish. Machine Operators operate front-end loaders, dozers, tractors, and speed swings, which are needed for day-to-day activities and to keep the territory clean of scrap rail and used ties and to maintain drainage and roadways. They also operate spot tampers, switch tampers, regulators, brooms, weed mowers, and cranes that are needed seasonally. All truck drivers who operate larger over-the-road vehicles -- whether they be welders, section foremen, or others in the track, B&B or signals departments -- must possess DOT and CDL licenses, which requires the OTRR to provide regular training and testing and ensure the proper renewal of licenses.

[108] Detector cars frequent the high tonnage portions of the railroad several times a month.

Mr. Albin concludes that the minimum OTRR track maintenance force required to perform the daily OE maintenance of the 1,770 miles of mainline, siding, and yard track on OTRR consists of 236 regular track employees, stationed at 30 locations across the OTRR rail system. BNSF Exh. III.D.4-3 is a schematic of Mr. Albin's MOW bases and crew locations. In addition there are 48 part-time track employees that handle seasonal works such as plowing fireguards and special projects.

b) Bridge/Building Maintenance Personnel

Otter Tail accounts for just one water service mechanic and just one carpenter/helper to assist with bridge maintenance.

Water service is an important function as it involves maintaining the fueling facilities on OTRR, as well as the water and sewer systems, boiler systems and such other utilities on the railroad. Shop complexes, buildings, and treatment plants require piping, testing, inspections, repairs, routine cleaning and pumping of systems, and lubrication of parts to keep them in proper working order. However, water service is not the only personnel requirement with respect to bridges and buildings on a railroad. The water service employees and carpenter/helpers are part of a larger B&B workforce.

In his restatement of B&B personnel, Mr. Albin has two B&B supervisors located in Glendive and Donkey Creek, where the major structures are located, including the locomotive repair facility, a car shop, fueling facilities, and headquarters office buildings. Donkey Creek and Glendive will each have B&B crews consisting of an inspector, six carpenter/helpers, one water service employee, and one machine gang. Additional B&B crews are located at Sheridan, Glendive, and Fargo, and each consists of a foreman, three carpenter/helpers, and one truck driver. Each supervisor has a seven-person mobile gang

equipped with boom trucks, chase vehicles, and hydraulic tools. The mobile units assist in tightening bolts, cleaning steel spans, clearing brush and debris at bridge openings, and small maintenance chores at buildings and fueling facilities. The total full-time B&B workforce includes:

Inspectors	2
Foremen	6
Carpenter/Helpers	18
Water Service Mechanics	2
Truck Drivers	4
Mobile maintenance gang	14
Total	46

The B&B Supervisor oversees the work of the B&B operating maintenance crews as well as the yearly bridge rebuilding and scheduled maintenance program.[109] The Bridge Inspector is responsible for inspecting all bridges and large culverts and making instant repairs or calling in bridge crews as needed to address problems identified on inspection. (The track department will inspect and maintain culverts with less than 36" diameters.) The carpenters and helpers handle the larger repair jobs identified by the inspector.

Coordination between bridge maintenance crews and track department inspectors is essential as many maintenance tasks, such as raising bridge ends, aligning track on bridges, and ballast deck maintenance, require the expertise and involvement of both departments. The bridge crews work closely with track gangs to handle adjustments to structures required as a result of relay or tie work.

[109] In BNSF Reply Exh. III.D.4-1 Mr. Albin has shown the B&B supervisors in his maintenance-of-way summary with the maintenance-of-way general office personnel and assigned sixty-six (66%) percent of their time to OE.

c) Signals Maintenance Personnel

Otter Tail includes in its company personnel 42 signal maintainers, but no other signals personnel. Mr. Albin includes a full-time staff of 74, including signal maintainers, technicians, and general crew members, in his restatement of the signals department personnel:

Signal Maintainers	41
Electronic Technicians	6
Inspectors	6
Dispatch Center Maintainers	3
General Crew Members	18
Total	74

Based on the network configuration of OTRR provided to him by BNSF's operating witnesses, Mr. Albin determined that the existing OTRR territory would have approximately 37,000 AAR signal units requiring 41 signals maintainers across the system.[110] An AAR signal unit is an industry wide standard that assigns a unit value to every piece of signal equipment on the railroad.[111] The industry standard for AAR units per maintainer varies depending on the FRA requirements and rules for testing wayside signals and highway crossing equipment. Obviously, a maintainer can handle more units if the work units are confined to a small geographical area such as in a yard or terminal. However, if a territory exceeds 60 miles, the "windshield" time (*i.e.*, travel time) comes into play and the number of units must be reduced. In this area, where weather, tonnage,

[110] BNSF.RP.WP.III.D.4.-0078.

[111] This standard was established by all railroads so a uniform method of billing could be used at joint facilities or at railroad/railroad crossings.

and windshield time are all factors, Mr. Albin used a standard of one maintainer for every 900 signal units.[112]

Mr. Albin determined that three signals supervisors would be required for the territory covered by OTRR, based on the workforce that has been established. The supervisors would be located at Donkey Creek, Glendive, and Fargo. In addition, there would be signal crews assigned to Sheridan, Mandan, and Hysham. Each crew location would have six or eight signal maintainers, an electronic technician, a signal inspector, and a three-person maintenance crew. An additional three crews members would be assigned around the clock to the Dispatch Center at Donkey Creek.

The signal crews maintain the specialized equipment relating to the CTC system and are responsible for keeping in good operating condition all wayside signals, crossing signals, hot bearing detectors, and power switches. Signal crews also must follow the work of track gangs, (relay, ties, surfacing) to test and make adjustments to any signal circuits that may have been disturbed during those activities. These crews work directly with the Track Department on line outages relating to broken rail and switch problems.

Signal maintainers are required by FRA to perform a number of periodic tests on all wayside signals and wayside crossings.[113] Approximately sixty (60%) percent of a signal maintainer's time is spent performing these tests. The other forty (40%) percent is spent on maintenance.[114] OTRR would be required to comply with these FRA regulations, but Otter Tail's estimates and costs for maintenance personnel fail to take

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[112] BNSF.RP.WP.III.D.4.-0078.

[113] BNSF.RP.WP.III.D.4-0081 to 0092.

[114] BNSF.RP.WP.III.D.4.-0093.

these requirements into account as Otter Tail provides no additional maintenance workers in this area to assist with the daily work.

The signal inspector is required to perform relay testing as well as other signal related circuit testing. An inspector can normally handle about 200 miles of railroad. A signal electronic technician is responsible for keeping the network CTC in tolerance range and calibrating hot box detectors annually to maintain system integrity. Regular signal maintainers generally are not technically able to perform these tests.[115]

As noted above, Otter Tail's MOW company personnel included only 42 signal maintainers, but ignored all of the other responsibilities of this department.

d) Communications Maintenance Personnel

Otter Tail does not have any telecommunications maintenance personnel. In his restatement of telecommunications personnel for OTRR, Mr. Albin included two supervisors[116] and crews at Donkey Creek and Glendive and four additional crews located at Sheridan, Hysham, Mandan, and Fargo. Each of these latter four crews consists of a foreman, an electronic technician, communications technicians, and communications maintainers. The Telecommunications department includes:

Foremen	5
Microwave Technicians	5
Communications Technicians	6
Communications Maintainers	13
Radio Shop technicians	10
Total	39

[115] *Id.*

[116] In BNSF Reply Exh. III.D.4-1, Mr. Albin has shown the telecommunications supervisors in his maintenance-of-way summary with the maintenance-of-way general office personnel and assigned sixty-six (66%) percent of their time to OE.

The foremen and technicians maintain the microwave systems, telephones, the infrastructure of the data network, the Automated Equipment Identification (AEI) sites and the equipment identification video equipment located at those sites, and all other train yard cameras and scanning equipment.

The radio shop technicians are responsible for maintaining the radios (diesel locomotive radios, portables, etc.) used on the railroad and maintain a radio repair shop with parts and supplies for repairing locomotive and portable radios and EOTDs.

The foremen and communications maintainers install and maintain cable (both underground and overhead) for data to the network, switches, interlockers, and the like. They also perform necessary maintenance on microwave towers and pole lines. They are responsible for responding to emergencies involving microwave and data network outages.

The total number of telecommunications personnel is 39.

e) Electrical Maintenance Personnel

Otter Tail includes two electricians in its company maintenance-of-way personnel.

In his restatement of the electrical department personnel for OTRR, Mr. Albin assigned this department a supervisor,[117] and included 10 additional personnel located at Glendive and Donkey Creek. This department includes:

[117] In BNSF Reply Exh. III.D.4-1, Mr. Albin has shown the electrical supervisor in his maintenance-of-way summary with the maintenance-of-way general office personnel and assigned sixty-six (66%) percent of this position's time to OE.

Foremen	2
Journeyman/Electricians	8
Total	10

The electrical department crew maintains the electrical facilities and systems that are necessary to rail operations. A few of the systems that the electrical department maintains are:

- HVAC systems in buildings,
- Power distribution systems in yards and other facilities,
- Area lighting in yards and parking lots,
- Power control and lighting in shops and office buildings,
- Electrical and fuel monitoring systems at fueling facilities,
- Emergency power systems,
- Electrical systems for signal and telecommunications,
- Electrical systems at waste water treatment plants,
- Track switch heaters.

f) Purchasing/Materials Management Maintenance Personnel

Otter Tail included in its management staff a Manager of Purchasing and Budget, but provided no employees under this individual, possibly on the assumption that materials would be shipped directly to the worksite on a just-in-time basis. Even though much of the material can be shipped directly from vendors to the worksite, some MOW and mechanical materials must be kept on hand for day-to-day maintenance and emergencies. Therefore, a small Purchasing and Materials Management (PMM) department is required for an efficient operation to avoid delays due to waiting for materials. Mr. Albin has estimated that eight MOW personnel would be required to handle the purchasing, inventories, receipt, and delivery of all maintenance materials required for OTRR.

In BNSF's restatement of costs, the G&A department includes a PMM facility and a Director of Purchasing and Purchasing Agent. As the Director and Purchasing Agent are part of the G&A staff of OTRR, their salaries are not included in Mr. Albin's MOW budget. Mr. Albin includes only the eight MOW workers with responsibilities relating to engineering, MOW, operating, and mechanical departments. These workers include:

Materials Manager	1
Machine Operator	2
Truck Driver, and	2
General laborer	2
Administrative	1
Total	8

The PMM serves as a regional store for track, B&B, signal and communications, system electrical material, and roadway equipment parts. It also supplies locomotive and freight car parts to the repair shops, and supplies and monitors fuel, lubricating oil, and other such items for the fueling facilities. The store would operate three shifts per-day, seven days per-week. Truck deliveries of station supplies, freight car and locomotive parts, maintenance-of-way materials, AFE materials, and work equipment parts are made directly from this facility to departments on the OTRR. The transportation and disposal of hazardous waste materials also are handled through this facility.

The Materials Manager is responsible for supervising the employees engaged in ordering, loading, unloading, storing, issuing, and distributing materials and supplies to the departments. The Machine Operators operate the cranes and other machinery used in disbursing, receiving, loading, and unloading material.

The fueling facilities at Donkey Creek, Glendive, and Mandan are supplied and managed by PMM department personnel who supply locomotive and freight car repair

parts to the locomotive maintenance and servicing facilities at these points, and to the train yard and freight car repair tracks.

As the Purchasing Department procures and provides materials for both the capital and OE maintenance programs, a portion of the employees' time is allocated to OE maintenance based on the relationship of the materials purchased. Because most of the materials are consumed by OE related activities, seventy-five (75%) percent of the purchasing employees' time is attributable to OE maintenance.

iii) Comparison Of Mr. Albin's Proposed Staff With Other Railroads

A comparison of Mr. Albin's MOW organization with the current maintenance staff of other relatively large regional railroads and with BNSF's existing staff on the OTRR replicated line segments demonstrates that Mr. Albin's estimates are realistic. The table below shows comparisons with MRL, FEC, WC, and BNSF.

Table III.D.4-5
Comparison of MOW Staffing Levels

Railroad	Route Miles	Track Miles	Average Tonnage	Mow Mg/Sup.	Crews	Total
MRL	600	900	30 MGT	29	132 + seasonal gangs	161 + seasonal gangs
FEC	360	500+	30 MGT	13	182 + seasonal gangs	195 + seasonal gangs
WC	1920	2870	0- 40 MGT	40	708	748
Existing BNSF (OTRR replicated segments)	1284	1771	53 MGT	15 (not incl. headq.)	440 (including seasonal gangs)	455-
BNSF's OTRR	1285.8	1768	85 to 66	36	413 + seasonal (48)	449 + seasonal (48)

Source: Workpapers BNSF.RP.WP.III.D.4-0019 to 0028. BNSF's proposed OTRR reflects the slight changes in route miles and track miles determined by BNSF's operating and capacity witnesses.

The table above demonstrates that Mr. Albin's estimate of the full-time staffing requirements for the OTRR is in line with the crew that BNSF currently has on all of the line segments replicated by the OTRR, given that the OTRR is assumed to carry substantially more traffic than BNSF currently handles on these lines today. For example, Mr. Albin's proposed staffing for the Glendive-Fargo line segment, which will have substantially higher tonnage than existing levels, is 141 compared to BNSF's current staffing of 127. Otter Tail's proposed staffing for this segment with even higher proposed tonnages was 64. Mr. Albin's staffing on a miles per employee basis is also more in line with that of FEC and MRL. MRL has 3.73 route miles per employee (5.59/track miles per employee); FEC has 1.85 route miles per employee (3.08/track miles per employee); WC has 2.57 route miles per employee (3.83/track miles per employee) and Mr. Albin's proposed OTRR has 2.86 route miles per employee (3.94/track miles per employee) despite much higher tonnage.[118]

(b) Compensation

Otter Tail derives the compensation for its company field personnel by taking the average wages for four general positions from BNSF Wage Forms A & B produced in discovery.[119] Otter Tail's wage levels included the straight time wage levels and the overtime allowance included in the document, which for the four positions selected ranged from { } percent. To those figures, Otter Tail

[118] In contrast, Otter Tail's proposed 215-person workforce would mean one person for every six route miles or for every 8.28 track miles.

[119] OTP Errata Opening electronic workpaper "Ottertail Salaries.123."

added forty (40%) percent of all salaries and wages for fringe benefits and five (5%) percent for office materials and supplies. Otter Tail added a materials cost based on twenty (20%) percent of the wages of signal and track employees and an allowance for travel, meals, and accommodations based on ten (10%) percent of the wages of water service mechanics, carpenters, and masons. Otter Tail then arbitrarily assumed that only sixty-five (65%) percent of the total salaries, wages, and additives are associated with OE. Finally, Otter Tail took the total maintenance costs and reduced them even further by the ratio of 2002 GTMs to 2021 GTMs.

Otter Tail gives no explanation for its percentages. Nor does it give any explanation of why only signals and track employees need maintenance materials to do their jobs. And no rationale is given for limiting travel allowance to structures employees, which is especially of note as Otter Tail asserts that its all purpose employees can be assigned anywhere over the system. Finally, Otter Tail fails to explain why it assumes that its personnel count for 2002 would be reduced from 2021 levels proportionately with the difference in GTMs between those two periods. As noted earlier, Otter Tail's development of staffing levels that are significantly lower than existing BNSF levels while at the same time increasing the tonnages substantially above existing BNSF levels is inconsistent with its theoretical assertion that staffing levels are directly related to tonnage levels.

Otter Tail's new indexing proposal is inconsistent with past Board precedent and, more importantly, yields nonsensical results. Basically Otter Tail is suggesting that it developed all of its maintenance-of-way staffing levels and contractor costs based on its forecast of OTRR traffic 20-year hence and, as a result, it is entitled to reduce those costs

based on the ratio of forecasted 2002 OTRR volumes to forecasted 2021 traffic levels. The result is a more than 14 percent reduction from Otter Tail's already low maintenance-of-way estimates.

In prior stand-alone cost proceedings, the parties developed an estimate of the normalized or average annual maintenance of the SARR of the 20-year DCF period. Under this approach, staffing levels for maintenance-of-way headquarters personnel and operating expense related field personnel requirements at the start of operations were developed and conservatively assumed to remain constant throughout the DCF period. Capital related expenditures were calculated based on the average densities projected for the SARR over the same 20 years. This normalized cost was dropped into the Board's DCF model and adjusted only for anticipated inflation.

In this case, Otter Tail has not done anything methodologically different in developing staffing levels for the maintenance-of-way headquarters and field personnel, but it computes its normalized capital related expenditures not on the average density levels over the 20-year DCF period but rather on the last year (2021) projected traffic levels. Presumably, it is Otter Tail's perception that its use of 2021 traffic levels for computing the stand-alone capital related expenditures serves as justification for indexing both capital and operating expenditures back to year 2002 levels. However, because the operating expenditures are not computed based on specific assumptions of density -- and indeed such expenditures do not vary directly with density -- reducing operating expenses by the ratio of 2002 density to 2021 density is wrong and is nothing but a thinly veiled attempt by Otter Tail to artificially reduce maintenance-of-way expenses.

Taken literally, the impact of Otter Tail's proposed reductions are untenable. For example, for the first year of operations, the OTRR will be staffed by 0.86 of a Chief Engineer. Similarly, the day one equivalent of Otter Tail's proposed 14 person field gangs is 12 people, and those gangs will operate fractions of different pieces of equipment. Otter Tail's proposal is equally nonsensical for contract maintenance expenses where Otter Tail is implicitly assuming snow removal and weed spraying costs will be lower in the first year because traffic levels are assumed to be lower than in year 20 of the DCF period.

Otter Tail's new adjustment should be rejected.

In developing his maintenance-of-way estimate for the OTRR, Mr. Albin followed the Board's traditional approach and determined the staffing levels and contract expenses needed at the commencement of operations and developed his capital costs based on the average of the traffic levels forecasted over the OTRR 20 year DCF period.

Mr. Albin's labor costs for OE track personnel are taken from BNSF discovery documents providing the hourly wages for specific MOW positions.[120] Mr. Albin uses a { } percent overtime allowance, which reflects the BNSF engineering office operating expense for overtime in 2002.[121] This is consistent with the { } percent reflected in the Wage Form A and B's and is reasonable considering that maintenance individuals are on call at all hours of the day and night, including holidays. In BNSF's experience, overtime for maintenance employees is unavoidable, and reducing

[120] BNSF.RP.WP.III.D.4-0060 to 0075.

[121] BNSF.RP.WP.III.D.4-0094.

maintenance staffs to lower levels (such as the one Otter Tail has designed for OTRR) increases the percentage of overtime for the remaining staff. Mr. Albin's use of { } percent overtime for OTRR, therefore, is extremely conservative.

Mr. Albin then applied a { } percent additive for fringe benefits, based on current BNSF records for 2002 fringe benefits.[122] Otter Tail did not give the source for its forty (40%) percent for fringe benefits.

Mr. Albin also relied on standard BNSF and railroad practice in developing his additives for materials and supplies and for travel, meals, and accommodations. It is customary for *each* department to include a labor-based charge for materials and supplies, which includes not only the maintenance supplies and materials expended in performing its tasks, but also the required safety equipment.[123] The percentage of the additive for this item is based on the actual expenditures by each department for these materials and supplies. As set forth below, Mr. Albin applied each department's appropriate additive to the salaries of employees in that department. The materials additive should not be confused with the additive for *office* supplies and materials. Office supplies include paper, pens, files, stationery, envelopes, and other office supplies. The materials additive covers the particular expendable materials consumed in performing maintenance tasks.

Because the nature of maintenance work is that all MOW workers must travel to some extent in performing their jobs, an allowance is made per employee to cover travel,

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[122] BNSF.RP.WP.III.D.4-0095 to 0099.

[123] This does not include the track maintenance equipment and tools which are accounted for separately.

meals, and corporate accommodations. Accordingly, Mr. Albin applied the ten (10%) percent additive to all OE wages and salaries.

Mr. Albin's restatement of OTRR's annual OE budget for MOW management by department is summarized below.

Systems Engineering Office. The OE portion of the General Office Staff salaries and wages is $919,126 for managerial staff and $1,515,999 for Roadmasters and Departmental Supervisors.

Track Department. The Track Department maintenance personnel cost includes a { } percent materials cost, based on BNSF records of the actual amounts used by BNSF to cover that cost. This covers the cost of small tools such as picks, chisels, wrenches, lining bars, measuring tools, and other such items that are regularly replaced as they wear out, as well as materials expended in the performance of tasks, such as nails, screws, spikes, adhesives, and other typical maintenance items. For the 236 track workers and 48 seasonal workers, that cost is more than $2.8 million, which is substantially higher than the amount allowed by Otter Tail. Mr. Albin's total cost for track department OE maintenance, including labor, fringe benefits, and other additives is $22,166,812.

Bridge and Building Department. The B&B department personnel cost for 46 employees includes a { } percent additive for structures' maintenance materials. The total B&B OE cost is $4,046,208.

Signals Department. The Signals Department personnel cost for 74 employees includes a { } percent materials cost because of the more expensive materials used in signal maintenance. The total cost is $6,382,046.

Telecommunications Department. The Telecommunications personnel cost for 39 employees includes a { } percent additive for materials, based on the actual cost of materials for this group. The total cost is $3,267,540.

Electrical Department. The Electrical department personnel cost for ten employees includes a { } percent additive for materials, due to the increased costs for the tools and supplies involved in maintaining these systems. The total cost is $853,749.

Purchasing and Materials Management. The total OE budget for eight PMM personnel is $443,750.

Total Salaries and Wages. BNSF Reply Exh. III.D.4-1 depicts the personnel requirements, additives, and total costs for each of the departments of the OTRR Engineering Department. The total OE budget for company personnel is $39,594,831.

(2) OE Track Maintenance Equipment

The only MOW equipment included in Otter Tail's OE maintenance costs are hi-rail trucks, hi-rail inspection vehicles, signal maintainer vans, a utility van, welders trucks, a few ballast regulator/snowplows and tamper/lining machines, cranes, and very small allocations for miscellaneous equipment and small tools for all crafts without distinction.[124] While Otter Tail has identified some of the needed equipment, it has not included them in sufficient quantities to perform efficient maintenance. The pieces of equipment specified by Otter Tail will be spread out too far, with only one piece of each type equipment covering work for more than 200 miles of railroad. Thus, Mr. Albin

[124] OTP Errata Opening electronic workpaper "Otrr_MOW.123."

found Otter Tail's list of equipment and small allocations for small tools woefully inadequate.

BNSF Reply Exh. III.D.4-1 includes a comprehensive list of the Systems Engineering and Departmental equipment requirements that would be reasonable for the daily maintenance requirements of a railroad with the geographic configuration and annual tonnage of OTRR. Mr. Albin's estimate of the OTRR operating expense equipment requirements are based on the projects that would have to be undertaken by each department, the number of crews in each department that would be needed to perform such projects, and the equipment that would have to be available to each crew or crew member, either on its own or in conjunction with other crews, to perform the work most efficiently. Where possible, equipment is shared. However, equipment that is used regularly, such as rail grinders, rail saws, drills, air compressors, generators, and rail expanders, must be in sufficient supply to allow each crew ready access when small jobs such as grinding frogs and switches and replacing rail come up.

Some of the essential items of equipment that Otter Tail overlooked include air compressors, brush cutters, rail drills, rail grinders, speed swings, welders, tie cranes, snooper cranes, dozers, anchor machines, tie adzers, loaders, mowers, curve lubricators, and track inspectors' trucks. The meager allocations to small tools and miscellaneous equipment are not nearly sufficient to cover these items. A list of specific quantities and types of equipment and tools needed by each department and each production work gang in each craft area are set forth in Mr. Albin's workpapers.[125]

[125] BNSF.RP.WP.III.D.4-0100 to 0107.

Mr. Albin's estimate of the total cost of the maintenance-of-way equipment needed for daily operations on OTRR is $14,657,442[126] compared to Otter Tail's estimate of $2.6 million (which of course is further reduced by Otter Tail's adjustment based on the ratio of 2002 GTMs to 2021 GTMs). Mr. Albin's designation of the kinds and quantities of equipment needed to maintain OTRR to the appropriate operating and safety standards is far more realistic than Otter Tail's. In many instances, Otter Tail's miserly allocation of equipment would cripple OTRR crews' ability to handle multiple tasks simultaneously. Moreover, even assuming all program maintenance is contracted out, providing a minimal staff with a modicum of equipment to handle the daily maintenance is a false economy. An already sparse workforce of 204 persons would never be able to meet the demands of a high tonnage railroad such as OTRR and would be further hampered without an adequate supply of the proper equipment. Based on Otter Tail's provision of equipment, OTRR efficiency would be undercut awaiting the availability of MOW personnel and equipment. Staffing and budget constraints would lead to the deferral of maintenance, which is a dangerous and highly inadvisable practice, as deferral seriously exacerbates existing MOW problems. BNSF has had success in reducing its MOW forces to the extremely low present levels over the past five to six years only by researching/testing and equipping its MOW crews with modern day equipment, using concrete ties, and by handling the larger work projects with efficient system production gangs who handle not only the capital replacement programs, but also undercutting, shoulder ballast cleaning, out-of-face surfacing, and switch grinding.

[126] BNSF.RP.WP.III.D.4-0107(A) to (H).

Of course, Otter Tail's failure to provide the needed equipment may be due to its apparent misconception that contractors will supply and maintain all equipment.[127] Otter Tail offers no evidence, however, that costs to cover such contract provisions have been taken into consideration. As discussed above, Otter Tail's contract cost for rail/tie replacement and resurfacing is based on small jobs with a backhoe, and do not include costs for sophisticated heavy duty machinery. There are no costs in Otter Tail's evidence for contractors to maintain OTRR owned maintenance-of-way equipment, or for OTRR to rent equipment that would be maintained at the lessee's expense. And it is unlikely that the contractors will agree to cover equipment ownership and leasing costs at their own expense. Therefore, it would be arbitrary and inappropriate for the Board to rely on any of Otter Tail's implicit assumptions about equipment costs being included in contracts, and any evidence to such affect offered on rebuttal would be improper.

(3) OE Contract Work

There are certain maintenance activities, such as weed spraying and snow removal, that by and large are contracted out by both large and small railroads. Otter Tail stated in its Narrative that OTRR would use contractors for vegetation control, rail geometry testing, rail grinding, ultrasonic rail testing, ditching, communications and signals, derailment, snow removal, track program maintenance, and miscellaneous outside engineering contracts for surveys and bridge work. OTP Nar. at III-D-60 to 61.

[127] In devising the Mechanical/Engineering Department for OTRR, Otter Tail asserts with respect to mechanical maintenance that "[m]aintenance of the railroad's locomotives, freight cars, maintenance-of-way equipment and vehicles will all be contracted." OTP Nar. at III-D-20. Otter Tail, however, has not provided for the rental or maintenance of MOW equipment either in its G&A costs or in any of its MOW contract costs. In fact, as discussed in section III.D.4.b.(3) below, Otter Tail actually excludes equipment costs in deriving unit costs for a number of its contract MOW activities.

Mr. Albin agrees with the use of contracts for these services, but disagrees that the costs are accurately reflected in Otter Tail's OE costs.

The differences between Mr. Albin's estimates of contract work and those of Mr. McDonald are driven for the most part by their use of different unit costs and different standards for determining the frequency with which track maintenance activities must be done. Otter Tail derives many of its unit costs from *FMC* with no explanation of what is included or of the suitability of those costs to the OTRR. In other instances, Otter Tail claims to derive unit costs from BNSF contract costs, but overlooks key elements of the costs.

With respect to frequency standards, Otter Tail offers no support for its standards, whereas Mr. Albin bases his standards on the tonnages involved, his many years of experience on these lines, and the standards that have been tried and proven by heavy tonnage railroads over the past few years.

Moreover, Otter Tail omitted entirely from its OE track maintenance estimate such crucial activities as yard cleaning, coal dust cleanup, and stabilization projects along the Yellowstone River and Jamestown Subdivision. Mr. Albin assumes that the OTRR would contract for these track maintenance projects as well. As shown in BNSF Reply Exh. III.D.4-1, Mr. Albin has included these costs in his estimate of contract work. Each of the OE contract costs is discussed below.

(a) Weed Spraying

Otter Tail included a unit cost of $70 per mile for regular and noxious weed control to be applied to 561 miles of OTRR right of way. It purports to have used BNSF weed spraying contracts to derive its unit costs for these activities, but upon closer examination it is clear that Otter Tail has misread the contracts. Otter Tail took the unit

costs for labor only for regular and noxious weed spraying and applied those unit costs to the miles of right-of-way in each state and then took the average as its unit cost. The contracts, however, clearly specified {

} Otter Tail ignores both the cost of { } and the cost of the { } Moreover, Otter Tail's unit cost was based only on contracts for { } When these additional costs are taken into account BNSF's actual costs result in an average unit of cost of { } per mile for regular vegetation control and ${ } per mile for noxious weed spraying (including { }).[128]

All OTRR main and secondary tracks must be sprayed annually with EPA approved pesticides. Chemicals must be rotated periodically to provide adequate vegetation kill from year to year. Certain areas require second applications and crossing areas require additional coverage to provide increased kill to improve sight distance for motorists at road crossings. The spraying program is managed by the Environmental Department with the field supervisors monitoring the application, the contractors' production, and the effectiveness of the kill. Regular weed spraying would be required on 1766 miles of OTRR track.

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[128] {

}} BNSF. RP.WP.III.D.4-0108.

In addition to regular weed spraying, the railroad must also spray for noxious weed control. Noxious weeds are those which have a harmful effect on agricultural productivity or to human health and welfare, and therefore are "outlawed" by state governments. In some areas, noxious weeds must be controlled from right-of-way line to right-of-way line, which results in increased application costs. Approximately 641 miles of the OTRR right-of-way in various pasture and agricultural areas must be sprayed for noxious weeds at the unit cost of ${ }/mile.[129]

BNSF also incurs costs for spraying brush and crossings in these areas of the county at the same cost as for noxious weed spraying. Approximately 900 acres of brush and 1,100 acres of crossings would require weed control.

The FRA also requires railroads to provide vegetation control under bridges, which involves spreading the pellets by hand. This time-consuming activity, however, is not contracted out by BNSF, but is handled by BNSF's internal mobile bridge crew. Therefore, Mr. Albin has not included any additional cost for this task in his restatement of contract costs. It should be pointed out, however, that Otter Tail has offered no evidence that it has included this important activity in either its contract or internal maintenance costs. Indeed, as Otter Tail's proposed track and structure crews have too few members to spare any for this type of activity, it is likely that the OTRR as staffed by Otter Tail would have to contract for this activity, but the costs to do so are clearly not reflected in Otter Tail's vegetation control costs.

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[129] *Id.*

Total costs for vegetation control are $785,427.[130]

(b) Ultrasonic Rail Testing

Otter Tail proposes to perform ultrasonic rail testing only twice a year, but offers no support for that frequency. It also performs testing only on mainline tracks and not on branch lines or light density lines.

Rail lines which handle the tonnage levels proposed for OTRR should be tested regularly. BNSF uses two different standards for rail testing. The first is to test all rail every 15 MGT. The second is to test rail with tonnages of 50 MGT or more four times a year, and rail with less than 50 MGT twice a year. In this case, BNSF applied both standards and selected the latter test as it resulted in the lower test miles. Thus, 6,149 miles of rail would have to be tested annually on OTRR. This frequency is required to locate internal rail defects and remove portions of rail that are defective before they develop into failures that could result in derailments and/or interruption of service.

Mr. Albin accepts Otter Tail's unit cost of $90, but applies it to the 6,149 miles for a total cost of $553,433.

(c) Rail Grinding

Otter Tail's standard for rail grinding is to grind rail every 100 MGT using two passes, which it applies only to 136-pound and 132-pound mainline rail. BNSF's general policy is to grind curves greater than three degrees every 15 MGT, curves less than three degrees every 30 MGT and tangents every 60 MGT to maximize rail life. One pass is sufficient if grinding is performed on the above frequencies for tangent and curves less than three degrees. Curves greater than three degrees always require two passes. If the

[130] BNSF Reply Exh. III.D.4-1.

rail is not ground regularly, it deteriorates and additional passes at additional cost would be required to properly profile the rail. It is important that a rail profile be maintained that fits the wheel profile of the heavy cars. If this is not done, areas of high stress are created in the ball of the rail, resulting in defects and fatigue. The only way heavy haul Class I railroads have been able to improve rail life to 1 BGT and beyond is through a diligent rail maintenance program. Strict adherence to an aggressive rail grinding schedule is an integral part of such program.[131]

Even more important is an aggressive special grinding program at switches and crossings involving grinding at the frog, stock rail and switch points. Switches are by far the highest maintenance item on a heavy tonnage railroad both for track and signal maintenance forces. Modern switch grinding equipment has made it possible to improve turnout component life and to reduce outages at turnouts resulting from switch points and other components not matching or being out of alignment. Special grinding must also be done to rail at crossings because the large production grinders must pass by crossings due to flangeway restrictions. The rail at crossings takes both the load from trains and from traffic and thus requires special care. Mr. Albin has included grinding of switches and crossings in his rail grinding calculations.

For regular grinding, Mr. Albin calculated 2,158 pass miles including a single pass on tangents and curves less than three degrees and a double pass on curves greater than three degrees. Mr. Albin's calculations are included in electronic workpaper "III D 4 Maintenance of Way.xls." Otter Tail used a unit cost of $1,615 per mile applied to

[131] *See* "Grinding Delivering on its Promises." Railway Track & Structures, ed. Tom Judge, June 2003 p. 53 and "Keeping a Low Profile" by Robert J. Derocher in Progressive Railroading, June 2003, p. 50. BNSF.RP.WP.III.D.4-0109 to 0117.

1,095.6 miles. Otter Tail derived its unit cost from a BNSF invoice attached to a BNSF contract with { }. As with other contract costs, Otter Tail includes labor but omits the additional costs for {

}. When properly calculated, the cost is { } per pass mile. Mr. Albin applied that cost to 2,158 pass miles per year, for an annual cost for rail grinding of { }.[132]

Mr. Albin has included switch grinding using BNSF's standard grinding frequency of 50 MGT and cost { } per switch for a total cost of { } per year.[133]

Grinding at crossings is done at the same frequency as for mainline track. Based on the number of crossings on the OTRR and a unit cost of { }, Mr. Albin's cost for grinding at crossings is { }.[134]

(d) Track Geometry Testing.

Major railroads (Class I's and others) test track geometry on a regular basis to ensure that the track alignment, profile, cross level, super-elevation, gauge, and twist all meet FRA and corporate track safety standards. BNSF's policy is to test from two to four times per year on lines with the densities proposed for OTRR. The OTRR line segments with densities greater than 50 MGT would be tested four times a year, and the segments with densities less than 50 MGT would be tested twice a year.

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[132] BNSF.RP.WP.III.D.4-0118 to 0121.

[133] BNSF Reply Exh. III.D.4-1.

[134] BNSF Reply Exh. III.D.4-1.

Otter Tail tests only once a year regardless of the density, but gives no explanation for this minimal testing. Mr. Albin, therefore, used the BNSF standard, which requires testing of 5,784 miles.

Otter Tail uses a unit cost of $305 per mile based on a cost from *FMC*. It appears that Otter Tail took the total track geometry testing cost from *FMC* and divided it by the total track miles on the *FMC* SARR to derive a cost per mile of $265, which it then indexed to 1Q02 for a unit cost of $305. It applied that unit cost to 1049 miles (which is just the mainline route miles on the OTRR) for a total cost of $320,082. This is incorrect. Since the unit cost Otter Tail derived was on a per-track mile basis, Otter Tail should have applied it to the mainline track miles on the OTRR or 1682 miles, which would have equaled $513,010.

However, because the 1997 *FMC* cost is not necessarily representative of the costs incurred today and because Otter Tail's methodology both for deriving and applying a unit cost based on *FMC* is flawed, Mr. Albin relies instead on a unit cost of { } per test mile based on BNSF's actual costs in 2002 for track geometry testing.[135] The unit cost includes the costs for both the labor and equipment. Application of the { } unit cost to the 5,784 test miles determined under the BNSF standard results in a total cost of { }.

(e) Miscellaneous Engineering (Including Bridges And Building)

For miscellaneous contracts, Otter Tail includes a unit cost of $1,078 per route mile derived from *FMC,* but gives no explanation of why that cost would be applicable to this railroad. The railroads in the two SAC cases are entirely different, carry different

[135] BNSF. RP.WP.III.D.4-0122 to 0123.

traffic, and presumably have different structures and facilities. Thus, there is no basis for applying this unit cost to the OTRR. Moreover, Otter Tail asserts that this amount is supposed to cover all miscellaneous engineering for bridges, buildings, and any other needs that Otter Tail deems should be covered by contract and, according to Otter Tail's Narrative, allowances for clean up of spills and derailment have been included. OTP Nar. at III-F-60-61. This clearly is not so. Otter Tail has no cost for cleanup of spills or derailments in its electronic spreadsheet and the unit cost from *FMC* for miscellaneous engineering explicitly does *not* cover derailment costs. As shown on OTP.OP.WP.3268, derailment was listed separately in the *FMC* costs and Otter Tail did not add that cost into the miscellaneous engineering cost that it borrowed from *FMC*. BNSF has included a special category for derailments and clean up of spills, which are discussed in the section below.

Based on his experience with contractors and his analysis of the structures and facilities on the lines replicated by OTRR, Mr. Albin independently determined that the cost for bridge engineering would include ${ } for concrete repairs, ${ } for underwater inspection for scour on the substructure of the 400 plus OTRR bridges, and ${ } for steel repairs to the bridges for a total contract costs of ${ }[136].

Contract maintenance on buildings is generally 0.5% of the construction cost of such facilities. Therefore Mr. Albin has included $ 365,293 for building. Based on information received from BNSF, these amounts are in line with BNSF budgets for those items on these

[136] BNSF.RP.WP.III.D.4-0124.

line segments *in addition to* the work performed by the internal workforce. Mr. Albin's calculations and supporting documents are in his workpapers.[137]

(f) Ditching

As discussed in section III.F.2, supra, Otter Tail constructed OTRR with trapezoidal ditches with a minimum two-foot bottom width. Mr. Albin accepted that specification because of Board precedent in recent decisions. Generally, Mr. Albin would specify the AREMA standard minimum of a three-foot width at the base of the ditch for this type of ditch.[138] All major railroads specify much wider (and deeper) ditches. In some cases, BNSF specifies ditches up to eight feet wide, with a two-foot minimum depth.

These standards exist for good reasons. A trapezoidal ditch section of only two feet wide and two feet deep will have inadequate capacity to contain soil erosion or rock fallout from the excavated back slope, let alone to carry water runoff through a long cut section. Side wash and silt would quickly contaminate the ballast section. In the very small ditches Otter Tail specifies, any obstruction will cause the water to stand, creating a soft subgrade that will reduce the roadbed's ability to withstand the heavy train loading. These conditions will eventually lead to a pumping action (caused by the pounding of wheels of passing trains) and an irregular track surface, which will in turn require imposing slow orders on train operations until corrective action is taken to restore the track surface and ballast section. Otter Tail's proposed narrow and shallow side ditches

[137] BNSF Reply Exh. III.D.4-1.

[138] See also Track Cyclopedia (Tenth Edition), page 35. BNSF.RP.WP.III.D.4-0125 to 0126.

would create a greater propensity for frost heaves, thus requiring constant cleaning and entailing high maintenance costs.

A regular ditch cleaning program keeps railway ditches defined and clear so that water runoff will be effectively drained away from the subgrade. Maintaining the subgrade on track with tonnages in excess of 100 MGT is of the utmost importance as subgrade stability relies directly on good drainage. Where, as here, the ditches are narrow, regular ditching is especially important.

Otter Tail allows for ditch cleaning for only 553,946 linear feet (104.9 miles) per year. However, in light of Otter Tail's specification of narrow ditches, Mr. Albin determined that these ditches should be cleaned every other year, which means 193 pass miles of ditching each year.

Otter Tail uses a unit cost of $0.28 per linear foot which it purports to derive from BNSF contracts, but which in fact is based on an analysis of one invoice. The terms of the contract provide for an annual program of ditching that includes { } linear feet of ditching in { } days.[139] The contract provides for a { } That equates to a production rate of { } per day. As the invoices show, { } BNSF's annual costs equate to a daily rate of { } Deriving a

[139] BNSF.RP.WP.III.D.4-0127.

cost per linear foot based on one invoice is inaccurate and does not reflect the terms of the contract. Mr. Albin calculated the ditching cost using the average daily rate under the contract. Mr. Albin's annual cost for ditch cleaning is $473,947.

(g) Snow Removal, Derailment And Casualty Repairs.

Otter Tail has included $226,208 for snow removal based on a 1997 *FMC* unit cost. There is no reason to believe, and OTP makes no attempt to explain why, those costs should apply to OTRR, particularly in light of the cold northern area traversed by the OTRR. Moreover, it applied its unit cost to only 1049.1 miles. That figure represents only the miles of mainline rail, although OTP does not explain its secret for preventing snowfall on branch lines, light density track, and yards tracks. According to BNSF records, BNSF spent a total of { } on snow removal across the BNSF system or approximately { } per route mile. The Northern territory on BNSF historically has between 10 and 25 percent higher weather related costs. Therefore, Mr. Albin applied the per route mile cost to the OTRR route miles and added 20 percent for a total snow removal cost of ${ }.[140]

BNSF's record of FRA reportable train accidents for 2002 show that there were significant train related derailments on the proposed OTRR line segments, with clean-up costs of { }.[141] Some of these were caused by mechanical defects, some by impediments on the track, and some by weather conditions. No matter how carefully and well the railroad is maintained, derailments are, unfortunately, a fact of life that must be

[140] BNSF.RP.WP.III.D.4-0128 to 0129.

[141] BNSF.RP.WP.III.D.4-0130.

taken into account and the costs accounted for. Mr. Albin therefore included an annual cost of ${ } for derailments on the OTRR.

In addition to derailments and other FRA reportable accidents, BNSF incurs substantial costs for other casualty losses as a result of washouts, floods, land slides, slope failures, and the like. In 2002, BNSF incurred more than { } million in total casualty expenses across the system (including { } million in FRA reportable incidents).[142] Mr. Albin's estimate for derailment costs does not cover the non-derailment casualties that OTRR can reasonably expect to incur. BNSF does not keep records by line segment for these types of casualties as it does for the FRA reportable incidents. Thus, it is reasonable to believe that the 2002 proportion of FRA reportable derailment costs to non-derailment casualty costs for the OTRR segments would be similar to that for the 2002 entire system – *i.e.*, { }, respectively. Therefore, Mr. Albin has included an additional allowance of { } to cover casualties to the track structure.

(h) Coal Spills And Other Environmental Cleanup

Railroads routinely incur substantial annual expenses for environmental mitigation associated with maintenance of fueling facilities and clean up of coal spills. Maintaining fueling stations entails more than just the facility itself. It includes preparation of storm water prevention plans, periodic testing of water samples for pollutants and compliance with discharge requirements. BNSF incurred $1,359,800 in 1995-1996 for environmental mitigation on the fueling facility expansion for coal trains in Lincoln, Nebraska.[143] It is

[142] BNSF.RP.WP.III.D.4-0131.

[143] BNSF.RP.WP.III.D.4-0132 to 0135.

only reasonable to assume that fueling facilities on the OTRR would require the same. Therefore, Mr. Albin included this cost in his restatement of OE contract costs.

Additional amounts are incurred each year for mitigation of coal spills and clean-up of coal dust that accumulates on the right-of-way. At times, the bottom dumping door on a coal car may not have latched properly, allowing coal to spill from the car as it moves along the track. The deposits of coal on the track can cause derailment, and therefore must be cleaned up immediately.

According to BNSF Roadmaster Wayne Meidinger, who until recently was stationed at Douglas, Wyoming, and was responsible for maintenance activities on the southern part of the Orin Line, coal dust is another substantial problem. The strong Wyoming winds blow the dust off the open top coal cars exiting the mines and spread it over the entire embankment. The coal dust covers the track and fouls the ballast, leaving a blackened layer of dust from several inches to a foot and a half thick. Photographs provided by Mr. Meidinger effectively demonstrate the problem. The coal dust presents a major maintenance challenge, but more seriously, a safety hazard as any fire on the right of way will start the coal burning. Burning coal can only be extinguished by pouring dirt over it. For this reason, BNSF maintenance supervisors have worked with local county fire marshals to devise a plan to deal with this situation. In 2002, Mr. Meidinger undercut eight miles between MP 90 and MP 98 (between Bill and Walker, Wyoming) to clear the track of coal. Using a dozer, grader and loader, they gathered, loaded, and hauled to North Dakota for disposal approximately 100 carloads of dust spoils. A similar campaign was undertaken on several other stretches of the Orin Line. These projects involved removing coal dust ranging in depths from two to eight inches

and in width from eight to thirty feet, as shown on a chart in Mr. Albin's workpapers.[144] This on-going program will cost BNSF { }. The photographs, showing before and after clean up, depict the extent of the problem and the magnitude of the maintenance effort.

On their inspection trip, Mr. Albin and other BNSF team members found evidence of similar coal dust problems north of Converse Jct. to Reno. Similar coal dust clean up problems and other maintenance challenges are inevitable when moving millions of tons of coal, and there is no reason to expect that OTRR's experience would be any different. Therefore, Mr. Albin has added { } for these environmental mitigation costs. His calculations are included in his workpapers.[145]

(i) Yard Cleaning

Otter Tail omitted entirely any costs for yard cleaning. For safety and health reasons, yard tracks must be cleaned annually to remove all foreign materials that fall from rail cars when cars are moved during handling operations. In addition, coal commonly dropped from cars must be removed routinely between annual cleanings. Mr. Albin estimates that 83 miles of yard track would be cleaned each year at ${ } per mile. This unit cost is based on BNSF actual contract costs with Knox Kershaw, Inc. The contract provides for { }.[146] The total cost is $91,572.

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[144] BNSF.RP.WP.III.D.4-0136 to 0157.

[145] BNSF.RP.WP.III.D.4-0158.

[146] BNSF.RP.WP.III.D.4-0158(A) to (F).

(j) Stabilization Of Embankment

i) Yellowstone River

BNSF Engineering and MOW Consultants' field trip revealed several areas along the Yellowstone River where special construction would be required to fit the railroad grade between the river and the rock bluffs. Regardless of the type of construction completed to protect the embankment from the river, which is continually changing its channel, there will be continual yearly maintenance as the river erodes the railroad grade at various locations. The rock bluffs on the upper side require annual inspection for rock scaling as well as ditching. Run offs from the mountains will cause erosion of the embankment and ice jams in spring will cause track outages due to ice and water over the track and damage to the railroad embankment. In the past few years, TranSystems has worked with BNSF Engineering Department on the preparation and acquisition of environmental permits for embankment stabilization at twelve locations along the Yellowstone River and on the Forsyth Subdivision. Work has been completed on two other locations (MP 61.5 to MP 62, Tusler, Montana, and MP 158 to MP 163 in Hysham) which became an even greater threat and required immediate attention. The other projects are still pending and will be completed over the next five years at an annual cost of ${ }. The inspection and stabilization of areas along the river will be a continual concern for the OTRR.[147]

ii) Jamestown Subdivision

Otter Tail also ignored evidence along the right of way of the significant stabilization projects underway along the Jamestown Subdivision between Sterling, ND

[147] BNSF.RP.WP.III.D.4-0159 to 0166.

and Valley City, ND. BNSF has spent considerable sums of money on stabilization and raising the railroad grade due to the high water level in small lakes and sloughs that the railroad grade crosses over. Over the past ten years these lakes and sloughs have risen several feet and the railroad has had to raise the track grade from three to eight feet in places such as MP 167, 128, 117, 111, 79 and 73 between Sterling and Valley City. In addition, the embankments require continual heavy rip-rapping for protection from erosion caused by the wave action from the constant high winds that sweep through North Dakota. The high water levels and increased erosion were the result of the unusually high rainfall that eastern North Dakota has been experiencing over the past several years and the impact on the railroad is something that will have to be contended with for years to come. There were three major projects on the Dickinson, Jamestown and Forsyth subdivisions in 2001 totally { }. As these types of stabilization projects must be repeated approximately every three years, Mr. Albin included an annual cost of { } for stabilization along the OTRR line. [148]

Mr. Albin's estimate of the annual cost for OE contract maintenance-of-way is $12.4 million. His calculations of costs for contracting work are included in BNSF Reply Exh. III.D.4-1, in the electronic workpapers "III D 4 Maintenance of Way.xls."

(4) Summary Of OE Maintenance-Of-Way

Otter Tail's total OE MOW cost is $18.7 million. Mr. Albin's total restated cost is $71.4 million. Otter Tail's evidence fails to support its assumptions about the maintenance requirements of the OTRR plant. Otter Tail's MOW staff is meager, its equipment minimal, and it has offered no support for its numbers. Its implied assumption

[148] BNSF.RP.WP.III.D.4-0167.

that most maintenance (including what should be classified as operating maintenance) will be handled by contractors is a shell game designed to avoid having to address the real-world activities and real costs associated with providing adequate maintenance. As discussed above, Otter Tail's total operating maintenance budget is based on the ridiculous and completely unsupported assumption that operating maintenance for track work is only ten (10%) percent of the cost for programmed track replacement. With respect to operating expense contract costs for activities that are typically contracted out, Otter Tail's estimates are understated because it uses unsupported frequencies for track maintenance activities such as rail grinding and testing, and miscalculates the quantities for other contract work such as weed control and ditch cleaning.

Under SAC principles, Otter Tail has the burden of proof to show in its opening evidence that its assumptions are reasonable and that its costs are supported. Otter Tail's evidence fails to meet its burden of proof on maintenance of way OE.

c. OTRR Capital Maintenance Of Way

Even though the annual capital cost is not added into the stand-alone costs, the exercise of developing these costs demonstrates the fallacy of Otter Tail's arbitrary allocation methodology. Developing both the capital budget and the OE budget in a principled and consistent manner and then calculating (as opposed to allocating) the percentage of total annual MOW costs that are attributable to operating expense provides a basis for analyzing whether Otter Tail's percentage-based allocations have any relationship to the real-world division between capital and operating expenses. Mr. Albin demonstrates that Otter Tail's approach produces totally unrealistic results.

Mr. Albin's MOW capital budget is discussed under the following headings: (1) OTRR Capital Replacement Programs (by asset group) and (2) Equipment Requirements for the Capital Budget.

(1) OTRR Capital Replacement Programs

In its estimate of total maintenance, Otter Tail included the program replacement of various capital assets based on their asset lives, a labor cost for track replacement, and then allocated 35 percent of it internal workforce's salaries and equipment costs as capital expenditures. As discussed in the Overview, there is no principled explanation for Otter Tail's allocations. Moreover, as discussed below, Mr. Albin takes issue with a number of Otter Tail's assumed asset lives.

In his restatement of capital costs, Mr. Albin developed his capital budget for programmed maintenance in the same way that he developed the operating maintenance-of-way budget – adhering to the principles for classifying MOW activities and costs as either capital or operating expense. In the subsections below, he calculates the annualized replacement costs for each category of capital asset. For the programmed track maintenance he develops both the labor and materials cost for track replacement by building from the bottom up the system production gangs that are needed to handle the annual program maintenance of the 1,770 miles of railroad track BNSF calculated for the OTRR.

(a) Annual Track Replacement

For each of the major track items -- rail, ties, surfacing, turnouts, and crossings – Mr. Albin estimated the amount that would be replaced each year and then determined the manpower requirements based on (1) the expected production rates for the appropriate gang types needed to perform that maintenance, (2) the manpower required to unload and place material at the work site in preparation for the gang, and (3) the

manpower required to clean up the work site and load scrap and secondhand material.[149] The personnel requirements for the annual replacement maintenance program on OTRR include rail gangs (120 persons), tie gangs (44 persons), surfacing gangs (24 persons), turnout gangs (6 persons), crossing gangs (6 persons), switch tie gangs (6 persons), switch undercutting gangs (6 persons), track undercutting gangs (6 persons) and shoulder ballast cleaning gangs (6 persons). The number of personnel, wages and details are included in BNSF Reply Exh. III.D.4-1.

Mr. Albin used BNSF's rail labor cost for estimating gangs to develop the total cost for each of the pertinent gangs. To that total he added fringe benefits. He also added an allowance of twenty-two (22%) percent to cover the work crews' expenses including travel, corporate accommodations, and meals.

Mr. Albin's estimate of the total annual capital budget for track maintenance labor is $18.0 million.

In determining the annualized track materials cost, Otter Tail used a rail life of 1.5 BGT and claims that that is conservative given that segments of the WRPI line have withstood 2.0 BGT. In response to a request for workpapers supporting this rail life, Otter Tail produced selected portions of a UP report indicating that the WRPI line had experienced 2.0 BGTs and that 80% of the *tangent* rail on the WRPI is still in place. Otter Tail therefore claims that 1.5 BGT is conservative. However, since the WRPI line is doubled track, none of that rail has actually withstood 2.0 BGTs. It is more accurate to assume that each track has experienced only 1.0 BGTs. This is consistent with Otter

[149] Details of his calculations are in BNSF Reply electronic workpaper "III D 4 Maintenance of Way.xls." A summary of the normalized program maintenance costs is included in BNSF Reply Exh. III.D.4-1.

Tail's statement in its Narrative that it assumed that in double track sections, the tonnage is distributed evenly over the two tracks. OTP Nar. at III-D-60. Moreover, the UP study explicitly referred to *tangent* track and not to curves. Track in curves often has a life of only 0.3 BGT, which would lead to a lower overall average for all rail. Based on BNSF's curve inventory, approximately 296 route miles of the OTRR track is in curves.[150] Mr. Albin has used a rail life of 1.2 BGTs for rail life on tangents. Even this life is achievable only if OE maintenance crews spot grind curves and switches on a regular basis -- daily OE activities that Otter Tail overlooks in its OE costs.

Otter Tail uses second-hand rail for lighter density mainlines and assumes a remaining rail life of 0.75 BGT. However, Otter Tail's unit cost for second-hand rail is not appropriate for rail with that much life remaining. According to discussions Mr. Albin had with the District Sales Manager for L.B. Foster Rail Products in Lee Summit, MO, and the General Director of Rail at BNSF in Fort Worth, Texas, a life of 0.75 BGT reflects a quality of rail approaching new rail. Such rail most likely has been removed from track without accumulation of any significant tons, such as when it was used only for a short duration as emergency track panels or temporary shooflies. It can no longer be considered "new," but it is not typical second-hand rail. Such rail is hard to find and when it is found carries a price much closer to that of new rail. Second-hand rail at the unit price used by Otter Tail would be rail with a remaining life of about 400 MGT, which is the life that Mr. Albin used in his calculations.[151]

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[150] BNSF.Reply.Exh.III.D.4-1.

[151] BNSF.RP.WP.III.D.4-0168 to 0170.

The annual capital costs for track component replacements including rail/tie/surfacing, undercutting, shoulder ballast cleaning, switch undercutting, turnout replacement, switch tie, and crossing replacements total $26.7 million. His tie replacement costs are based on the use of Grade 5 ties on the Fargo-Benson line, which, as discussed in section III.F.3 infra is necessary to permit the 60 mph speeds proposed by Otter Tail.

(b) Annual Bridge And Culvert Replacement

Otter Tail estimated $1,383,822 for the normalized bridge and culvert maintenance costs and $927,237 to maintain all buildings, shops, and other facilities (fueling facilities, a locomotive shop, etc.) based on replacing the assets at the end of their economic lives. Mr. Albin agrees with the asset lives and the methodology. However, because Otter Tail underestimated the investment in facilities and buildings as discussed in Section III.F.7 *infra,* its costs for annualized maintenance of such facilities also are understated. Mr. Albin's normalized replacement costs reflect BNSF's restated road property investment costs.

His estimate of the total annual capital budget for bridges ($5.0 million), for culverts ($0.4 million), and for buildings and facilities ($2.4 million) is $7.8 million.

(c) Annual Signal And Communication Replacement

Otter Tail included $7,660,387 in its capital costs for replacement of signal and communication equipment, roadway signs, and fencing based on the economic lives of those assets. Mr. Albin calculated his replacement costs in the same way as Otter Tail but his costs are higher because of the additional quantities of these items included in BNSF's restated investment costs. In his restatement, Mr. Albin estimated the annual

capital MOW budget for the signals and communications and electrical departments, which includes program maintenance of crossing warning devices, hot bearing and dragging equipment detectors, microwave stations, and CTC. The total annual capital MOW cost for those items is $9.4 million.

Total Asset Replacement Programs cost is $20.4 million.

(2) Equipment Requirement For Capital Budget

(a) Production Gang Equipment

As discussed above, Otter Tail estimated a total equipment budget of $2,640,000 and allocated thirty-five (35%) percent of that amount or $924,000 to capital costs. In his restatement of the capital MOW equipment, Mr. Albin developed a list of the equipment that would be needed by each of the system production gangs performing annual scheduled program maintenance on OTRR. Some of the items omitted from Otter Tail's list include anchor machines, anchor remover, back hoe, cranes, rail grinders, rail expanders, spike drivers, hopper cars for hauling ballast, tie adzers, and the like. Mr. Albin's comprehensive list includes the minimum standard equipment required to perform the programmed replacement of track structure and components. The list is included in BNSF Reply Exh. III.D.4-1. Mr. Albin's calculations of the pieces of equipment needed by each gang are included in his workpapers.[152] His estimate of the total annual maintenance equipment for the capital budget is $10,148,647.

[152] BNSF.RP.WP.III.D.4-0100 to 0107.

(b) Work Train Equipment

In his restatement, Mr. Albin determined the number of work trains that would be needed on OTRR, an item that Otter Tail ignored completely,[153] possibly on the assumption that contractors would take care of such things. However, nothing in Otter Tail's evidence either supports that assumption or covers the costs associated with such assumption.

Mr. Albin calculated the number of work train days that would be needed for each activity, including tie distribution, rail gang distribution, surfacing and ballast distribution, and miscellaneous scrap clean up. His estimate includes the cost for picking up released rail and ties. As state laws prohibit burning creosote coated scrap wood ties, they must be removed to an approved landfill or disposed of in an environmentally acceptable manner. Mr. Albin took that into consideration as well. Mr. Albin has also estimated the costs for crews to load and unload materials from work trains. He estimates that maintenance of OTRR would require { } work train days at ${ } per day for track maintenance at an annual cost of ${ }.

BNSF Reply Exh. III.D.4-1 also summarizes Mr. Albin's estimate of the work train equipment. Details of his capital budget calculations are included in his workpapers.[154]

Mr. Albin determined that OTRR would need four work trains operating throughout the year. The work trains are used for such tasks as hauling rip rap, dumping emergency ballast, hauling away waste from yard cleaning, hauling debris, etc. Mr.

[153] Otter Tail initially included work trains in its opening evidence, but without explanation eliminated them in its errata. OTP Errata at 6.

[154] BNSF Reply electronic workpapers "III D 4 Maintenance of Way.xls."

Albin conveyed work train requirements to BNSF witness Mr. Mueller, who then determined the number of locomotives needed for the work trains and included that locomotive cost in his operating costs in Section III.D.3.

d. Total Annual Maintenance-Of-Way Costs

Mr. Albin's estimate of the total annual cost of maintaining OTRR, including costs for personnel, materials, equipment, and outside contract work, would be $153.2 million at First Quarter 2002 levels. Of this amount $71.4 million or 46.6 percent, represents the amount attributable to OE. A comparison of Mr. Albin's estimate with Otter Tail's estimate is set forth in Table III.D.4-5.

Table III.D.4-6
Comparison Of Summary Of BNSF Estimate Of
Total Maintenance And OE Maintenance Costs
To Otter Tail's Opening Statement

Item	BNSF (Millions)	Otter Tail (Millions)
Personnel & Materials	$64.7	$17.2
Contract Work	$12.4	$48.5
Equipment	$24.8	$ 2.6
Normalized (Capital) Maintenance	$51.3	$31.5
Total Maintenance Cost	$153.2	$99.8
Operating Expense	$71.4	18.7
Operating Expense Portion	46.6%	21.9%

As Table III.D.4-6 demonstrates, Otter Tail has understated the MOW costs associated with maintaining a railroad designed to accommodate the traffic designated for OTRR.

As noted above, the annual capital cost is not added into the stand-alone costs, but the exercise of developing these costs is essential to demonstrating the fallacy of Otter Tail's arbitrary allocation methodology.

As can be seen from the figures above, developing both the capital budget and the operating expense budget in a principled and consistent manner clearly shows that Mr. Albin's estimated operating expense maintenance-of-way is 46.6 percent of total annual MOW cost. This is considerably higher than Otter Tail's estimate of only 21.9% of its total annual maintenance and shows the arbitrariness of Otter Tail's method of determining maintenance-of-way operating expenses by simply allocating an arbitrary percentage of certain categories of the total annual cost to the operating budget.

It is important to note that there is nothing in Otter Tail's opening evidence to support those percentages. In fact, in response to a workpaper request for backup to its

OE personnel and OE costs, Otter Tail simply stated that the MOW staff costs and OE are based on its expert's experience with CNW.[155] However, Otter Tail did not include any documentation of CNW's (or WRPI's) staffing levels or any other maintenance experience. And since WRPI was part of CNW from its inception and has been absorbed into the UP since 1994, it is questionable to what extent its experience has any relevance to a stand-alone railroad, whether in the real world or in the hypothetical SAC world. As can be seen from BNSF's evidence comparing Otter Tail's MOW staffing and costs to that of other real world railroads, the results produced by Otter Tail's reliance on percentages that presumably were derived from Mr. McDonald's experience on the WRPI bear no resemblance to the experience of real-world railroads or to the real-world OE budget needed to maintain the OTRR.

In contrast, Mr. Albin's estimate of the OE budget in relation to total MOW costs is consistent with the actual experience of BNSF and other railroads. According to BNSF's Assistant Vice President of Engineering Services, in 2002, the OE portion of BNSF MOW budget was { } percent, and the budget for 2003 anticipates operating expenses at { } percent of total costs.[156] As the table below shows, Mr. Albin's development of OE costs produces a result that is significantly closer to the real-world experience of MRL, FEC and WC than is Otter Tail's estimate of 21.9%. Otter Tail has made no attempt to support its methodology and has put in no evidence on opening to counter the real world experience of other railroads.

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[155] BNSF.RP.WP.III.D.4-0013.

[156] BNSF.RP.WP.III.D.4-0171.

Table III.D.4-7
Comparison of Operating to Capital Expense Ratios

Railroad	OE as Percentage of Total MOW Budget
Otter Tail's OTRR	21.9%
MRL	58.5 – 64.5%[157]
FEC	37.5% - 44.4%[158]
WC	30-40%[159]
BNSF's OTRR	46.6%

Source: Workpapers BNSF.RP.III.D.4-0019 to 0028;
BNSF Reply Exh. III.D.4-1.

In assigning an unreasonably low percentage of OTRR's maintenance costs to OE, Otter Tail overlooks the important relationship between a railroad's level of OE maintenance activity and its need for capital maintenance expenditures. Much of a railroad's OE maintenance is aimed at ensuring that its assets achieve their predicted lives. Without ongoing maintenance, those assets would have to be replaced *more* frequently, leading to additional costs associated with the programmed maintenance cycles. An unduly low OE, such as Otter Tail proposed, is thus penny-wise and pound-foolish because the failure to spend operating dollars on a daily basis results in shorter economic lives for the track components and thus more frequent capital replacement of the assets. Moreover, as described in detail above, failure to provide an adequate operating budget would result in deferred maintenance that would degrade service.

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[157] BNSF.RP.WP.III.D.4-0021 to 0022. Calculated on basis on information provided by MRL, which gave range of budget for past few years.

[158] BNSF.RP.WP.III.D.4-0019 to 0020. Calculated on basis of information provided by FEC, which gave a range of budget for past few years.

[159] BNSF.RP.WP.III.D.4-0023 to 0028.

Insufficient OE resources would also hamper a railroad's ability to deal expeditiously with unexpected events that could interfere with critical train operations.

Mr. Albin has structured a program of maintenance for OTRR that strikes the proper balance between OE and capitalized programmed maintenance.

e. Maintenance Windows

A high tonnage, high density railroad with continuously cycling unit trains mixed with time-sensitive intermodal traffic must include time into its operating plan for maintenance crews to access the track for program maintenance, daily maintenance, regular inspections, and for unexpected repairs. Deferring this type of maintenance is unacceptable on any railroad.

There are three types of essential railroad maintenance activities that require extended periods of track time: (1) programmed replacement by system production gangs, *i.e.,* rail, tie, surfacing, planned contract work, and the like, (2) regular inspections and planned daily maintenance, and (3) maintenance work required to address unplanned events like the repair of broken rail, realignment of surface, or other emergencies that disrupt traffic. Programmed MOW work can be planned to avoid interference with peak traffic periods. To a lesser extent, the more regular inspections and planned day-to-day maintenance can also be worked around peak traffic periods, although it cannot be altogether ignored just because traffic volumes are heavy. Safety would be compromised if a railroad totally avoided routine inspections just because traffic levels were high during a particular time. But the third category of maintenance activities cannot be planned or avoided regardless of the level of traffic.

Otter Tail based its operating plan on a string diagram that analyzes train movements for what Otter Tail considers to be a peak traffic period. This string diagram

assumes that there will be no maintenance activity on the railroad during that period. While it may be reasonable to assume that the railroad would not schedule its programmed replacement of assets, or its seasonal contracting activities such as weed spraying, ditching, rail grinding, track geometry, etc. during the peak period, it is unrealistic to expect that *no* maintenance will be conducted during that or any other period on a railroad handling the tonnages OTRR is assumed to be handling and running the numbers of trains OTRR is assumed to be operating. Some maintenance must be performed in the heavy-tonnage territories throughout every week of the year. BNSF's experience bears this out and there is no basis for assuming anything to the contrary.

In his analysis of BNSF's Random Failure Reports for 2002, discussed more fully in III.D.4.a, Mr. Albin noted that on the five major line segments replicated by OTRR, during the peak month of November 2002 identified by BNSF, there was a total of 232 outages on the OTRR line segments or an average of eight occurrences per day, with resulting track outages averaging 2.8 hours each. As shown in the table below, these occurrences cannot be ignored and time must be spent performing maintenance that shuts down the lines in order to address them.

Table III.D.4-8
BNSF Random Failure Occurrences on OTRR Line Segments
During Peak Period Selected By Otter Tail

Sub-Division	Random Failures November 2002			Duration of Delays (Minutes)		
	Signal	Mechanical	Track	Signal	Mechanical	Track
Forsyth	27	3	10	3459	615	1985
Orin	22	6	51	2892	590	8000
Dickenson	31	6	15	6600	900	3200
Big Horn	17	8	7	2198	1801	1463
Jamestown	19	2	8	3137	362	1460
Totals	116	25	91	18236	4268	16081
Average Minutes Per Outage				158	171	177
Average Hours per Outage				2.63	2.85	2.94

Source: BNSF Reply electronic workpaper "Random Failures 2002.xls."

In addition, other inspections and immediate repairs of detected problems must be conducted regardless of traffic volumes. Indeed, the need for regular performance of this maintenance activity increases with the increase in tonnage. Examples of situations requiring track time even during peak periods include:

- Immediate follow up and repair of any problems found by track inspectors,
- Closer inspection and subsequent repair of rough track reported by track and train crews;
- Immediate inspection of signal outages and malfunctions;
- Maintenance of turnouts, grinding frogs, welding frogs, and switch points;
- Mechanical adjustments of switches and corresponding signals;
- Prompt attention to track irregularities requiring adjustment or alignment and surfacing;

- Raising and maintenance of bridge ends, especially on open deck bridges in high tonnage areas;
- Immediate correction of drainage problems that could damage the subgrade or impede traffic;
- Maintenance to switch heaters and blowers;
- Inspections after unusual events, such as major rain or snow storms.

Often, equipment needed for repairs is too large to move by road and must move by rail. For example, a normal and somewhat minor daily occurrence is the need to raise or align track to remove a slow order. This must be done immediately to avoid a more serious outage or track failure. It may take two to three hours to move the large equipment into place, complete the job and return the equipment to storage. During that time, the track is closed to traffic. Similarly, a simple task such as unplugging a culvert or cross drain between double main tracks in an inaccessible area (*i.e.*, on a high fill or cut) may need several hours of track time, but that time is essential to avoid soft subgrade and an eventual slow order if the condition is not corrected.

5. Leased Facilities

Otter Tail assumed that as the replacement for BNSF, the OTTR would participate in any joint facility agreements on the same basis as does BNSF. In particular, Otter Tail assumed that the OTTR would operate between Brushvale and East Breckenridge, Minnesota via the BNSF trackage rights over the Red River Valley & Western Railroad. OTP Nar. at III-B-2. BNSF's Reply evidence accepts this assumption and the compensation terms and applies those terms to the corrected traffic level.

6. Loss and Damage

BNSF accepts Otter Tail's calculation of the unit cost by commodity loss and damage costs for OTTR, but applies it to the BNSF cars and tons for the OTTR.

7. Insurance

BNSF witness Kent testifies that a carrier the size of the hypothetical OTTR would not be able to achieve the low insurance costs enjoyed by BNSF. Essentially, Class I carriers the size of BNSF, NS, CSX, and UP, are self insured with deductibles per incident of around $25,000,000. Smaller carriers self insure for much lower levels. Beyond the self insured level, Class I carriers, and most regional and short-line carriers, secure insurance through major insurers such as Marsh Inc. and AIG. The higher the self-insurance level, the lower the insurance premium tends to be. As a result, smaller carriers often pay more in insurance costs as a percentage of expenses than larger carriers do.

To examine the reasonableness of Otter Tail's application of the 2002 BNSF ratio of insurance to freight operating expenses (less depreciation and casualties and insurance) of 3.76% to the OTRR, Mr. Kent examined that historical ratio for Class I carriers for the years 2000, 2001, and 2002.[160] That examination shows that the ratio for Class I carriers ranges from a low of 2.03% to a high of 11.55%.[161] It is logical to assume that OTRR would experience the same level of insurance costs as its Class I peer group; that is, Class I carriers with less than $1 billion in revenues per year. Table III.D.7-1 shows that the three-year average for those carriers was 5.55% of total freight operating expenses as compared to 3.11% for larger carriers. Application of that ratio to the OTRR freight

[160] *See* BNSF Reply electronic workpaper "Insurance.xls."

[161] AAR data shows CNGT experiencing 24.19% in insurance costs in 2002. However, given that 2002 was the first year of its reporting as a consolidated carrier owned by a Canadian railroad, Mr. Kent excluded that outlying number from consideration here.

operating expenses yields an annual insurance expense of $19.7 million. That amount is consistent with the insurance cost experienced historically by small Class I carriers.[162]

Table III.D.7-1

Category of Carrier	Insurance Operating Expense Ratio			
	2000	2001	2002	Average
Class I with <$1 B revenues	6.30%	5.40%	4.96%	5.55%
Class I with >$1 B revenues	3.00%	2.95%	3.38%[163]	3.11%

8. Ad Valorem Taxes

BNSF accepts Otter Tail's unit cost calculations of ad valorem taxes and applies them to the corrected amount of OTTR property by state, but rejects Otter Tail's final adjustment to the taxes. Although Otter Tail never acknowledges its adjustment, let alone presents any basis for it, they reduce the taxes by nearly 20%, or $1 million annually. It appears that Otter Tail is suggesting that BNSF's taxes are based on a mix of road equipment property and rolling stock that is owned, but that the OTRR would not incur taxes on its rolling stock because it is leased. Otter Tail has not demonstrated, however, that (1) BNSF's taxes are reflective of its equipment property in each of these states, or (2) that BNSF does not pay taxes on leased property. In fact, North Dakota and South Dakota do not have a tax on personal property, so neither BNSF owned nor leased rolling stock is included in the basis for the tax calculation. However, in most other states, including Wyoming and Montana, the assessor calculates tax based on all property owned or used in the business. In short, there is no distinction between owned or leased rolling stock in those states. Thus, any adjustment for leased equipment is wrong; BNSF corrects the error in its Reply.

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[162] *See* BNSF Reply electronic workpaper "Insurance.xls."
[163] Excludes outlier ratio of CNGT at 24.19%.

9. Other — Operating Costs Related to Re-Routed Traffic

As addressed in Section III.C above, Otter Tail rerouted traffic that BNSF inter-train switches at its yard in Minot, but fails to take into account the need for the OTRR to perform this service. Mr. Mueller corrects this oversight in developing his operating plan for the OTRR and provides for the necessary additional switch crews at Glendive.

10. Summary of Total Operating Expenses

Table III.D.10-1
Annual Operating Expense For The OTRR — 2002

	Item (1)	Otter Tail OTRR Amount (millions) (2)	BNSF OTRR Amount (millions) (3)
1.	Trackage Rights	0.034	0.081
2.	Maintenance of Way (spot)	18.741	71.395
3.	Locomotive Fuel and Servicing	70.232	75.592
4.	Locomotive Lease	13.609	31.110
5.	Locomotive Maintenance	19.484	25.812
6.	Operating Personnel Incl. Materials and Supplies	53.978	84.733
7.	Freight Car Expenses	32.677	36.956
8.	Ad Valorem Taxes	5.124	6.236
9.	Loss and Damage	1.124	0.762
10.	General and Administrative	11.260	22.425
11.	Insurance	8.501	19.708
12.	Total	$234.764	$374.811

E. NON-ROAD PROPERTY INVESTMENT

1. Locomotives

Otter Tail assumed that all of the OTRR's locomotives would be leased and BNSF accepts that arrangement. The OTRR's locomotive requirements and leasing costs are discussed in Sections III.C.2.d and III.D.1.

2. Rail Cars

Otter Tail assumed that all of the OTRR's rail cars would be leased as well and BNSF accepts that arrangement. The OTRR's rail car requirements and leasing costs are discussed in Sections III.C.2.e and III.D.2.

3. Other

The OTRR's company motor vehicles and office equipment, such as computers, software programs, telephones, and the like are discussed as operating expenses in Section III.D.3. Maintenance-of-way equipment that is used to support the day-to-day maintenance activities of the OTRR's MOW departmental workforces is discussed in III.D.4.b.(2) and equipment used to support the program replacement maintenance activities is discussed in III.D.4.c.(2).

F. ROAD PROPERTY INVESTMENT

BNSF's road property investment evidence is sponsored by the following experts: Arnold S. Tesh of FTI Consulting, Inc. (FTI) (III.F.1 Land); Robert C. Phillips, P.E. of Ralph Whitehead Associates, Inc.(RWA) (III.F.2 Roadbed Preparation), Michael R. Baranowski of FTI (III.F.2 and spreadsheets); Gerald Albin of TranSystems (III.F.2); George T. Zimmerman, P.E. of RWA (III.F.3 Track Construction and III.F.12 Track Schedule (Staging)); Paul B. Michiels, P.E. of RWA (III.F.5 Bridges) and Rick A. Meredith of RWA (III.F.5 Bridges and Schematics); Joseph Walton III, Consultant on subcontract to RWA (III.F.6 Communications); C. W. (Pat) Price of RWA (III.F.6 Signals); James Primm, Consultant on subcontract to RWA (III.F.7 Buildings); Dennis K. Prewitt of RWA (III.F.2 Culverts and Compilations); and Robert H. Baughman, P.E. of RWA (III.F.9 Mobilization, III.F.10 Engineering/Construction Management and III.F.11 Contingencies) (together "BNSF Engineering Consultants"). This team of experts reviewed Otter Tail's road property investment evidence and concluded that Otter Tail has used improper assumptions or incorrect calculations and thus has understated road property investment costs, in some areas by substantial amounts. The problems with Otter Tail's assumptions and development of costs are explained in detail in §§ III.F.1 through III.F.12. For the reasons set out in those sections, the Board should apply BNSF's cost assumptions in carrying out its analysis of the stand-alone costs for OTRR. The differences between BNSF and Otter Tail on the issues in dispute are set out in the table below.

Table III.F-1
Summary of BNSF's Estimate of Road Property Investment
for Otter Tail Railroad Versus Complainant's Estimate at 1Q2002 Levels

Item	BNSF 2002 Amount ($Millions)	Otter Tail 2002 Amount ($Millions)	Difference
III-F-1. LAND	$78.90	$33.27	$45.63
III-F-2. ROADBED PREPARATION			
a. Clearing and Grubbing	1.67	1.57	0.10
b. Earthwork	1,200.11	568.57	631.54
c. Lateral Drainage	1.45	0.90	0.55
d. Culverts	27.40	26.86	0.53
e. Other	283.18	34.63	248.55
III-F- 3. TRACK CONSTRUCTION			
a. Geotextiles	1.38	0.33	1.04
b. Subballast and Ballast	190.47	102.07	88.40
c. Ties	157.74	141.38	16.36
d. Track (Rail)	198.71	185.50	13.21
e. Switches (Turnouts)	58.17	36.42	21.75
f. Other	226.37	190.71	35.66
Track Labor	275.04	212.61	62.42
III-F-4. TUNNELS	0.00	0.00	0.00
III-F-5. BRIDGES	367.08	155.82	211.25
III-F-6. SIGNALS AND COMMUNICATIONS			
a. Centralized Traffic Control System (CTC)	200.95	200.46	0.50
b. Hot Bearing Detectors and Dragging Equipment Detectors	2.89	2.22	0.67
c. Communications	60.41	11.85	48.56
d. Other	21.78	1.99	19.79
III-F-7. BUILDINGS AND FACILITIES			
a. Fueling	43.78	13.50	30.28
b. Locomotive Facility	18.10	8.98	9.12
c. Station/Office	6.09	4.74	1.35
d. Roadway buildings	9.18	4.29	4.89
III-F-8. PUBLIC IMPROVEMENTS			
a. Fences	21.45	18.14	3.31
b. Roadway Signs	0.72	0.41	0.31
c. Crossings	27.53	13.19	14.34
III-F-9. MOBILIZATION	89.91	44.83	445.08
III-F-10. ENGINEERING COSTS	472.78	176.26	296.52
III-F-11. CONTINGENCIES	396.43	215.82	180.61
TOTAL	**$4,439.67**	**$2,407.32**	**$2,032.32**

Source: OTRR Construction.xls; BNSF Exh. III.F-1.

1. Land

As mentioned above, Arnold S. Tesh, CRE, is sponsoring BNSF's land testimony. Mr. Tesh reviewed the testimony of Mr. Burris, Otter Tail's property valuation witness, regarding the cost of acquiring property for the hypothetical stand-alone railroad OTRR from mines located in the Powder River Basin ("PRB") in Wyoming and Montana to the Big Stone Generating Station located in Big Stone, South Dakota.

As Mr. Tesh explains, the right-of-way ("ROW") of the OTRR follows the existing BNSF ROW from the Converse Yard in Wyoming through the states of Montana, North Dakota, and Minnesota to Big Stone, South Dakota. OTRR also includes branch lines to Jacob Junction, Eagle Butte Junction, Nerco Junction, Absaloka, Big Sky, Snowden, and Big Stone. Specifically, OTRR parallels BNSF's system from the Converse Yard north to Donkey Creek, Wyoming, then northwest through Gillette and Sheridan, Wyoming, northwest to Moran Junction, Montana, then northeast through Miles City to Glendive, Montana, then east through Bismarck and Jamestown to Fargo, North Dakota, then southeast through Moorhead and Brushvale, Minnesota to East Breckenridge, Minnesota where it operates over the Red River Valley and Western Railroad via trackage rights, then southeast to Benson, Minnesota, and finally then west to Big Stone, South Dakota.

Mr. Tesh personally inspected the properties that abut BNSF's ROW from Converse Yard in Wyoming to Moran Junction, Montana and from Mandan, North Dakota to Big Stone, South Dakota, concentrating on the cities of Mandan, Bismarck and Fargo, North Dakota, and Moorhead, Minnesota. He also evaluated land transactions involving nearby properties sold on

or before January 2001. His methodology is described in detail in BNSF Reply Exh. III.F.1-1.[1] In addition to the exhibits and workpapers that are included with this Reply filing, Mr. Tesh has other volumes of supporting data, including but not limited to individual sales transactions, valuation maps and field notes, tax maps, topographic maps, photographs, and listing and marketing brochures, which he has retained and are available for viewing in his offices.

For the remaining portions of the OTRR ROW, Mr. Tesh made several adjustments to the property valuation prepared by Mr. Burris so that it more accurately reflects the market data in the vicinity of the land appraised. An overall summary of land Mr. Tesh appraised and adjusted appears as BNSF Reply Exh. III.F.1-2. BNSF's engineering consultants advised Mr. Tesh regarding the required widths of OTRR's ROW. The ROW widths are the same as those set forth in Otter Tail's evidence. The ROW widths are generally 100 feet wide in the less populated areas and 75 feet wide in cities and towns. BNSF's engineering consultants, its operating consultants, and other BNSF witnesses provided the sizes and locations of OTRR's yards and other facilities, including an office site. Mr. Tesh also determines the cost of acquiring land for OTRR's microwave system. That land is required to construct antenna towers and communications centers. The total amount Mr. Tesh determines Otter Tail would need to pay sellers in order to acquire the property necessary to build the OTRR is $79 million. This conclusion is based on the assumption that all sellers would be willing sellers, and that no assemblage premium would be paid, except where the BNSF actually paid a premium for assemblage in its acquisition of the ROW parcels.

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[1] The methodology employed in his analysis does not contain any added cost for mineral rights, and does not differentiate between easements in perpetuity versus fee. The valuation units that support Mr. Tesh's appraisal are in BNSF Reply electronic workpaper "Land_Report.xls." The sales are in BNSF Reply electronic workpaper "Land_Sales.xls."

Mr. Tesh is a real property consultant and certified real property appraiser at FTI Consulting, Inc. He has been valuing real estate for more than 37 years, including 25 years spent performing property appraisals for use by railroads. There is not another appraiser in the country who has valued more railroad property than he has. He has experience appraising commercial, industrial, residential, and agricultural properties located throughout the United States, as well in the Caribbean, Canada, Mexico, and Central America. Mr. Tesh is a Counselor of Real Estate ("CRE") of the American Society of Real Estate Counselors, one of only 1,100 real estate experts in the world who have earned that designation. He has also served as an officer of various other real estate associations. He has his certification to appraise real estate in many states, including four of the five states that OTRR's right of way crosses.[2] He has been appointed to represent more than 900,000 members of the National Association of Realtors as its Chairman of the Commercial Regulatory and Legislative Subcommittee. He is an adjunct professor in the Commonwealth of Virginia where he lectures on real estate finance, brokerage, appraisal, and real estate principles.

Otter Tail relies on the testimony of Mr. Burris to support its real estate purchase price for OTRR. Mr. Burris is a Senior Vice President of L. E. Peabody & Associates. Although he has testified on land valuation before the Board in the past, he does not appear to be a qualified real estate appraiser. OTP Nar. at IV-11. Based on his statement of qualifications, Mr. Burris appears to have no relevant experience in valuing real property. Mr. Burris relies on sales transactions supplied by Mr. Michael Brook a real estate appraiser certified in Montana. However, it is Mr. Burris who determines the "value" of OTRR's real estate for Otter Tail.

[2] Mr. Tesh is not currently certified in South Dakota. Because the OTRR ROW in that state is short, he only inspected the ROW there as part of his review of Mr. Burris' work.

a. Right-of-Way Acreage

Otter Tail contends that the OTRR will need to acquire approximately 14,552.67[3] acres for its right-of-way ("ROW") at a total cost of $30,268,781 in 2000.[4] BNSF proposes to use the same ROW widths as used by Otter Tail. Otter Tail proposed using 100-foot ROW widths for OTRR, except in towns where it used 75-foot ROW widths. The Board has consistently held that ROW widths of 100 feet are appropriate in rural areas and 75 feet in major urban areas. *See WPL*, slip op. at 76; *McCarty Farms, Inc. v. Burlington Northern, Inc.*, STB Docket No. 37809, slip op. at 52 (served Aug. 20, 1997). Although many of the towns through which OTRR passes are not major urban areas that would justify using only a 75-foot ROW, to limit the areas of disagreement, BNSF accepts Otter Tail's specification of ROW widths. Mr. Tesh valued the land for the OTRR based on the ROW widths proposed by Otter Tail. In the property values section below, there is a more detailed discussion of how that ROW was valued.

b. Yards and Other Facilities Acreage

Otter Tail asserted that OTRR would need to acquire only 271.03 acres for yards and other facilities at a total cost of $2,979,094.75.[5] As discussed in detail above, Mr. Mueller disagrees with the adequacy of the acreage proposed by Otter Tail. His detailed study requires a

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[3] Otter Tail states on III-F-5 of its testimony that "[t]he total acres for the OTRR right-of-way, excluding easement acres, equals 14,881 acres." The 14,552.67 cited here is from Otter Tail's Errata Opening electronic workpaper "OTRR Land.xls." BNSF's engineering witness calculated the total necessary acreage as 15,317.57 acres because of a difference of approximately 2 additional route miles in length and additional acreage associated with the Orin Line not included by Otter Tail.

[4] Otter Tail assumed 792.09 acres would be used pursuant to an average annual rental fee per acre of $73.11 requiring a total of $57,910. *See* OTP Errata Opening electronic workpaper "OTRR_Land.xls," worksheet" easements." It also assumed an assemblage fee of $50,159. OTP Opening Exh. III-F-3 at page ll.

[5] *See* OTP Opening Exh. III-F-3, page 9 of 11.

larger yard at Glendive to perform intra-train switching of stack trains requiring additional tracks and facilities. At Donkey Creek a larger yard is also necessary because of an increase in the number of tracks and the size of certain facilities. To meet Mr. Mueller's additional requirements, Mr. Phillips recommends that OTRR acquire 319.8 acres for its Glendive yard and an additional 245.1 acres for its Donkey Creek yard. Mr. Mueller also made changes to the operations at the other yards. In total, Mr. Phillips determined it will be necessary to purchase 608.6 acres for yards and other facilities. Mr. Tesh estimates the total cost of purchasing land for those yards at $11.6 million. A more detailed explanation of how Mr. Tesh arrives at his conclusion for OTRR's yards and facilities is in the property values section below and in BNSF Reply Exh. III.F.1-1, Appendix C.[6]

c. Microwave Acreage

Otter Tail proposed acquiring an additional 58.51 acres at a total cost of $23,889.67 for 45 microwave towers. BNSF communications witness, Mr. Walton, testifies that 13 additional microwave towers will be necessary on OTRR's route. He states that each of the microwave towers will require 1.5 acres. Mr. Walton determined that microwave towers would be spaced 22 miles apart based on BNSF's practice in North Dakota. Based on that requirement, Mr. Walton determines that a total of 87 acres are necessary for microwave towers. Based on these requirements, Mr. Tesh concludes that the land for microwave towers will cost approximately $400,000. A more detailed discussion of how he arrived at that conclusion follows below and in BNSF Reply Exh. III.F.1-1, Appendix D.[7]

[6] *See also* BNSF Reply electronic workpaper "OTRR_Land_Conclusions.xls."
[7] *See also* BNSF Reply electronic workpaper "OTRR_Land_Conclusions.xls."

d. Property Values

The most significant area of dispute between the parties on the issue of land relates to the per acre or per square foot values of the land to be acquired. Mr. Tesh personally inspected and valued OTRR's proposed ROW, and abutting properties, from Converse Yard to Moran Junction in Wyoming, and portions of the ROW in the Bismarck/Mandan Metropolitan Area and in the Fargo/Moorhead Metropolitan Area. Additionally, he inspected all the ROW that he did not directly value from Mandan, North Dakota to Big Stone, South Dakota.[8] He concentrated his efforts east of Mandan in the metropolitan areas of Bismarck/Mandan, North Dakota (Bismarck/Mandan Metropolitan Area) and Fargo and West Fargo, North Dakota/Moorhead, Minnesota (Fargo/Moorhead Metropolitan Area). His thorough and detailed field inspection of those areas is consistent with appraisal industry standards and is in conformance with the Uniform Standards of Professional Appraisal Practice ("USPAP").[9] He evaluated the quality of land, topography, size, shape, and accessibility on both sides of the ROW in these metropolitan areas and he determined the "Highest and Best Use" of those properties.[10] Those uses include

[8] To match his valuation inventory to Mr. Burris' work product, Mr. Tesh does not report any conclusions for less than an entire county on the OTRR.

[9] The Appraisal Standards Board's Advisory Opinion AO-2 requires, "where physical characteristics information is not available through an opportunity for a complete inspection or from reliable third party sources, an appraiser has the duty to obtain necessary information to develop the appraisal before continuing or to withdraw from the assignment."

[10] The "Highest and Best Use" of a parcel of land is defined as "the reasonably probable and legal use of vacant land or an improved property, which is physically possible, appropriately supported, financially feasible, and that results in the highest value." *The Appraisal of Real Estate* at 297.

single-family, multi-family, industrial, commercial (including retail, office, and lodging), transitional,[11] and other/open.

The designation of those use categories made it possible for Mr. Tesh to determine a value that is specific to each property being acquired. Mr. Tesh bases his values on market data from actual property sales. A team of experienced analysts and appraisers, working under his direction helped him collect market data. The market data Mr. Tesh uses includes not only sales information, but also tax and subdivision maps, land use surveys, tax plats, topographic maps, precipitation and soil surveys, and other pertinent documents.[12] In addition, while in the field inspecting OTRR's ROW and abutting properties, Mr. Tesh also inspected properties in the vicinity of the ROW that were sold during approximately two years preceding the date of valuation. He determined the market cost of acquiring the subject land for the OTRR by evaluating a variety of factors, including use, topography, quality, size, location, and access.[13] Those determinations were made in the field while he was inspecting the subject and abutting properties.

Mr. Tesh's physical inspection of the property being valued in combination with reviewing local market data is consistent with the basic principle of the sales comparison approach to value land; that is, that the appraiser must consider the "degree of similarity or

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[11] Transitional land is generally vacant property found within the path of expanding development. It often has an interim agricultural use, but due to the market anticipation of conversion to higher and better economic use, it enjoys a higher unit value than most other agricultural land.

[12] Attached as Appendix A of BNSF Reply Exh. III.F.1-1 is a Partial List of Sources of Land Sales Data. The members of his team who helped gather this data are Joseph Grouby and Benjamin Grouby of the Benjamin Group, Inc., and Mike Caplan of FTI Consulting.

[13] These evaluations include reference to tax maps, subdivision plats, U.S. Geological Survey topographic maps, as well as field inspections.

difference between the subject property and the comparable sales."[14] Any appraisal disregarding this basic principle is unreliable. Moreover, any methodology that results from simply averaging sales prices and applying the result to a subject property is not appraising, because it is not demonstrative of value. The direct sales comparison approach requires the appraiser to consider differences between sales considered comparable to the subject property and to make appropriate adjustments to account for those differences.

In total, Mr. Tesh personally valued or inspected 763.53 miles of the OTRR ROW. He spent about three weeks in the field doing inspections. In the metropolitan areas mentioned above, Mr. Tesh thoroughly inspected and valued 43.99 miles of the OTRR ROW. He divided that portion of the ROW that he valued into 207 valuation units. A new valuation unit began whenever the use or unit value changed on either side of the ROW. The market cost of each valuation unit is the sum of the market costs of the acquisition parcels existing along each of its sides. Consequently, each valuation unit represents an equal blend of the uses and unit values prevailing on its two sides.[15] In other words, he reviewed and valued both sides of the ROW, not just one side. His methodology is set out in detail in BNSF Reply Exh. III.F.1-1. He followed the same process for the 317.39 miles between Converse Yard and Moran Junction.

(1) Critique of Mr. Burris' Valuation of OTRR's ROW and Other Facilities

Mr. Tesh reviewed the evidence submitted by Otter Tail on the cost to acquire land for the OTRR. He testifies that the value estimate made by Otter Tail was flawed in many respects.

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[14] *The Appraisal of Real Estate* at 91 (11th ed. 1991).

[15] Any allocation other than 50:50 would be arbitrary and speculative. There is no better evidence of where the stand-alone railroad would be other than the location of the current railroad. Correspondingly, there is no more fair and reasonable assumption, for valuation purposes, of where the property lines for abutting acquisition parcels would be other than in the middle of the existing right-of-way.

His thorough inspection reveals that the characteristics of the relevant land to be acquired for the ROW varies considerably by highest and best use, topography, access, soil conditions, and other material factors. Otter Tail incorrectly assumed that the characteristics of the land to be acquired for the ROW did not vary for long stretches of track. That faulty assumption may have been due to the fact that Mr. Burris is not a qualified appraiser and may not have recognized the differences in use, topography, etc. as they occurred, or it may have been due to the inadequate amount of time that he spent observing the ROW. Mr. Burris also mistakenly assumed that simply averaging a handful of sales would equate to the value of the subject property. This is why his conclusions included overly precise numbers (the average dollars and cents per acre). No buyer or seller of real estate thinks of value in terms of this precision. An example would be Mr. Burris' calculated price of $41,517.57 per acre for commercial land in Bismarck. A typical buyer would say $41,500 per acre.[16] Mr. Burris' number is not a realistic estimate of market value of any parcel of land in Bismarck. It is simply a calculated mathematical average of sales in Burleigh County, ND. It is only a measure of central tendency and gives weight to all sales on a per unit basis regardless of how comparable they are to the subject property, how large they are, or how far they are from the subject property. In fact, it does not even consider whether they are comparable at all, aside from being in the same county.

Mr. Tesh thoroughly inspected and valued certain parts of the ROW over which Otter Tail coal is to be transported. With the time and resources available, he was unable to inspect the

[16] Rounding is a typical and accepted practice in the appraisal profession. Carrying a result out to two decimal places implies far more precision than is warranted in Mr. Burris' analysis. The appraiser is expected to determine the value that would likely be expressed by buyers and sellers. However, Mr. Burris does no more than calculate the mathematical weighted average of some sales that occurred in the same county, state or region in which the OTRR ROW is located.

entire ROW Otter Tail proposed for OTRR as he would have preferred. Therefore, Mr. Tesh accepted Otter Tail's calculated prices for those portions of the ROW that he was unable to visit, subject to certain adjustments that are set forth below.

According to Mr. Tesh, Otter Tail committed a multitude of errors in its land valuation ranging from its valuation methodology to its choice of valuation segments and uses and the valuation of areas along the ROW. A discussion of the errors in Otter Tail's evidence and how they must be corrected follows.

Mr. Tesh states that, on its face, the property methodology, definitions, valuation criteria, and valuation process that Otter Tail sets forth in its Narrative are, with one notable exception, reasonable restatements of appropriate valuation theory for conventional market value assignments, if not for railroad acquisition assignments. That exception, relating to the determination of across-the-fence ("ATF") values, is explained in more detail below. In any case, Mr. Tesh testifies that it is clear that the correct USPAP guidelines were not followed by Mr. Burris in calculating prices for the OTRR ROW. He concludes that the valuation process as stated by Otter Tail is misleading and does not produce a credible result.

The first step in the methodology Otter Tail said Mr. Burris followed after the route for OTRR was identified was to perform a field trip in April 2002 that lasted approximately one week. During that short field trip, Otter Tail contends that Mr. Burris made visual observations of the more than 1,284 mile ROW on which he based his land estimate.[17] During that field trip, Mr. Burris is said to have parcelized the ROW categorizing it by land uses. According to Mr.

[17] BNSF estimates that the actual ROW necessary would be 1285.84 miles. However, because neither Mr. Burris nor Mr. Tesh investigated the ROW in some of the locations associated with the additional mileage, Mr. Tesh did not attempt to value that additional mileage here. Mr. Tesh reaches a conclusion only as to 1280.82 miles along the ROW.

Tesh, ordinarily, a real estate appraiser first determines the "highest and best use" of a parcel of property by thoroughly inspecting it, a process that cannot be completed by simply driving by the property as Mr. Burris describes. The record of the field trip shows that there were parts of the ROW that were inaccessible and that less than 40 in depth "observations" were actually made on the trip.[18] Mr. Tesh testifies that it is unclear how Mr. Burris arrived at a determination of the highest and best use of the entire OTRR ROW on such a short trip with only a handful of in-depth "observations." He states that so few "observations" during such a short time period do not provide sufficient detail to enable one to identify land use in any significant way. He testifies that it would be impossible for Mr. Burris to tell from such a hit-or-miss approach where one land use ends and another begins. That may explain why Mr. Burris recorded such large swaths of continuous land use.[19]

Nonetheless, apparently Mr. Burris categorized all of the land into use classifications based on his field trip observations. Parcels were then allegedly established as a function of land use. Using this approach, Mr. Burris divided the approximately 1,287 miles of the OTRR ROW into only 307 parcels. Mr. Tesh states that this is a starkly inadequate number of valuation units to determine the value of the OTRR ROW.

To demonstrate its inadequacy Mr. Tesh provides an example using the OTRR's ROW in the state of North Dakota. OTRR's ROW in North Dakota, which stretches from the Montana border near Beach for approximately 368 miles to Fargo, is broken into only 84 parcels of land by Mr. Burris.[20] In other words, the average size of the land segment for which Mr. Burris

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[18] *See* OTP.OP.WP.003389 and 3393.

[19] *See* OTP Errata Opening electronic workpaper "OTRR Land.xls" and Exh. III-F-2.

[20] Including each side of the ROW, Otter Tail has 39 parcels encompassing OTRR's ROW in the state of Wyoming, 56 in Montana, 71 in Minnesota and 1 in South Dakota.

calculated a price in North Dakota was close to 4.45 miles long.[21] In contrast, for the 35.13 miles of OTRR's ROW in the metropolitan areas of North Dakota that Mr. Tesh personally inspected in detail, he found 167 valuation units, or approximately 4.75 units per mile. That is more than 20 times the number of valuation units per mile that Mr. Burris determined under his approach. There were stretches of up to 74.85 miles where Mr. Burris determined homogenous land use (*e.g.*, residential, industrial, commercial, or agricultural use) in the state of North Dakota.[22] Based on his inspection in North Dakota, Mr. Tesh states that no such long stretch of contiguous use exists along the ROW in that state.

Among Mr. Burris' North Dakota valuation segments is Cass County, which contains the city of Fargo, a part of the Fargo/Moorhead Metropolitan Area. Mr. Burris has a single valuation unit that is seven miles long, extending through the cities of Fargo and West Fargo, that he described as being continuously commercial. His calculated price for the entire valuation unit is $0.20 per square foot. In those same seven miles, Mr. Tesh identified 104 valuations constituting 52 valuation units. Those valuation units included commercial, industrial, and residential properties, with values ranging from $0.16 per square foot to $7.50 per square foot. Anyone who has visited Fargo, or is familiar with typical urban development, knows that a single-use, single-value, seven-mile parcel is a gross oversimplification that fails to recognize the number of times that land uses and/or values change in Cass County. Clearly, Otter Tail's one-parcel conclusion is wrong. Mr. Tesh states that it is not credible on its face.

In addition to these problems, Mr. Tesh is unable to imagine how Mr. Burris categorized his overly large "parcels" into land use categories at all, given that he is not a real estate

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[21] The average size parcel Otter Tail valued was 6.498 miles long in Wyoming, 8.93 miles long in Montana, 2.26 miles long in Minnesota, and 1.61 miles long in South Dakota.

[22] *See* OTP Opening Exh. III-F-2 at page 4 of 7.

appraiser. Based on his work here, Mr. Tesh concludes he has certainly not demonstrated the requisite skills or provided the evidence of training required to identify accurately the highest and best use of land. Obtaining those skills requires extensive training and experience. Such training typically includes courses in the various approaches to real property valuation and completion of an apprenticeship under the supervision of a certified and experienced appraiser.

The next step in the valuation methodology Mr. Burris purportedly followed was to arrive at an ATF unit value using comparable sales data. OTP Nar. at III-F-4 and 8. Mr. Burris' performance of this step was his most notable departure from acceptable valuation practice for several reasons. First, for comparable sales data, Mr. Burris obtained sales transactions from September 1995 to January 2003 from Michael Brook, a real estate appraiser in Billings, Montana. Using that information, Mr. Burris trended the sales forward or backwards in time to the first quarter of 2002.[23] Second, he averaged those transactions by county and land use type and applied that result to each of his parcel's acreage to develop an acquisition cost for each parcel. If there were no comparable land sales in a county for a particular land use type, Mr. Burris used an overall average by land use type based on several counties' or several states' sales.[24]

The first problem with Mr. Burris' approach here is the sales he relied upon. He incorrectly relied upon future and old sales of land in order to estimate the acquisition cost of the OTRR ROW. Otter Tail claimed that OTRR would be constructed by October 2001. Otter Tail's construction schedule assumes that all land acquisitions would have to be negotiated and closed by at least September 2000. Otter Tail indicated Mr. Burris valued the OTRR ROW as of

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[23] *See id.* at III-F-9 and n. 13.
[24] *Id.*

January 2002.[25] Mr. Tesh testifies that, assuming that four months is a reasonable time to allow for the recording of a sale, Mr. Burris should not have relied on any market data or events that occurred after January 2001. However, Mr. Burris incorrectly relied on many sales that occurred as late as January 2003. OTTR then adjusts the conclusions backwards to 2000. However, real estate is not a fungible asset. Land costs for specific properties cannot be indexed the way costs can be indexed for track and ties and other materials. There is no reliable way to trend a real estate number backwards without actually valuing the properties involved as of the earlier date, using data that would have been available in the market at that time. According to Mr. Tesh, this form of "appraising" for past value is misleading and clearly violates the economic principle of anticipation, which states that "what a person will pay for a property depends on the expected benefits from the property in the future."[26] Obviously, buyers and sellers could not have any knowledge of transactions that had not yet occurred. It is baffling that Mr. Burris would use sales subsequent to the date that the land would be acquired. He opines values as of 2002, and then adjusts those numbers back to an acquisition date in 2000. Therefore, Mr. Burris is using data irrelevant to the valuation. Using inappropriate data renders any conclusion based on them misleading and unreliable.

In addition, the process that Messrs. Brook and Burris used to select certain transactions and exclude others is unspecified. Mr. Brook was instructed to provide sales transactions for certain counties along the OTRR ROW.[27] The sales transactions are therefore from areas anywhere in the counties through which the ROW runs. There was no attempt to identify and use only those sales close to the ROW or at least give those sales greater weight than other less

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[25] *See* OTP.OP.WP.003593.
[26] *Real Estate Principles*, Eighth Edition, Charles J. Jacobus, Prentice Hall, 1999, p 376.
[27] OTP.OP.WP.004799-4803.

comparable sales. Mr Tesh believes that Messrs. Brook and Burris must have employed some undisclosed selection process because the sales transactions used cover a mere subset of all the available transactions. At the end of the transaction selection process, Mr. Burris was left with only 634 sales from which he calculated averages for property prices along the more than 1,284 miles of ROW.

To illustrate the insufficiency of Otter Tail's transaction database, Mr. Tesh refers to Mr. Burris' conclusions in North Dakota where he reported 213 sales transactions to support his valuation conclusions for the entire state.[28] Mr. Tesh points out that Mr. Burris reported no sales to represent the industrial use category and only 22 commercial sales for the entire state. Mr. Tesh explains that such a limited number of sales transactions are inadequate to value such a large part of the ROW, Mr. Burris used only seven commercial transactions for the entire Bismarck/Mandan metropolitan area in which most of the area should be classified as commercial. In contrast, Mr. Tesh reported some 28 commercial sales comparables in downtown Bismarck alone. Many of those sales were less than five blocks from the proposed subject ROW.

Mr. Tesh testifies that the more important problem with Otter Tail's methodology is a glaring and recurring error in Mr. Burris' approach that directly conflicts with acceptable real estate valuation techniques. That is, to determine ATF values one does not average sales transactions, but compares the land being valued with "comparable" land sales transactions. This is something that Mr. Burris ignores. Of course, Mr. Burris' averaging methodology would

[28] Otter Tail used 92 sales in Wyoming, 74 sales in Montana, and 141 sales (including 135 agricultural sales) in Minnesota, and 114 sales in South Dakota. (The South Dakota sales were used to value only 1.6 miles of ROW). BNSF sales data appear in BNSF Reply electronic workpaper "Land_Sales.xls."

not be the correct way to determine real estate values even if he simply divided the total of all sales prices by the total number of sales, resulting in a simple average price per acre or square foot. However, his methodology is even more egregious because he calculates a weighted average sales price per square foot. Mr. Tesh points out that sales of large pieces of property tend to sell at lower unit prices than those of smaller properties. This means that weight averaging the per square foot price of large tract property sales with the per square foot price of small parcel sales artificially lowers the overall per square foot price. This problem is further aggravated by the fact that Mr. Burris does not select sales that are in the same competitive markets as are the properties he is valuing. To value property in the city he often includes rural sales of large properties and weight averages them with smaller urban sales that are adjacent to the subject property. This technique distorts the sale characteristics of all the properties and yields an unreliable and misleading conclusion. Finally, Mr. Burris averages sales from different regions and states to establish value where he has no sales transaction. Mr. Tesh notes this is completely unacceptable. Mr. Tesh was able to find many more sales than Mr. Burris and used them to appraise--not average.

In conclusion, Mr. Tesh found Otter Tail's description of Mr. Burris' methodology for valuing the OTRR ROW quite troubling. Because Otter Tail did not proffer an independent written report to substantiate Mr. Burris' work or even the semblance of adequate supporting documentation, Mr. Tesh concludes that the valuation process Otter Tail followed, as described in its Narrative, is misleading and does not produce a credible result in accordance with USPAP. Mr. Tesh explains that his criticism is supported by the internal inconsistencies in Otter Tail's valuation of OTRR's ROW, which reflect no knowledge of relevant market characteristics and differences. Mr. Tesh concludes that Otter Tail's valuation conclusion is patently unsupportable.

(a) Otter Tail Has Substantially Undervalued the OTRR ROW

i) Otter Tail Undervalued Urban Areas Along OTRR's ROW

As mentioned above, Otter Tail's valuation of metropolitan areas is without adequate reasoning or support. Therefore, Mr. Tesh concentrated his efforts on reviewing those areas most closely. For each of the metropolitan areas of Bismarck/Mandan and Fargo/Moorhead, he personally and thoroughly inspected the location for the OTRR ROW and performed a full sales comparison appraisal. He spent eight days in the two metropolitan areas, spending about equal time in each. Mr. Tesh's methodology is summarized below and is set forth more fully in BNSF Reply Exh. III.F.1-1.

a) Bismarck/Mandan Metropolitan Area

The OTRR ROW in the Bismarck/Mandan metropolitan area extends from the Heart River, west of Mandan, to 106th Street, east of Bismarck. It transits the center of both cities, within their most densely developed and improved corridors. The ROW abuts such highly valued sites as shopping centers, office buildings, downtown commercial areas, the Bismarck Convention Center, banks, and retail stores. As a consequence of Otter Tail's incorrect methodology, Mr. Tesh concludes it substantially undervalued land in Bismarck and Mandan by $3.6 million.

i. City of Bismarck

Whereas Mr. Burris divided the OTRR ROW in the City of Bismarck into a mere five valuation segments, with only one unit value ($0.95 per square foot) for commercial property in

the entire city,[29] Mr. Tesh made more than 100 individual appraisals along the same portion of ROW. Mr. Tesh based his analysis on having been to the Bismarck/Mandan metropolitan area for four days and having thoroughly inspected and mapped OTRR's entire ROW through that city. He recorded as many as 14 changes of use alone, without considering value changes, within a given one-mile stretch in the center of Bismarck. His valuation of OTRR's ROW in Bismarck reflects all those changes of use on both sides of the ROW. By comparison, Mr. Burris spent one night in Bismarck while touring the 375 miles between Miles City, Montana and Benson, Minnesota.[30] Mr. Tesh states that it is not possible to spend so little time observing a complex urban ROW and properly determine either land uses or values.

Assuming the broadest possible boundaries for the metropolitan area, Mr. Burris had 81 sales transactions for Burleigh County (which includes the City of Bismarck). Of those 81 sales, however, he identified only three commercial sales transactions that were the basis for his valuation of most of the property in Bismarck. Mr. Burris' commercial sales were $0.26, $2.22 and $2.40 per square foot. From those three data points, Mr. Burris weight averaged the sales (weighing heavily the low per square foot priced sale because of its large acreage) to conclude that commercial property in Bismarck is valued at $41,518 per acre, or $0.95 per square foot. He then used that average to calculate a price for 57.7 acres or nearly 5.63 miles along the OTRR ROW in the center of the City of Bismarck. He "averaged" those three commercial transactions without regard to the fact that one of them was very close to the ROW and sold for $2.40 per square foot.[31] By weight averaging that sale with the lower valued larger sales from remote

[29] Mr. Burris classified only one short valuation parcel in Bismarck of about 0.64 miles as residential on only one side of the ROW. He calculated its price at $0.20 per square foot.

[30] *See* OTP.OP.WP.003389.

[31] *See* OTP.OP.WP.003766.

locations (*e.g.*, the $0.26 per square foot sale was of 522,720 acres far from the ROW),[32] Mr. Burris concluded that an average $0.95 per square foot price was appropriate for commercial sales in the downtown Bismarck area. In fact, Mr. Tesh determined that Mr. Burris' price was well below the typical selling price for commercial property in downtown Bismarck, an urban center with few parcels selling below $4.00 per square foot.

Mr. Tesh identified 37 commercial land sales within the city of Bismarck. Using those confirmed commercial land sales, Mr. Tesh found commercial lot values in Bismarck range between about $2.00 and $8.00 per square foot. There was also a recent sale of more than $24.00 per square foot in that area. However, Mr. Tesh did not consider that sale typical of values along the ROW and did not use it in his analysis. He did confirm commercial land sales in the ROW market at a minimum of two to nearly eight times higher than Mr. Burris' conclusion. Mr. Tesh's conversations with local realtors and assessors, as well as his independent sales research and analysis, confirm that valuation.

Although Mr. Burris designated most of the ROW within Bismarck as commercial property, he designated most of the remainder of Burleigh County ROW as agricultural property. He calculated prices for the agricultural property at $653 per acre (less than $.015 per square foot). A close look at the sales that Mr. Brook chose and Mr. Burris relied on shows that only a few of them are close to the ROW. Mr. Tesh did not identify any agricultural highest and best use land in Bismarck. He noted some land on the outskirts of the city that retains agricultural uses, but he concluded that land was transitional in nature and was likely to be developed in the next few years as Bismarck expands to the east. Mr. Burris' failure to differentiate agricultural

[32] *See* OTP.OP.WP.003762 and 3766.

lands from transitional property along the ROW is another cause of his gross understatement of acquisition cost for the OTTR lands.

In the City of Bismarck, Mr. Tesh performed a thorough inspection of the subject land and analyzed the current market data necessary to understand how the variations in land quality and value should be interpreted. Mr. Tesh also relied on information he researched at the Board of Realtors in Bismarck, where he holds an affiliate membership. From Mr. Tesh's review of sales data and his analysis of the highest and best uses of land along the OTRR ROW, he determined that the value of OTRR's ROW in the Bismarck metropolitan area on January 1, 2001 was $5.4 million BNSF Reply Exh. III.F.1-1 Appendices A & B for the relevant sales and valuation units for Bismarck.

ii. City of Mandan

The OTRR ROW also passes through the commercial center of Mandan parallel to Business Loop I-94. The ROW abuts auto dealerships, shopping centers, other commercial property, and industrial uses. Otter Tail's conclusions regarding the ROW in the City of Mandan do not reflect its value.

During his one day drive of more than 325 miles from Bismarck, North Dakota, to Benson, Minnesota, Mr. Burris divided Morton County and the City of Mandan into only four valuation segments. Mr. Burris divided the OTRR ROW in the City of Mandan itself into only two parcels containing about four miles and categorized the uses as residential on one side and commercial on the other. He used one unit value ($2.23 per square foot) for commercial uses and one unit value ($0.063 per square foot) for residential uses. By comparison, Mr. Tesh found 78 changes in use or value along the same portion of ROW. As previously noted, Mr. Tesh's analysis is based on having been in the Bismarck/Mandan metropolitan area for four days and having thoroughly inspected and mapped OTRR's entire ROW through the cities. His valuation

of OTRR's ROW in Mandan reflects all those changes of use and value on both sides of the ROW.

Mr. Burris relied on 42 sales transactions in Morton County (which encompasses Mandan). Of those 42 sales, he identified only four commercial transactions. They ranged between $1.99 per square foot and $2.57 per square foot. From these four data points, Mr. Burris weight averaged those commercial sales in Mandan to arrive at $97,136 per acre, or $2.23 per square foot. He used that amount to value 34.9 acres or 3.9 miles along one side of the OTRR ROW in the center of the City of Mandan. According to Mr. Tesh, it is not possible for anyone who carefully examines the subject property to conclude that nearly four miles of land in Mandan has the same use and value in this heterogeneous market.

A close look at the commercial sales Mr. Brook chose and Mr. Burris relied on shows that they are relatively close to the ROW. For that reason, they appear to be a reasonable basis for determining Mandan commercial values. However, that conclusion reinforces Mr. Tesh's conclusion that Mr. Burris' valuation of commercial land in Bismarck at $0.95 per square foot was unreasonable. Mr. Tesh states that it is not reasonable to value the commercial land in the two adjacent cities at such different values.

Moreover, Mr. Tesh concludes that the value of commercial land in Mandan is acutally higher than Mr. Burris' $2.23 per square foot calculation based on commercial land sales by the BNSF in the area at $3.00 per square foot in 1999. Mr. Tesh identified eight commercial land sales within the City of Mandan. Using those confirmed commercial land sales, Mr. Tesh found commercial lot values in Mandan ranging between about $1.75 to more than $3.00 per square foot. Mr. Tesh's valuation conclusions were confirmed by conversations with local realtors and assessors, as well as his independent sales research and analysis.

Mr. Burris calculated a precise $2,753.26 per acre ($0.06 per square foot) value as his average price for "residential ranchette" property in rural Morton County. He also calculated a precise $24,461 per acre ($0.56 per square foot) "residential" price for Morton County. However, Mr. Burris applied the lower "residential ranchette" price to "residential" property in the City of Mandan. Mr. Tesh states it is difficult to comprehend how Mr. Burris came to that conclusion when he had reported that residential comparables were priced at nearly ten times more. Mr. Tesh further states that he saw no residential property that would command such a low ($0.06 per square foot) price during his inspection of the Mandan ROW. According to Mr. Burris' calculation, a quarter acre lot in downtown Mandan would sell for $653, a patently ridiculous conclusion.

From Mr. Tesh's review of sales data and his analysis of the highest and best uses of land along the OTRR ROW in Mandan, he determined that the value of OTRR's ROW in the Mandan metropolitan area on January 1, 2001, was $2.9 million. BNSF Reply Exh. III.F.1-1 Appendices A & B for relevant sales and valuation units for Mandan. Otter Tail calculated prices for the approximately seven miles of land in Mandan at $1.75 million. This is about sixty percent of its true market value.

b) Fargo/Moorhead Metropolitan Area

The cities of Fargo and West Fargo, North Dakota, and Moorhead, Minnesota comprise this metropolitan area. The central business district of the metropolitan area lies on both sides of the Red River in Fargo and Moorhead. The OTRR ROW in the Fargo/Moorhead area parallels I-94, US Route 10, and Main Avenue through West Fargo and Fargo, and US Route 10, Main Avenue, MN Route 231, and 20th Street South through Moorhead. It passes through light and heavy industrial areas, single family and multifamily neighborhoods, shopping centers, major office buildings, retail shopping areas, government office buildings, universities, and public

parks and recreation areas. Otter Tail's valuation of the Fargo/Moorhead metropolitan area is undervalued by $10.97 million.

On the same day that Mr. Burris drove through and observed the two cities in the Bismarck/Mandan Metropolitan area, he also drove across North Dakota, observing the small towns and agricultural land along the way, and then drove through and observed the three cities in the Fargo/Moorhead Metropolitan Area.

i. Cities of Fargo and West Fargo

Mr. Burris divided Cass County, in which the cities of Fargo and West Fargo are located, into 9 valuation segments. He included both these cities in one, seven-mile long segment that he classified as commercial on both sides of the ROW. Although Mr. Tesh found that the segment included heavy and light industrial property, moderate to high-density commercial property, multifamily residential property, single-family residential property, and a public park, Mr. Burris calculated one $0.20 per square foot price for both sides of the ROW for the entire seven miles. In contrast, Mr. Tesh identified 52 valuation segments (104 value units counting both sides of the ROW) and estimated values ranging between $0.16 per square foot and $7.50 per square foot.

Approximately six miles of Mr. Burris' single commercial segment contained many parcels with light to heavy industrial uses on the north side of the ROW. Mr. Tesh states that these uses are clearly industrial and not commercial. The industrial nature of the surroundings is obvious upon proper inspection of the properties. The remainder of the north side is, in fact, commercial. It includes high-density office development worth much more than Mr. Burris' valuation. The south side of the ROW contains more varied property, although approximately 2.6 miles are also industrial uses. Also on the south side of the ROW, there is a mixed multifamily and single family residential area, which includes a public park. The remainder of

the south side consists of commercial uses including fast food, shopping, a renovated senior center, restaurants, and public space. Mr. Burris assigned all these uses a single, $0.20 per square foot, value. Mr. Tesh questions whether any of this land, excepting the most inaccessible industrial land, could be acquired for as little as $0.20 per square foot.

Despite having designated most of Fargo/West Fargo as commercial, Otter Tail reported only three commercial land transactions (priced from 7 to 58 cents per square foot) for all of Cass County. Mr. Tesh reviewed the description of these three transactions and discovered that Mr. Brook had described all of them as light or heavy industrial property.[33] Nonetheless, Mr. Burris classified them as commercial transactions. Mr. Tesh states that industrial property typically conveys for lower prices than commercial property. Therefore by incorrectly applying industrial sales data to commercial properties, Mr. Burris improperly depressed the value of some of the most valuable and expensive property in the cities of Fargo and West Fargo. Mr. Tesh observes that Mr. Burris consistently misclassified obvious industrial uses as commercial in all his valuations. But Mr. Burris' error here was compounded when he calculated an erroneous commercial price by relying on his standard averaging technique using the three incorrectly classified commercial sales transactions. Setting aside competent appraisal methodology, common sense indicates that commercial land in almost any urban area in America is worth more than $0.20 per square foot. You simply cannot buy commercial land in the Fargo/West Fargo market for $0.20 per square foot. Finally, Mr. Tesh observes that these mischaracterized "commercial" sales range in size from about 10 acres to some 52 acres and Mr. Burris makes no adjustment for the size differences. As previously stated, it is common for smaller tracts of

[33] *See* OTP.OP.WP.003860-62.

similar land to command higher unit values than larger tracts. Not adjusting for transaction size drives down average values.

Otter Tail reported no residential, industrial, or even agricultural sales transactions for the remainder of Cass County. Based on his analysis of Otter Tail's transactions, Mr. Tesh determines that it includes no true commercial land transactions for Cass County either. For his Cass County "parcels" Mr. Burris calculated averages for 77.12 acres of commercial land,[34] 4.09 acres of residential land, and 413.93 acres of agricultural land without using any local sales transactions for comparison. Mr. Burris relied on the average of all transactions in North Dakota in the agricultural and residential property type for pricing the Cass County and miscategorized industrial transactions for commercial property.

Mr. Tesh visited the cities of Fargo and West Fargo. During more than two days, he plotted the uses along OTRR's ROW. He divided the ROW into 52 valuation units based on the actual uses he observed along the ROW. He and his team reviewed more than 225 actual sales transactions including commercial, industrial, and residential sales. Based on his detailed analysis of that and other information, he determined that the value of the land along OTRR's ROW in the cities of Fargo and West Fargo is $5.6 million. BNSF Reply Exh. III.F.1-1 Appendices A & B for relevant sales and valuation units for Fargo and West Fargo. This compares to a valuation of $718,049 by Otter Tail.

i. City of Moorhead

The OTRR ROW in Moorhead crosses the Red River from Fargo, runs between Main Avenue and Central Avenue through the center of the city, turns south parallel to 20th Street South, and passes the campuses of Minnesota State University at Moorhead and Northwest

[34] Note that much of the land Mr. Burris classifies as being commercial land is, in fact, industrial land. Consequently, Mr. Burris reports improper prices for both types of land.

Technical College. Otter Tail's valuation of the Moorhead metropolitan area is also undervalued by $6,088,000.

On the same day that Mr. Burris traveled through Mandan and Fargo, he also passed through Moorhead. Mr. Burris divided Clay County, in which the city of Moorhead is located, into 13 valuation segments. The first three of Mr. Burris' segments cover approximately 1.7 miles and are classified as commercial on both sides of the ROW. Covering approximately the same distance, Mr. Tesh identified 27 value or use changes. In this area, Mr. Tesh made over 50 individual appraisals of parcels adjacent to the ROW. Mr. Tesh's valuations include primarily commercial units, but also include residential and industrial uses. Mr. Burris' next three "parcels," covering about 1.9 miles, are classified as mixed commercial and residential. Mr. Tesh concludes that about 1.6 miles of those segments on the east side of the ROW are, in fact, industrial uses. For example, there is a large Budweiser brewery at the southern end of this industrial area. Mr. Burris classified about one mile of the west side of the ROW as residential and commercial. Mr. Tesh finds that this portion of the ROW includes both multifamily and single family uses and includes the campuses of two universities. Mr. Tesh questions how Mr. Burris confused the extensive industrial uses as residential and commercial and the multifamily uses as commercial.

Otter Tail reports *no* sales transactions at all in either the City of Moorhead or Clay County. Instead, Mr. Burris relies on the average of his commercial sales transactions in all the states (*i.e.*, Wyoming, Montana, North Dakota, Minnesota, and South Dakota) as the basis for valuing commercial property in the City of Moorhead. Mr. Tesh identified more than a dozen commercial land sales in the city, several of which are sales of BNSF land adjoining the OTRR ROW. Using his out-of-state commercial sales average, Mr. Burris calculated a $0.51 per square

foot price for all commercial land in Moorhead. Mr. Tesh found commercial sales in Moorhead ranging between $0.73 per square foot and $5.64 per square foot. Two of these sales were on the ROW and conveyed for $3.79 per square foot and $5.64 per square foot, respectively. Mr. Tesh states that, considering the availability of this sales data, Mr. Burris' averaging technique and valuation for commercial land in Moorhead is incorrect and misleading on its face.

For residential property in Moorhead, Mr. Burris relies on the average of two residential sales transactions for property in Big Stone County, a more rural area far south of Moorhead. Using this data, Mr. Burris calculated a $0.22 per square foot price for Moorhead residential land. At this price, a 10,000 square foot residential lot would convey for $2,200. Mr. Tesh found residential lots in Moorhead containing approximately 10,000 square feet that conveyed for $50,000 to $80,000. Based on this data, Mr. Tesh states that residential prices in Moorhead are twenty to forty times Mr. Burris' calculated residential land price. Mr. Tesh states further that, because Mr. Burris failed to develop comparable land sales using local data, Mr. Burris' conclusions for the city of Moorhead lack foundation and are misleading and unreliable.

Mr. Burris failed to identify obvious industrial uses properly for a substantial distance along the OTRR ROW. He did not identify any industrial land sales or calculate an industrial land price for Moorhead. Mr. Tesh concludes that Mr. Burris incorrectly identified the highest and best use of property adjoining the ROW and that Mr. Burris' valuation for this property is misleading and unreliable.

Finally, Mr. Burris relies upon the average sales price for all agricultural property in the state of Minnesota to calculate a price for the agricultural property in Clay County. Mr. Tesh did not identify any agricultural land in the City of Moorhead. In addition, Mr. Tesh does not view this "mixed bag" approach to valuation as appropriate. In addition to identifying incorrectly the

highest and best use of property adjoining the ROW in Moorhead, Mr. Burris calculated below market prices for the 27.435 acres of commercial land, 167.88 acres of agricultural land and 11.975 acres of residential land he calculated prices for in Moorhead.

Mr. Tesh visited the Moorhead metropolitan area and, during two days, plotted the uses along OTRR's ROW and divided it into 104 valuation units. He and his team reviewed more than 20 sales transactions. Based on his detailed review of this and other information, he determined that the value of the land along OTRR's ROW in the Moorhead Metropolitan area is $6.7 million. BNSF Reply Exh. III.F.1-1 Appendices A & B for relevant sales and valuation units for Moorhead. This compares to a valuation of $611,576 by Otter Tail.

ii) Otter Tail Undervalued OTRR's ROW from Wyoming to Moran Junction

In addition to inspecting thoroughly the OTRR in the metropolitan areas mentioned above, Mr. Tesh also thoroughly inspected the portion of OTRR's ROW from its beginning at the Converse Yard in Wyoming to Moran Junction in Montana. His total valuation of that portion of the line is different from that of Otter Tail's witness. Mr. Burris calculated prices for that land (excluding the Orin Line)[35] at $7,682,862 and Mr. Tesh values that land at $13.2 million.

Over two days, Mr. Burris designated 60 segments for the portion of the OTRR ROW between the Converse Yard to the proposed yard at Moran Junction. He relied on less than 120 sales in calculating a price for that land. Mr. Tesh performed a much more thorough analysis, carefully examining that portion of the ROW over a week and a half long period. During his detailed field inspections, he designated more than 530 valuation units. In all, he made 1,062 individual valuations along that stretch of the OTRR ROW. He also reviewed and analyzed

[35] The Orin Line is discussed later.

more than 450 sales. Of those, he relied on over 250 sales in reaching his value determination. Mr. Tesh's entire valuation for that portion of OTRR's ROW from its beginning in Wyoming to Moran Junction, excluding the Orin Line, is $13.2 million. His methodology is set out in detail in BNSF Reply Exh. III.F.1-1.

iii) Otter Tail Undervalued Certain Cities and Towns Along OTRR's ROW

Mr. Tesh did not have the time to inspect thoroughly all of the property that would need to be acquired for the OTRR. Therefore, he presents some OTRR conclusions unadjusted and in other instances adopts Otter Tail's land parcelization in the areas he did not categorize or presents conclusions he made from his own independent appraisal. To determine whether Mr. Burris' assumptions generate defensible conclusions, Mr. Tesh studied Otter Tail's sales data as well as additional sales transactions Mr. Tesh and his staff independently obtained.

For everything south of Moran Junction, Mr. Tesh thoroughly inspected the property and applied sound appraisal principles in arriving at market value conclusions. He also employed USPAP appraisal methodologies in the four metropolitan areas mentioned above. In those markets, he did thorough inspections of the land to be acquired for the construction of the OTRR. He divided all the land he inspected into proper parcels, and applied the appropriate valuation approaches and techniques to arrive at market value conclusions. Therefore, there was no need to use Otter Tail's assumptions in those areas. Mr. Tesh also visited those parts of the ROW east of Mandan to the Big Stone plant, although he did not classify the land areas outside of the metropolitan areas mentioned above.

For the remaining portions of the OTRR ROW, Mr. Tesh reviewed Mr. Burris' valuation closely. Based on his analysis, Mr. Tesh proposes several adjustments to Otter Tail's calculated prices for the properties he did not appraise.[36] Those adjustments are to ROW in:

1. The city of Jamestown, North Dakota; and
2. Small cities and towns that Mr. Tesh visited east of Mandan, North Dakota and those west of Mandan that Mr. Burris erroneously designated as agricultural.

a) Otter Tail Undervalued Land In the City of Jamestown, North Dakota

Mr. Tesh inspected the major metropolitan areas in North Dakota and Minnesota along the OTRR ROW. He also inspected and did detailed valuations of Gillette in Wyoming and Hardin in Montana. His detailed reviews of Bismarck, Mandan, Fargo, and Moorhead are described above. For the cities of Jamestown and Valley City, Mr. Tesh was not able to carry out as thorough a review, but he visited those cities and inspected the ROW and adjacent neighborhoods. Further, for these cities, he reviewed and considered more actual sales transactions of all types than Mr. Burris reported in order to determine whether Mr. Burris' calculations of prices for the properties in these cities were reasonable. Mr. Tesh concludes that Mr. Burris substantially undervalued the commercial, industrial, and residential properties in Jamestown. In Valley City, North Dakota, the ROW passes north of the city and is elevated most of the way. Mr. Tesh determined that his conclusions regarding agricultural land would apply to the Valley City ROW.

Mr. Tesh examined the OTRR ROW in Jamestown, North Dakota; however, he did not have time to evaluate fully the ROW within the city. Nevertheless, he concludes that it is clear

[36] A crosswalk to all of Mr. Tesh's adjustments to Mr. Burris' valuation appears in BNSF Reply electronic workpaper "OTRR-Land-Conclusions.xls," worksheet "summary."

that Mr. Burris improperly calculated the price for ROW property there. Mr. Burris designated seven value units over three miles of ROW that transit the city as commercial, residential, and open space property. Mr. Burris reported 29 sales transactions for all of Stutsman County (which encompasses Jamestown) that he classified as commercial, agricultural, or residential. Mr. Tesh and his team identified and reviewed 42 sales transactions just for the city of Jamestown alone. His review of those transactions indicates that commercial property in Jamestown typically sells for no less than $1.00 per square foot. Mr. Burris concluded $0.14 per square foot was the appropriate price for Jamestown commercial property even though two of his five commercial sales were for $1.11 and $1.14 per square foot unit. Both of these sales were within the developed area of Jamestown and were close to the OTRR ROW. Mr. Tesh questions how Mr. Burris could conclude that such a low price was appropriate for commercial property in view of these two sales.

Of the 42 actual sales Mr. Tesh considered in the city of Jamestown, ten sales are commercial, four are industrial, and 26 are residential. He found that industrial and residential property sales typically range between about $0.50 and $1.00 per square foot. Using his reported sales, Mr. Burris concluded about $0.30 per square foot was appropriate for residential property. He classified no land as industrial. The railroad goes through an intensely developed portion of Jamestown that includes both commercial and industrial uses. As such, it is clear that Mr. Burris' conclusion of less than $0.14 per square foot for commercial and industrial properties is inaccurate. Mr. Burris concluded that the total ROW acquisition price for property in Jamestown was $176,942. Mr. Tesh concludes that it should be about six times that number (a conservative estimate that is still less than $1.00 per square foot) using the abundance of market sales data he

reviewed. Based on that conclusion, the ROW acquisition cost in Jamestown alone (without assemblage factors) would be at least $1 million.

b) Otter Tail Misvalued Land In Several Small Cities And Towns As Though It Was Agricultural Land

Mr. Tesh notes that Otter Tail totally ignored many small population centers along the OTRR and calculated prices for them as if they were no more than crop or range land. Mr. Tesh reviewed valuation maps, USGS topographical maps, and U.S. and local census data to identify significant population centers that are at least towns (if not cities) west of Mandan, North Dakota, some of which, were not even mentioned by Mr. Burris, let alone valued separately from nearby lower priced agricultural uses.

For example, Mr. Burris' valuation segment "ND 227" includes the town of Wheatland. Mr. Burris classified the entire segment as agricultural at $271.08 per acre. Mr. Tesh identified residential sales in the vicinity of Wheatland and found that these sales were $0.30 per square foot or $13,068 per acre. For another example, Mr. Burris' valuation segment "ND 226" includes the town of Oriska. Mr. Burris classified the entire segment as agricultural at $271.08 per acre. Mr. Tesh identified residential sales in the vicinity of Oriska and found that these sales were $0.25 per square foot or $10,890 per acre. These prices are approximately 40 times Mr. Burris' calculated price for agricultural land.

Mr. Tesh valued the small communities from Converse, Wyoming to Moran Junction, Montana, and visited those from Mandan, North Dakota, to Big Stone City, South Dakota. Based on his inspection of these towns and considering numerous non-agricultural transactions in these areas, Mr. Tesh concludes that Mr. Burris' averaging calculations for agricultural land produced numbers that are below the actual value of these properties. Mr. Tesh adjusted Mr. Burris' numbers to reflect his experience and market research in a sample of those towns along

the ROW upward to a range of $2,500 to $25,000 per acre. Mr. Tesh adjusts the value of those areas to $14.8 million.[37]

iv) Otter Tail's Valuation of Agricultural Land Appears To Be Reasonable

Otter Tail designated a substantial portion of OTRR's ROW as agricultural or range land. Because of the limited time available, Mr. Tesh was unable to inspect the entire length of OTRR's ROW to determine whether those designations were accurate or whether Otter Tail's valuations there were correct. However, he was able to inspect several places along the ROW, which are discussed above, and for some of those places that Mr. Tesh was unable to visit and others that he did visit, he reclassifies population centers that Otter Tail miscategorized as agricultural/range land. For the remainder of the land that Otter Tail classified as agricultural/range, Mr. Tesh consulted with county assessors, agricultural appraisers, and county land sales transaction databases maintained by public sources to determine the reasonableness of Otter Tail's valuation of that land. His sources for this data are the U.S. Department of Agriculture and the Agricultural Extension Offices in the states of North Dakota and Minnesota. Mr. Tesh found that the average valuation of agricultural land by Mr. Burris, though somewhat low for North Dakota and Minnesota, was within a reasonable range of the valuation reported by those sources.

Mr. Tesh notes, however, that Mr. Burris' agricultural land conclusions ignore the fact that agricultural land adjacent to OTRR's ROW is more level with more water sources than is typical of agricultural lands in the counties the ROW traverses. Mr. Tesh believes those conditions make agricultural land adjacent to OTRR's ROW more valuable than would be

[37] The specific towns that are adjusted are listed with the calculations in BNSF's Reply electronic workpaper "OTRR_Land_Conclusions.xls," worksheet "Town Summary."

typical for agricultural land in the rest of the county. However, Mr. Tesh did not have sufficient time to determine market adjustments for agricultural lands to take these favorable conditions into account. Therefore, he does not adjust the agricultural prices Mr. Burris uses, except in those areas that are in fact towns or small cities.

v) Otter Tail Undervalued Those Portions of OTRR That Were Recently Acquired

Mr. Burris erred by understating the assemblage factor for the Orin Line and ignoring any assemblage value on the remainder of the OTRR ROW. Railroads usually pay a price above market value for land in order to assemble a rail corridor. The amount above market value is known as a premium. Railroads often pay this premium because they need strategically located properties to create a contiguous corridor in order to construct rail lines. Thus, when valuing land that has a highest and best use as a railroad corridor it is necessary to consider this premium.

Portions of the OTRR ROW were purchased and assembled by BNSF or its predecessor during modern times. As a result, an assemblage value should be applied to portions of the OTRR ROW or that portion of the ROW should be valued at its acquisition cost. For the Orin Line Section, which goes from Northport to Donkey Creek, the STB has approved using the actual purchase price for the line.[38] Mr. Burris proposed applying an assemblage factor of only 1.25, which would value a significant portion of the Orin Line including the Eagle Butte, Reno, Decker, Kuehn and Big Sky branches at only $250,797 including the assemblage factor. BNSF purchased the Orin Line including branches for $2,864,760 in 1978. In sum, Mr. Burris values a significant portion of the Orin Line at less than 9% of what BNSF paid for the entire Orin Line.

[38] In *WTU*, 1 STB at n. 144 (1996), the Board found that a total value of $2,864,760 was appropriate for the Orin Line.

As Otter Tail points out in its Narrative, appraisal literature states it is inappropriate to have an assemblage factor of near 1 as Otter Tail proposes for assembling property that connects points of significance as OTRR does. *See* OTP Nar. at III-F-9-10. Mr. Tesh applies the appreciation from the U.S. Department of Agriculture's National Agricultural Statistics Service, Agricultural Land Value Report from the purchase date of the Orin Line in 1978 to January 1, 2001. Mr. Tesh's calculation results in a price of $5,682,159 for the entire Orin Line as of January 2001.[39] Mr. Tesh who inspected the entire Orin Line has determined that the portion from Converse to Donkey Creek, which is contained in the OTRR ROW, represents 75% of the ATF of the entire Line. Accordingly, Mr. Tesh's valuation of that portion of the Orin Line in OTRR's ROW is $4.2 million.

(b) Otter Tail Undervalued Yards and Other Acreage

Mr. Burris calculated prices for 271.03 acres for yards and other facilities at $2,979,094.75. Mr. Phillips testifies that the actual acreage required for yards and facilities is 608.6 acres. Mr. Tesh concludes that the 11 yards and other facilities located where Otter Tail proposes would cost $11.6 million. Mr. Tesh was able to inspect all the yard locations, except those at Snowden, Benson and Glendive. The greatest difference between Mr. Tesh's valuation and that of Mr. Burris' is BNSF's conclusion for the yard at Glendive. Messrs. Burris calculated prices for 114.31 acres in Glendive, Montana for a yard there. Mr. Tesh valued 319.8 acres for a yard there. In addition, Mr. Burris calculated prices for those acres, which are in the middle of town, as though they are commercial land at $23,837 per acre based on two sales of $0.52 and $0.74 per acres.[40] Mr. Tesh concluded that this assumed price was too low.

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[39] BNSF Reply electronic workpaper "OTRR_Land_Conclusions.xls," worksheet "Recently Acquired Land."

[40] *See* OTP.OP.WP.003567-69.

According to Mr. Tesh, Mr. Burris' conclusion is reasonable when the entire city of Glendive's sales activity is considered in the average, but that if you focus just around the yard and downtown Glendive, where much of the use would be commercial, $25,000 to $30,000 is more reasonable. Indeed, one of the two commercial transactions that Mr. Burris relies on, which is closest to the OTRR ROW, is for $32,234 per acre.[41] Based on that information and his review of other transactions in the area, Mr. Tesh applies $30,000 per acre ($0.69 per square foot) to the 319.8 acres that Mr. Phillips stated is necessary for the Glendive yard for a total price of $9,594,000.

With respect to both yards and other facilities, Mr. Tesh's valuation differs from Mr. Burris' by more than one variable (*i.e.*, both the acreage and cost per acre). Therefore, in accordance with the STB's *General Procedures*, slip op. at 6, BNSF sets forth the itemization of the differences between BNSF's and Otter Tail's valuation attributable to each of those two variables Table III.F.1-2 below.

TABLE III.F-2
Comparison of Acreage and Unit Values

Otter Tail		
	Yards & Other Facilities	**Microwave Towers**
Acreage	271.03	58.51
Value/Acre	$10,991.75	$408.30
Value	$2,979,094.75	$23,889.67
BNSF		
	Yards & Other Facilities	**Microwave Towers**
Acreage	609	87
Value/Acre	$19,108	$4,759
Value	$11,629.00	$414,000

[41] *Id.* at 3569.

Mr. Burris calculated prices for 59.01 acres for microwave sites at $23,890. Mr. Walton concluded that OTRR would require 87 total acres for 13 additional microwave sites. The total value for those sites is approximately $400,000.

(c) Otter Tail's Land Appreciation Value Is Reasonable

Mr. Tesh also reviewed Mr. Burris' calculation of annual appreciation for a twenty-year projection on the Otter Tail real property and concludes it is reasonable.

Other -- Conclusion

Mr. Tesh's land value conclusion for the OTRR is more accurate, more reasonable, and more reliable than that of Otter Tail's expert.

- Mr. Tesh performed a thorough inspection of all the lands he appraised. He is qualified to carry out such an analysis as he is certified by four of the five states that the OTRR traverses. By contrast, Otter Tail's witness performed inadequate field inspections. Otter Tail's witness is not licensed or certified in any of the relevant states.

- Mr. Tesh has considered over 1,500 sales, all of which were dated before January 1, 2001 (*i.e.*, the last reasonable land recordation date before acquisition of the more than 1,284 miles of land on September 1, 2000).

- Through detailed field inspection, in the 763.53 miles Mr. Tesh personally (including Wyoming and Montana) inspected, he identified over 740 significant changes in use and/or unit value (*i.e.*, about one every 2,090 feet). He both realistically and conservatively documented and valued those numerous changes of use. Otter Tail's witness divides the entire 1,286 mile subject into 306 valuation segments on each side of the ROW (*i.e.*, about one every 4.2 miles).

- Mr. Tesh developed more reasonable indicators of value for certain small towns and cities that Otter Tail's witness misclassified and/or valued improperly. Otter Tail's witness undervalued and misclassified other small towns and cities as agricultural land. He also undervalued the metropolitan areas of Mandan, Bismarck, Fargo and Moorhead by not classifying the land correctly, by gathering an insufficient number of sales transactions and by relying on statistical averages of sales prices rather than actually appraising the specific properties abutting those being acquired.

- Mr. Tesh included a proper value for certain lands acquired in the recent past by the BNSF. Otter Tail's witness dramatically understated the assemblage factor paid for the Orin Line acquisition.

- Mr. Tesh valued yards and other facilities based in many cases on his actual thorough physical inspection of the relevant location and multiple relevant sales transactions. Otter Tail's witness significantly undervalued those sites based on his cursory viewing on them and his flawed "averaging" methodology--a poor substitute for an appraisal.

- Mr. Tesh's conclusions are consistent and show a reasonable and predictable relationship between higher and lower valued areas. Otter Tail's conclusions are erratic, inconsistent and indefensibly biased on the low-side because of Mr. Burris' imprudent reliance on price averaging. Mr. Burris' analysis is captive to random numerical aberrations and is unduly influence by large, remote sales data. Under his approach, one large sale can change the average price dramatically. In the case of a well-

done appraisal, an additional sale often has little or no effect on value. The application of sales prices of large parcels in rural areas to smaller abutting parcels in urban areas inappropriately suppresses the indicated unit prices of the smaller and more valuable urban parcels abutting the subject ROW.

Table III.F.1-3 summarizing Mr. Tesh's property value conclusions is set forth below.

TABLE III.F.1-3
Comparison of BNSF's Land Valuation and Adjustments to Otter Tail's Valuation

Land	BNSF	Otter Tail
Bismarck Metropolitan Area	$ 5,400,000	$ 1,778,104
Mandan Metropolitan Area	2,900,000	1,754,683
Fargo Metropolitan Area	5,600,000	718,049
Moorhead Metropolitan Area	6,700,000	611,576
Converse to Moran Junction	13,200,000	7,682,862
City of Jamestown	1,000,000	176,942
Cities and Small Towns	14,800,000	4,238,256
Recently Acquired Land	4,200,000	250,797
Yards & Other Facilities	11,600,000	2,979,095
Microwave Sites	400,000	23,890
All other[42]	13,100,000	13,057,512
Grand Total	$78,900,000	$33,271,765

[42] This category represents Otter Tail's land and other facility valuations in first quarter 2002 dollars; excluding Mr. Tesh's valuation and adjustments to Otter Tail's valuation. The two "all other" totals do not match, because of rounding of the BNSF numbers.

F.2 - F.12 CONSTRUCTION AND ENGINEERING OVERVIEW

BNSF's construction and engineering evidence is presented by a team of engineers from RWA, FTI and independent consultants on subcontract to RWA. These BNSF Engineering Consultants have extensive expertise in railroad construction, as described in their witness qualification statements in § IV. In addition, RWA engineers were assisted by BNSF's MOW expert Albin, a former long-time BNSF employee who was involved in BNSF engineering at the time of the construction of the Orin Line, which constitutes a part of the line segments that are being replicated by OTRR in this case. Mr. Albin was associated with the Orin Line from its conception through its emergence as one of the most heavily traveled line segments in the country. His personal experience and knowledge on the Glendive line has also been shared with RWA.

BNSF's Narrative on Construction and Engineering Costs includes an Overview in which BNSF Engineering Consultants critique Otter Tail's basic assumptions and specifications. It then discusses each of the major categories of engineering and construction costs identified by the Board in its March 12, 2001 decision in STB Ex Parte No. 347 (Sub-No. 3), *General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*. Consistent with the Board's guidelines for filing SAC evidence, the Narrative is organized under the following topics:

1. Land. (Land was discussed above)
2. Roadbed Preparation. This topic covers the many grading activities involved in preparing the roadbed upon which the track will be constructed. These activities include clearing and grubbing, excavation (earthwork), placement of embankment, lateral drainage, culverts, and other smaller items.

3. Track Construction. This topic covers the rail, ties, ballast and other track material used in constructing the railroad. It also includes costs for transportation of materials from suppliers to the site and labor and equipment for construction.

4. Tunnels. (There are no existing tunnels on the OTRR).

5. Bridges. This topic covers the design, specifications and methodology for costing construction of bridges on the OTRR.

6. Signals and Communications Systems. This topic covers the Centralized Traffic Control (CTC) system, Failed Equipment Detectors, and the Microwave and Land Mobile Radio (LMR) systems needed on the railroad to provide essential communications.

7. Buildings and Facilities. In addition to the headquarters, office, crew and yard offices on OTRR, this section includes discussion of the costs to construct fueling facilities and locomotive and car repair shops.

8. Public Improvements. Under this heading, fences, road crossings and crossing warning devices are discussed.

9. Mobilization. Under this heading the costs for mobilizing and demobilizing laborers and equipment involved in the construction of the railroad are discussed.

10. Engineering. This heading covers discussion of the costs involved in providing engineering services to plan, design and oversee construction of the railroad.

11. Contingencies. This heading includes a discussion of the necessity to provide a contingency additive to the estimated construction costs to account for unplanned events.

12. Construction Schedule. This includes a discussion of deficiencies in Otter Tail's proposed schedule.

Under each heading and subheading, BNSF Engineering Consultants discuss Otter Tail's inclusion (or omission) of items covered under that category heading, as well as Otter Tail's selection of construction specifications, quantities, and unit cost for each component. Where Otter Tail's selection of an item, specification, quantity or unit cost is well supported and feasible, BNSF Engineering Consultants have accepted them; where Otter Tail has failed to include an item or to support its selection, or the selection is infeasible or impractical, they have substituted a more appropriate selection.

No major railroad project of the size of OTRR has been undertaken since the construction of BNSF's Orin Line in 1976-1977 and CNW's Western Railroad Property Inc. (WRPI) lines in 1983. Even these projects were significantly shorter than OTRR. OTRR is assumed to cover 1,284.0 route miles. In recent years, railroads have developed modern standards and proven techniques to construct a railroad capable of handling the large volumes of coal and intensely time-sensitive intermodal and automotive traffic assumed to be carried by OTRR during the period 2002 through 2021. Otter Tail, however, has ignored these improvements.

Otter Tail's engineering witness, Mr. Richard McDonald, President of the engineering firm RJM Consulting and former Vice President of Western Rail Properties, Inc. (WRPI), sponsored Otter Tail's opening evidence on all aspects of road property investment other than land (III.F.1), roadbed preparation (III.F.2), bridges (III.F.5) and communications (III.F.6). Otter Tail states that consistent with stand-alone constraints, the intent with respect to constructing OTRR was "to minimize resources used in building the rail plant, consistent with safety, operational and service requirements, and future plant maintenance." OTP Nar. at III-F-3. Mr. McDonald purports to use the American Railway Engineering and Maintenance-of-Way Association (AREMA) standards in Chapter 16 of the AREMA Manual, and further asserts that

> . . . in many instances, the design criteria proposed for the OTRR are consistent with the criteria relied upon by WRPI/CNW in construction of the line between Shawnee Jct., WY, and Joyce, NE and consistent with BNSF's lines between Converse Jct., WY and Big Stone, SD as confirmed during Otter Tail's construction experts' April 2002 field trip.

OTP Nar. at III-F-3. However, Otter Tail provides no documentation of the WRPI design criteria it relied upon and no other evidence concerning WRPI.

As a guiding principle for the construction of a railroad with the size, tonnage and traffic proposed for the OTRR, BNSF Engineering Consultants relied on real-world specifications, including BNSF, industry and AREMA standards.

A second guiding principle in BNSF's restatement of construction and engineering costs is that the design and construction specifications must meet the operating needs of OTRR and enable OTRR to satisfy customer requirements. BNSF Engineering Consultants have consulted with BNSF's operating and capacity witnesses, Mr. Loren Mueller and Mr. David Wheeler with respect to the final configuration of the railroad. Where Mr. Mueller and Mr. Wheeler found that capacity modifications were necessary to efficiently handle the OTRR traffic over the routes and in the manner directed by Otter Tail, those capacity modifications were included in BNSF Engineering Consultants' analyses and restatement.

As a result of their analysis, BNSF Engineering Consultants concluded that although they accept many of Otter Tail's specifications and unit costs, there are a number of significant shortcomings in the complainant's evidence that in combination result in a railroad that lacks the appropriate facilities to meet the service requirements hypothesized for OTRR. BNSF's reply evidence corrects each of these deficiencies, as discussed in the pertinent subsections below.

As shown in Table III.F-1 above, and in more detail in BNSF Reply Exh. III.F-1, Otter Tail has *understated* the reasonable construction costs that would be incurred to construct a railroad project of this magnitude by $2 billion.

The first specific construction cost category BNSF addresses is Roadbed Preparation, which is § 2 according to the Board's format requirements. § 1 (Land) was considered previously.

F.2. Roadbed Preparation

Proper preparation of the roadbed is critical to the construction of a track structure that can dissipate the dynamic loadings of heavy, fast moving unit coal and other trains without critical, costly and time consuming failures. Roadbed preparation represents the largest construction cost difference between the parties, as summarized in the following table.

Table III.F.2-1
Summary of Grading Costs

Item	BNSF Total Cost ($Millions)	Otter Tail Total Cost ($Millions)	Difference
Line Segment			
Common	476,647,507	194,809,325	281,838,182
Loose Rock	232,864,496	75,518,528	157,345,968
Solid Rock	194,947,088	66,124,878	128,822,210
Borrow	271,724,950	226,937,869	44,787,081
Earthwork -- Yards			
Common	4,742,248	985,387	3,756,861
Loose Rock	1,165,763	0	1,165,763
Solid Rock	2,381,601	0	2,381,601
Borrow	15,181,715	4,193,176	10,988,539
Embankment -- Glendive	454,172	0	454,172
Earthworks -- Total	1,200,109,540	568,569,163	631,540,377
Water for Compaction	16,305,141	7,467,348	8,837,793
Clearing -- Total	1,318,957	1,228,239	90,718
Grubbing -- Total	347,093	341,069	6,024
Fine Grading	22,361,481	0	22,361,481
Stripping	4,557,707	0	4,557,707
Foundation Conditioning	39,937,881	0	39,937,881
Snow Removal	36,832,940	0	36,832,940
Additional Winter Equipment	43,849,265	0	43,849,265
Construction Lighting	16,483,268	0	16,483,268
Lateral Drainage	1,445,192	897,933	547,259
Retaining Walls	13,019,960	80,961	12,938,999
Rip Rap	14,912,274	11,514,699	3,397,574
Road Surfacing	5,389,791	4,932,550	457,241
Relocation of Utilities	1,029,713	1,024,684	5,029
Placing Topsoil	2,996,889	2,982,266	14,623
Seeding	3,555,584	0	3,555,584
Land for Waste Quantities	643,447	354,886	288,561
Environmental Compliance	1,407,021	1,400,150	6,872
Access Roads	2,358,003	0	2,358,003
Construction Site Access	1,472,543	0	1,472,543
Yard Demolition	1,911,719	0	1,911,719

Item	BNSF Total Cost ($Millions)	Otter Tail Total Cost ($Millions)	Difference
Yard Drainage and Paving	31,900,749	4,869,978	27,030,770
Yard Seeding	34,747	0	34,747
Relocated Roadways from Yards	1,501,317	0	1,501,317
Yard Retaining Wall	2,347,708	0	2,347,708
Detour	18,370,708	0	18,370,708
Total	$1,486,400,637	$605,663,927	$880,736,711

Source: OTP Errata "OTRR GRADING.xls," BNSF Reply electronic workpaper "IIIF2 GRADING.XLS."

As explained in detail in the remainder of this section, much of the difference in the parties' roadbed preparation cost is driven by errors and omissions made by Otter Tail's engineering experts, many of which can be attributed to an inability to recognize costly earthwork activities or even general familiarity with the characteristics of the proposed route. The roadbed preparation costs Otter Tail's witnesses advocate miss many of the costs that would be encountered if the construction of OTRR were to actually occur. Much of this understatement, which ranges in cause from selecting the wrong earthmoving equipment from RS Means for the varying soil and rock conditions along the route, to disregarding critical activities performed in the most recent large-scale railroad construction projects, is not surprising in light of the lack of rigor with which Otter Tail analyzed the earthwork requirements of the OTRR. For example, even though disputes related to earthwork costs for a stand-alone railroad typically yield the largest differences between the parties' construction cost estimates, of the 19 data categories gathered by Otter Tail's experts during its field trip, only one related to grading data.[43]

Had Otter Tail conducted a more thorough analysis of the OTRR earthwork requirements, it would have recorded the wide range of soil and terrain characteristics encountered by the OTRR along its nearly 1,300 route miles. As explained below, BNSF's engineering experts did undertake such a detailed analysis, taking extensive field notes and

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[43] *See* Otter Tail's field trip data summary form OTP.OP.WP.3391 which includes four entries under the grading category: (1) whether the observation point is in a cut, on a fill or level, (2) the roadbed width in feet, (3) the side ditch depth and, (4) the side ditch width. However, of the 38 field observations recorded by Otter Tail during its trip, only four included any information for side ditches and three of those four were in fill areas.

supporting recorded observations with photographs.[44] The BNSF experts documented vast amounts of unworkable clays and other soils with poor adhesion qualities along the proposed route and conclude that the earthwork requirements for the OTRR are more complex and thus far more costly than determined by Otter Tail.

In its opening evidence, Otter Tail presents OTRR as a coal and general freight railroad with 1,276.19 constructed route miles, 10.52 trackage rights miles and 7.7 miles of new wye track and other connecting track. The OTRR railroad extends from the southern portion of BNSF's Powder River Basin (PRB) line at Converse Yard, WY and follows the route of the BNSF Orin Line in a northerly direction to Donkey Creek, WY. This portion of the OTRR traverses the abrupt hills and ravines that represent the eastern foothills of the Laramie and Big Horn Mountains. The grasslands and high buttes and knobs that rise up along the ridges define this prairie land. The northern region is very hilly requiring heavy grading and earthwork to minimize railroad grades and curves. Names such as Rocky Hill, Neil Butte, Mt. Logan, Saddle Horse Butte, and Rochelle Hills symbolize the topography of the route. Even with the high fill and deep cut sections along the route grades in excess of 1 percent are the norm.

From Donkey Creek the route proceeds northwest following the route of BNSF's mainline through Gillette and Sheridan, WY, crossing the Wyoming/Montana state line and continuing northwest to Moran Junction, Montana. This segment traverses the eastern foothills of the Big Horn Mountains. The railroad runs along tributaries, through deep cuts and along ridges and high fills as it meanders its way from Gillette. The sandstone buttes and red clay knobs continue along the ridges of the undulating prairie land. The late afternoon sun actually

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[44] While Otter Tail's field trip workpapers include a blank photograph log suggesting photographs supporting its observations were taken, Otter Tail produced a scant 34 panoramic view photos from its field trip.

cast shadows from the Big Horn Mountains over the route between Sheridan and Wyola, WY. The route traverses many creeks and rivers flowing out of the Big Horns on their way to the Yellowstone and then Missouri Rivers. Sandstone that weathers rapidly and silty clays that are very unstable are characteristic of this route. The area surrounding Moran Junction is cropland with irrigation channels adjacent to the Yellowstone River.

At Moran Junction, the line turns northeast and follows BNSF's mainline through Miles City, MT to Glendive, MT. A branch line, the Snowden Branch, continues northward from Glendive to Snowden, MT. The portion of the route follows the Yellowstone River. The banks of the Yellowstone offer adverse conditions for the construction of a roadbed due primarily to the high sandstone bluffs and the destructive river currents created by the annual spring thaw. The Yellowstone River Valley is hemmed in with 150-foot high bluffs. The OTRR roadbed, like that of the BNSF, will have to be carved out of these rocky bluffs that bordered the riverbanks. Soil characteristics along the river consist of silty clays and rapidly weathering sandstone. The clays and sandstone are marginal material for establishing stable slopes along the river. The river flows straight into the roadbed at several places. If the river is not undermining the roadbed, rock is sliding off the unstable slopes. The unstable rock cuts require that the line be protected in many locations by slide fence and slope failure warning devices. Local stone cannot be used to shore up slopes along the river due to its weathering nature; it quickly melts away. Spring thaws from the Rocky Mountains turn the usually gentle river into a destructive flow of ice and high water. The ice flow and high water quickly takes its toll on the adjacent roadbed embankments. Thousands of tons of granite riprap and many sections of piling have been installed over the years by BNSF in an attempt to rebuild and protect the roadbed. Many rivers

and creeks run into the Yellowstone along this route creating the need for many bridges and culverts.

At Glendive the line turns east, crosses the Montana/North Dakota state line and follows BNSF's mainline through Bismarck and Jamestown, ND to Fargo, ND. From Glendive to Bismarck, the grade is heavy through very remote and undulating terrain. The high buttes and knobs along the ridges also characterize this prairie land. The Badlands of western North Dakota offer rugged terrain and are characterized by the red clay buttes and knobs. The red clay is actually baked clay called scoria created from subterranean fires fueled by lignite coal. The red clay is marginal for roadbed construction because it quickly turns to mud when wet. The grades are very curvy through the Badlands because of this unusual terrain. East of the Badlands the terrain is less severe, however the topography continues to be undulating requiring many high fills and significant cuts to minimize curvature and grade. Marginal material along the route has required continual slope and subgrade maintenance and repair.

East of the Missouri River between Bismarck and Fargo, the terrain is moderately undulating, requiring significant cuts and fills. A major cut on the east side of the Missouri River was constructed to serve as an approach to the river bridge. Just east of Bismarck is a region known as the "Coteaux." The Coteaux represents a region of land in central North Dakota that is poorly drained. The plateau in this region has no tributaries to carry runoff to adjacent streams and rivers. The underlying heavy clays prevent the water from perking away. As such, the Coteaux is characterized by hundreds of small ponds and lakes. The water table in this region is high and in many areas the roadbed has to be constructed through standing water. The Coteaux exist all the way to Jamestown. The route then crosses the deep Sheyenne River

valley across the Valley City bridge. From Valley City the railroad is fairly straight with less undulation.

The section from Jamestown to Fargo is not as severe as the western part of North Dakota, however fertile land does not necessarily translate into ideal roadbed conditions. The thick layer of topsoil covers a gumbo type of heavy clay. This highly plastic clay is very unstable under the heavy axle loads of modern rail equipment.

At Fargo the OTRR turns southeast and crosses the North Dakota/Minnesota border and follows the BNSF mainline to Brushvale, MN. From Brushvale to E. Breckenridge, MN, the OTRR operates over the Red River Valley & Western Railroad ("RRVW") via trackage rights for 10.52 miles. The OTRR then continues southeast again following BNSF's mainline to Benson, MN. A large portion of this section traverses the east side of the Red River Valley. The land is flat and very fertile for crops, but offers major challenges to roadbed construction. There is a deep layer of topsoil with heavy, highly plastic clay underneath. The heavy clays are very unstable with failure planes fairly deep below the surface. Many sections of piles have been driven between Moorhead and E. Breckenridge to stabilize the shifting roadbed. Most of the main line between Moorhead and E. Breckenridge experiences continual maintenance challenges because of mud in the track and a variation in cross level. From E. Breckenridge to Benson the railroad is mostly straight with less severe subgrade conditions.

Finally, from Benson the OTRR turns west, crosses the Minnesota/South Dakota state line and follows the BNSF mainline to Big Stone, SD to the spur that serves Otter Tail's Big Stone generating station where the OTRR terminates. This last portion of the OTRR route traverses large areas of granite rock and again becomes more undulating and curvy in nature.

The OTRR also includes seven branch lines. These are Reno Junction to Jacob Junction (Reno Branch), Campbell to Eagle Butte Junction (Eagle Butte Branch), Dutch to Nerco Junction (Decker Branch), Sarpy Junction to Absaloka (Kuehn Branch), E. Nichols to Big Sky (Big Sky Branch), Glendive to Snowden (Snowden Branch) and Benson to Big Stone (Big Stone Branch). Overall the OTRR system is assumed by Otter Tail to include a total of 1,560.4 miles of track, including main lines, passing sidings (which are considered main track) and branch lines, and 88.5 miles of yard, interchange and setout/storage tracks. A team of BNSF Engineering Consultants inspected virtually all of this route by hi-rail vehicle beginning at the Orin Sub continuing on through the Appleton Sub ending at Big Stone, SD. Detailed field notes and photographs are included with BNSF's workpapers.

Otter Tail used a roadbed width of 24 feet for single track (39 feet for double track) for the majority of the line segments comprising the OTRR and 28 feet for single track segments (43 feet for double track) on the Orin Line and the Reno and Eagle Butte Branches and on the lines between Campbell and Donkey Creek and Glendive and Fargo. Its double track widths are based on the single track widths with 15 feet between track centers.[45] Otter Tail assumed that total right-of-way (ROW) widths would be 100 feet except for areas within towns such as Gillette and Sheridan, WY, Miles City and Glendive, MT and Bismarck and Fargo, ND, where 75-foot ROW widths were used.[46] Roadbed specifications included the use of a 1.5:1 side slope for all lines.[47]

BNSF's Engineering Consultants developed constructions costs for OTRR on the basis of the mileage presented by BNSF's capacity and operating witnesses Messrs. Mueller and

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[45] OTP Nar. at III-F-15-16.

[46] *Id.* at III.F-5.

[47] *Id.* at III.F-16.

Wheeler. Changes made by these witnesses to Otter Tail's proposed main and yard track configuration for OTRR are described in § III-B.

Aside from the differences in configuration of the railroad, BNSF's Engineering Consultants accepted the majority of Otter Tail's roadbed specifications and earthwork quantity calculations as shown in the table below. The BNSF Engineering Consultants did find certain of the assumptions and calculations performed by Otter Tail inapplicable to the OTRR. These relate to the need for access roads along the OTRR route, the earthwork requirements for line segment for which no engineering report information is available and Otter Tail's assumptions regarding the earthwork quantities for the OTRR yards. The table below summarizes BNSF's Engineering Consultants' analysis and treatment of the roadbed specifications proposed by Otter Tail.

Table III.F.2-2
BNSF's Analysis Of
Otter Tail's Roadbed Specifications

Specification	Accepted	Modified	Rejected
24' roadbed width on lower density lines (Single track)	Partially	Reject Otter Tail unsupported assumption of 24 foot roadbed from Reno Junction to Donkey Creek	
28' roadbed width on higher density lines (Single track)	X		
15' track centers on double track segments	X		
No access roads			X
100' and 75' ROW width (with modification of specific points)	X		
Use of ICC Engineering Reports for grading quantities on sections for which reports exist	X		
Modifications of ICC Engineering Reports for modern roadbed on sections where reports exist	X		
Quantities and modifications for Orin Line Segments	X		
Use of CARDS to estimate earthwork quantities for line segments for which no engineering report data exist		CARDS analyses are flawed	X
Side Slope of 1.5:1	X		
1 foot fill for new yards	Partially	Accepted for those locations in which yard existed at the time the Engineering Reports were prepared, but not for new yards.	
2' bottom width trapezoidal ditches	X		
Use of gabions instead of retaining walls	X		
Use of water for compaction	X		
Assumption of 30% waste	X		

BNSF's Engineering Consultants' disagreement with certain of Otter Tail's roadbed specifications is discussed below.

Side Slopes

Otter Tail has assumed that OTRR will have average side slopes of 1.5:1, which it asserts is consistent with prior STB decisions. Specifically, Otter Tail cites the Board's decisions in *WPL, FMC* and *TMPA* as supportive of its position. The BNSF Engineering Consultants have accepted Otter Tail's proposed 1.5:1 side slopes. They have also included costs for supplemental stabilization of these 1.5:1 side slopes in their estimate of OTRR maintenance of way expenses.

Access Roads

Otter Tail does not include any access roads along the OTRR right-of-way, and indeed, does not discuss them at all in its Narrative. Access roads are graded roadways constructed beside and, where possible, at the same grade level as the railroad's roadbed so as to provide convenient access either by hi-rail or by road vehicle to the track and ancillary facilities. BNSF has constructed these roads along much of its tracks, including over a large portion of the route replicated by OTRR. This network of roads is essential to the expeditious transportation of operating personnel, maintenance-of-way gangs, outside contractors, suppliers, materials, and equipment to distant segments of the line without disrupting train traffic flows. Access roads increase efficiency by freeing up track time otherwise needed to move maintenance crews and equipment by hi-rail from one point on the line to another.

The importance of access roads was highlighted during the field trips taken by both Otter Tail and BNSF engineering witnesses. Otter Tail's witnesses, traveling by public road, were by their own accounts precluded from taking observations at various points along the route that were inaccessible by road. In contrast, BNSF witnesses traversed, observed and photographed nearly the entire route via a combination of hi-railing along the tracks and driving along the well-

maintained network of access roads BNSF has constructed along the track. Those pictures are included in BNSF's electronic workpapers. [48]

Access roads play a critical role in providing many outside vendors and contractors clear and safe access to track sites not readily accessible by public roads. For example, the OTRR switch heaters are fueled by propane, which is stored in propane tanks along the right-of-way. Control points in this region typically include between four and eight propane storage tanks. Periodic deliveries of propane are made by vendors using trucks that are not typically equipped with hi-rail capabilities. These trucks use the access roads constructed by BNSF along the route to make the necessary deliveries. There is no reason to expect that propane deliveries would be done any differently on OTRR. Similarly, failed equipment detectors, wayside signals, rail lubricators, and a host of other facilities along the right-of-way are accessed today by contractors, suppliers and BNSF's own forces using the access road network put in place by BNSF without burdening track capacity. These same forces will require comparable access on OTRR. Otter Tail has not provided additional track capacity to accommodate movement of these forces along the track, therefore, the only viable option for access is via an access road network comparable to that in place along the OTRR route today. Without these access roads, the OTRR could not expect to provide the same level of service as the incumbent provides today.

Although they are an integral part of railroad operations, BNSF does not maintain an official inventory of access roads along its right-of-way. The BNSF Engineering Consultants developed access road requirements for the OTRR based on where separate access to facilities along the route is necessary. Specifically, the BNSF Engineering Consultants calculated the

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[48] The field trip yielded more than 400 photographs, which are included in the electronic workpaper CD "BNSF III F Field Trip."

access roads needed to access signal control points along the OTRR route. Details of these calculations are set forth in the BNSF workpapers.[49] This approach is indeed conservative because the OTRR will operate even more trains over some of the OTRR lines than BNSF does today, making access roads equally if not more integral to fluid operations on OTRR.

Right-of-Way Widths

Otter Tail specifies 100-foot right-of-way widths, except in cities and towns, where a 75-foot right-of-way is used. As explained in more detail in the discussion of earthwork unit costs, the restricted right-of-way width chosen by Otter Tail limits the type of equipment that can be used for earthwork excavation and hauling activities without causing damage to the adjacent property. Nonetheless, the BNSF Engineering Consultants accept Otter Tail's specification for ROW widths for all locations.

Unit Cost Source

Otter Tail develops unit costs for a number of OTRR's construction activities from the RS Means Heavy Construction Handbook for 2002 (RS Means or Means Handbook). These costs are at January 1, 2002 levels. The BNSF Engineering Consultants accept the use of the 2002 Means Handbook as the source for OTRR earthmoving unit costs.

a. Roadbed Preparation -- Clearing, Grubbing, Stripping, Foundation Conditioning and Undercutting

Preparation of the ground for roadbed construction includes clearing, grubbing, stripping and any other activities required to establish a suitable foundation for railroad track structures, as these activities are defined in AREMA standards in § 1.3.4.2, § 1.3.4.3 and § 1.3.5,

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[49] BNSF.RP.WP.III.F-0002-0041.

respectively.[50] In developing its opening evidence, Otter Tail includes some modest costs for clearing and grubbing, but neglects to consider other roadbed preparation costs necessary to properly construct railroad roadbed in the difficult clays and soil that characterize this territory. These include stripping the roadbed of organic materials unsuited for use in railroad embankment, foundation conditioning to ensure proper compaction of roadbed foundation materials and undercutting or removal of materials not suitable as a railroad roadbed foundation.

(1) Clearing and Grubbing

"Clearing" is the cutting of all trees, stumps, brush, shrubs, and other vegetation at a level not more than 6 inches above ground, and the disposal of all cut material, other fallen branches and all surface litter. "Grubbing" is the removal and disposal of all stumps, roots and embedded logs, and all boulders and debris visible on the surface.[51]

Otter Tail developed costs for clearing and grubbing by identifying the acres per track mile that were identified as having been cleared and/or grubbed when the rail lines being replicated by OTRR were originally constructed, based on quantities found in the ICC Valuation Section "Engineering Reports" for segments of OTRR for which such reports were available. Otter Tail increased these quantities slightly to account for the larger modern day roadbed section it specifies for OTRR. For BNSF line segments used by the OTRR that were constructed more recently, Otter Tail included no costs for clearing and grubbing. This is because the BNSF source documents referenced by Otter Tail did not separately identify quantities for clearing and grubbing.

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[50] BNSF.RP.WP.III.F-0042-0044.

[51] OTP Nar. at III-F-10.

According to the Orin Line project construction bid documents, clearing and grubbing requirements were assumed to be part of the bid for excavation cost and it was incumbent on the bidding contractor to determine the relevant quantities. Although clearing and grubbing were clearly required as part of the BNSF new line construction,[52] because quantities were not separately identified, BNSF's Engineering Consultants conservatively did not include separate costs for these activities in their restatement.

To develop the unit cost for clearing and grubbing, Otter Tail consults the Means Handbook for 2002, selecting a grubbing cost of $1,360.61 per acre to "Grub stumps and remove," but deviates from the Board's past precedent on clearing costs by reclassifying the clearing cost component into separate categories. Basically, Otter Tail assumes that a higher clearing cost will be incurred for those acres that are also grubbed and that the balance of the clearing identified in the ICC Engineering Reports (as adjusted for modern day earthwork standards) could be accomplished at a much lower cost per acre. Specifically, Otter Tail assumes that for the 227.47 acres it calculates would require grubbing, the clearing cost would be $2,818.41 per acre based on the Means cost to "Clear and Grub – Cut and chip light, trees to 6" diam." For the remaining 2,542.85 acres requiring only clearing, the cost would drop to $191.46

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[52] Section 3.2 through 3.2-5 of the BNSF Gillette North construction specifications (which includes the Eagle Butte to Campbell segment) state that clearing and grubbing are required, but should not be separately itemized in the billing. Instead, they should be included in the cost for excavation. Thus, Orin Line *quantities* for earthwork do not include *quantities* for clearing and grubbing, but the costs for those activities are incidental to the earthwork *costs.* BNSF.RP.WP.III.F-0049-0053.

The 1983 WRPI specifications also require clearing and grubbing, and state that payment for such shall be made per lump sum. *WRPI Specifications,* § 201. BNSF.RP.WP.III.F-0045-0048.

per acre[53] based on the Means cost for "Clearing with dozer and brush rake – Medium brush to 4-inches." Otter Tail provides no justification for this dramatically lower clearing cost other than a suggestion that its inspection team determined that much of the route would require "minimal clearing" and that the clearing would be "removal of brush as opposed to trees."

The BNSF Engineering Consultants reviewed carefully Otter Tail's proposed clearing and grubbing cost and, based on their experience and observations from their field trip, decided to accept Otter Tail's clearing and grubbing costs for acreage that will require both clearing and grubbing and to reject Otter Tail's cost for clearing with a brush rake for the remainder of the acres cleared. The brush rake selected by Otter Tail is essentially an open bulldozer blade with teeth that scrape the ground surface and can dislodge brush and push it into a pile. The unit cost proposed by Otter Tail covers pushing the brush into a pile along the right-of-way, but does not include any cost for removal and hauling of the brush pile for disposal. Because this method of clearing with a brush rake is similar to the initial phases of the stripping operation necessary to remove otherwise unsuitable material from the roadbed, the BNSF Engineering Consultants did not apply a separate cost for clearing but instead included this activity with its stripping costs.

(2) Stripping

"Stripping" involves the removal of all vegetation, sod, topsoil and otherwise unsuitable embankment material including leaves, branches and wood chips left over from clearing and grubbing activities. A portion of the material removed can be reused later as embankment and will be stockpiled along the right-of-way. The remainder of the stripped material requires disposal.

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[53] The clearing and grubbing section of Otter Tail's narrative contains a number of typographical errors that render the discussion virtually meaningless. The only way to determine the actual inputs and assumptions used by Otter Tail is to consult its electronic workpapers.

Otter Tail does not include any costs for this activity in its construction costs for OTRR, nor any discussion of it in its Narrative, presumably because stripping, although a common and necessary practice, is not reflected as a separate line item in the Engineering Reports.

According to AREMA, stripping should be done wherever surface organic material will create a weak zone in the final earth mass, and particularly to ensure removal of organic material from the zone of frost penetration.[54] Because OTRR will be constructed in areas where frost penetration is common, the entire route will require stripping to ensure only materials suitable for use as railroad roadbed are used. This requirement is consistent with BNSF's current construction practice, which typically requires the contractor to remove the top six inches of ground along the proposed roadbed before any excavation or embankment work can commence. Topsoil stripping is different from the topsoil stockpiling and placement required by the state of Wyoming. Stripping is grading out unsuitable materials and is required whether or not topsoil placement is required. In cut areas, the stripping operation ensures that unsuitable material is not placed as fill in an embankment area elsewhere within the project. In fill areas, stripping is important to ensure that the fill material placed is cohesive with the insitu material in order to prevent the development of a slip plane or other common subgrade failure.

Both the BNSF bid contracts and the WRPI specifications require this activity, but specify that the cost should be incidental with no separate itemization. However, neither the clearing and grubbing nor the earthwork excavation unit costs from Means include costs for activities associated with stripping. Stripping is listed in the Site Preparation section of Means as a separate item, with its own unit cost. To account for this cost, BNSF's Engineering

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[54] AREMA § 1.3.5.6a; BNSF.RP.WP.III.F-0044.

Consultants developed costs for stripping six inches of topsoil for the embankment portion of the right-of-way based on the following unit cost from RS Means 2002:

2230-880-0200	Stripping Topsoil, and stockpiling, sandy loam 300 HP dozer, ideal conditions	$0.55/CY

The 300 HP dozer was selected because of the heavy, difficult to work with clays that will be encountered along the OTRR route.

(3) Foundation Conditioning

Both BNSF and DOT specifications for this region call for subgrade to be compacted to 95% of laboratory density and moisture test. Because in its natural state the soils along the OTRR route are not compacted to this density, it is necessary to treat the soil to allow for proper compaction. Treating the soil involves the plowing and disking of earthen materials to break up the clay deposits and allow for proper compaction. In some instances, particularly along the Coteaux region described above, moisture must be removed from the soil before proper compaction can occur. During the engineering design phase of the OTRR construction, the soils along the route will be tested to determine the amount of foundation conditioning required.

In cuts, if the subgrade does not pass density test, it must be plowed, disked, water added (or dried) and compacted to a depth of 12-inches for the width of the roadbed. Pay is by the cubic yard for excavation. Because of the poor soil conditions found in this region, it would be rare to encounter material that meets compaction requirements in its natural state. Typical construction practices along this route (confirmed by field trip observations)[55] include conditioning all common and loose rock subgrade through cuts in this manner. The BNSF

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[55] BNSF.RP.WP.III.F-0054-0060.

Engineering Consultants determined that the clay soils in the region will necessitate conditioning of 100 percent of the excavated roadbed to ensure proper compaction.

For embankments, foundation conditioning is required on all fills four feet or less as well as in areas specifically designated by the engineer. Based on an approximate average fill height of 10 feet computed in the grading spreadsheet, the BNSF Engineering Consultants determined that 20 percent of the roadbed built as embankment will require conditioning. For these sections the BNSF Engineering Consultants assumed an average embankment height of two feet which, based on a 1.5:1 side slope, produced an average of six additional feet of conditioning beyond the actual roadbed width. Details of the BNSF Engineering Consultants calculation of OTRR foundation conditioning requirements are set forth in the BNSF workpapers.[56]

The unit cost for foundation conditioning was developed by the BNSF Engineering Consultants from Means as set forth in the following table.

Table III.F.2-3
BNSF Foundation Conditioning Unit Cost

Average cost of common earth excavation west of the Missouri River at Bismarck	$6.53
Average cost of common earth excavation east of the Missouri River at Bismarck	7.41
Average	6.97
02315-300-5640 Sheepsfoot or wobbly wheel roller, 6-inch lifts, 4 passes	1.05
Foundation Conditioning Cost	$8.02

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

Overall, foundation conditioning costs for the OTRR are $39.9 million.

[56] BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF_13 EW Cost."

(4) Undercutting

Undercutting involves the excavation and removal of materials that cannot function as railroad subgrade. These typically include materials through swamp or other low-lying areas, large rock and boulders and other materials that might inhibit proper compaction of the roadbed. OTP has ignored the undercutting of unsuitable material during the grading operation. It would generally be expected that a minimum of 5 to 10% of total excavation for a roadway project in this region would require undercutting. Many different layers of soil are encountered during a roadway build. Low lying areas accumulate rich organic materials that are not suitable for road building purposes. These areas must be undercut and the material wasted in an approved location. Highly plastic clays containing bentonite prevalent in this area are undesirable for roadbed construction and must be removed. Wet muck found east of the Missouri river at Bismarck will not support a heavy axle roadbed and must be removed. For this region it is estimated that the minimum amount of unsuitable material to be excavated and removed would be 10 percent of total excavation.

Unit costs developed from Means for undercutting material and replacing with borrow are summarized in the following table.

Table III.F.2-4
BNSF Undercutting Unit Cost

Excavating Bulk Bank Measure, Common earth piled, Backhoe, hydraulic, crawler mounted, 3-CY capacity = 160 CY/hour	$2.36
Mark up for loading onto trucks 15%	0.35
Mark up for heavy soil or stiff clay 60%	1.42
Total Cost with mark up for excavating with hydraulic backhoe	4.13
Off highway hauler, 22CY rear/bottom dump; ½ mile round trip; 4.2 loads/hr	2.28
Total Excavation Cost	6.41
Borrow, Loading and/or Spreading, Front-end loader wheel mounted	8.10
Hauling 20 CY dump trailer, 1-mile round trip; 2.5 loads per hr	2.68
Spread dumped material by dozer, no compaction	1.43
Sheepsfoot or wobbly wheel roller, 6-inch lifts, 4 passes	1.05
Total Undercutting Unit Cost	**19.67**

Source: BNSF Reply workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

Details of BNSF's restatement of clearing, grubbing, stripping, foundation conditioning and undercutting quantities and costs are included in BNSF electronic workpaper "IIIF2 OTRR GRADING.XLS."

b. Earthwork

(1) Segments For Which Engineering Reports Exist

In developing earthwork quantities for OTRR, Otter Tail relied on the information contained in the ICC Engineering Reports (ICC Bureau of Valuation Form No. 561) for those line segments that were in existence when the ICC conducted its rail line valuations studies circa 1915. The Engineering Reports contain estimates of actual earthwork quantities for each valuation section of the BNSF predecessor railroads by type of material – common, loose rock and solid rock - based on construction standards typical of that period. Otter Tail adjusted the earthwork quantities reported in the Engineering Reports to reflect the more modern railroad

roadbed construction specifications and applies a pro-rata portion of the adjusted quantities to the portions of each BNSF valuation section used by OTRR.

To minimize the amount of dispute between the parties, BNSF's Engineering Consultants have adopted much of Otter Tail's approach in their restatement of the OTRR earthwork quantities. They accept the use of the Engineering Reports for these valuation sections and the adjustments made by Otter Tail where no better information is available.

(2) Segments For Which There Are No Engineering Reports

There are no Engineering Reports for six segments of OTRR that were constructed subsequent to the ICC valuation studies: (a) Converse Yard, WY to Donkey Creek, WY; (b) Reno Junction, WY to Jacobs Junction, WY; (c) Campbell, WY to Eagle Butte Junction, WY; (d) Dutch, MT to Nerco Junction, MT; (e) Sarpy Junction, MT to Keuhn, MT; and (f) Nichols, MT to Big Sky, MT. For three of these segments – Converse Yard, WY to Donkey Creek, WY, Reno Junction, WY to Jacobs Junction, WY and Campbell, WY to Eagle Butte Junction, WY – Otter Tail developed earthwork quantities from BNSF actual construction contract documents. For the remaining three segments – Dutch, MT to Nerco Junction, MT, Sarpy Junction, MT to Keuhn, MT and Nichols, MT to Big Sky, MT – Otter Tail estimated earthwork quantities using a computer program developed by Otter Tail's consultant L. E. Peabody & Associates.

(a) Converse Yard To Donkey Creek And Reno To Jacobs Jct.

Otter Tail developed earthwork quantities for Converse Yard to Donkey Creek and for Reno to Jacobs Jct. based on testimony of BNRR witness Jerry Masters provided in ICC Finance Docket No. 37021,[57] which provided excavation figures covering the portion of BNSF's Orin

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[57] *Iowa Pub. Serv. Co. v. Burlington N.R.R. Co.*, ICC Docket No. 37021; OTP.OP.WP.4314 – 4321.

Line from Reno to Orin Jct. OTP Nar. at III-F-17. Otter Tail, however, reduced the actual Orin Line earthwork quantities to reflect a substandard 24-foot roadbed over certain portions of the line. Specifically, Otter Tail assumed the portion of the Orin Line between Reno Junction and Donkey Creek would be constructed with a 24-foot roadbed. Otter Tail has not, nor likely could, present any analysis in support of its assertion that the soils between Reno and Donkey Creek contain sufficient bearing strength to accommodate the heavy unit coal trains on only a 24-foot roadbed. This specification is absurd, particularly as Mr. McDonald notes that the WRPI line was constructed on a 28-foot roadbed and that line is in the general region of the Donkey Creek to Reno segment. In their restatement of OTRR construction costs, BNSF's Engineering Consultants reject Otter Tail's unsupported assumption of a 24-foot roadbed between Reno Junction and Donkey Creek and assume OTRR will replicate the 28-foot roadbed section originally constructed by BNSF. The BNSF Engineering Consultants accept Otter Tail's quantities based on a 28-foot roadbed for the remainder of these segments.

(b) Campbell to Eagle Butte

Otter Tail developed earthwork quantities for the Campbell to Eagle Butte line segment based on data produced by BNSF in discovery showing the actual construction quantities for this line. The BNSF Engineering Consultants accept Otter Tail's calculation of earthwork quantities for this line segment.

(c) Dutch to Nerco Junction, Sarpy Junction to Keuhn and Nichols to Big Sky

Otter Tail estimated earthwork quantities for these three line segments using a computer program developed by its consultant L. E. Peabody & Associates. The program is named the Computer Aided Railway Design System ("CARDS") and uses data drawn from U. S. Geological Survey ("USGS") topographical maps and user supplied inputs of railroad subgrade

elevation, roadbed cross section and crossing and bridge information to estimate earthwork quantities. Using CARDS, Otter Tail estimated 1,439,330 cubic yards of excavation and 485,000 cubic yard of borrow would be needed to construct the line from Dutch to Nerco Junction, 777,385 cubic yards of excavation and 326,000 cubic yards of borrow for the line from Sarpy to Kuehn and 438,925 cubic yards of excavation and 275,200 cubic yards of borrow for the Nichols to Big Sky segment.

The BNSF Engineering Consultants reviewed the CARDS information produced by Otter Tail and conclude that the earthwork quantities it produces are systematically understated. This understatement is caused by Otter Tail's use of railroad subgrade elevations for these line segments that deviate considerably from the actual subgrade elevations produced by BNSF in discovery and by the use of printed USGS topographical maps with 20-foot contour intervals that are not sufficiently granular to capture continual changes in actual ground line elevations. By failing to capture the many undulations of the actual ground profile, Otter Tail has misrepresented the ground line and understated quantities.

i) Subgrade Elevation

In its terse narrative discussing CARDS, Otter Tail explains that the OTRR grades for these three line segments are no greater than the current grades along these lines. One possible interpretation of this statement is that the railroad subgrade elevations evaluated within the CARDS program are the same as the actual existing subgrade elevations. A careful review of the details of the CARDS process reveals that this is far from the case.[58] The subgrade elevations used by Otter Tail as the basis for its CARDS based grading quantities deviate considerably from the actual subgrade elevations produced to Otter Tail by BNSF in discovery.

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[58] BNSF Reply electronic workpaper "III F 2 CARDS Comparison.xls."

Otter Tail does not explain why it did not use the actual subgrade elevations, nor does it explain why these actual data would not be relevant to the calculation of earthwork quantities. Instead, the operator of the CARDS program manipulated the railroad subgrade elevation to achieve what CARDS would consider an optimal subgrade elevation that balances almost perfectly the amount of cut and fill required.[59] This process produces a railroad subgrade that deviates from the actual subgrade elevations. In deviating from the existing subgrade elevations, Otter Tail achieves otherwise unattainable construction efficiencies.

ii) Ground Line Elevation

On top of using the wrong subgrade elevations for each of the three line segments, the CARDS program does not use the correct natural ground elevation in its calculations. The natural ground elevations are determined subjectively by the CARDS operator as the locations where the topographical contour lines would have crossed the railroad if the railroad had not been in place. Further complicating the process and potentially skewing the results is that contour intervals on the topographical maps used by Otter Tail are 20 feet.[60] Unlike the Digital Elevation Model ("DEM"), which also uses 20 foot contour intervals but extrapolates groundline elevation contours at a granular level, neither the CARDS operator nor CARDS itself makes any adjustments for changing elevations below 20 feet. This means that changes in elevation along the studied routes that are less than 20 feet are not captured within CARDS. By failing to record elevation changes of less than 20 feet, CARDS incorrectly assumes certain of the territory

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[59] *See* OTP.OP.WP.4413 Decker, 1,439,330 cubic yards of cut and 1,472,877 cubic yards of fill, WP 4439 Kuehn, 777,267 cubic yards of cut and 776,266 cubic yards of fill and OTP.OP.WP.4463 Big Sky, 438,925 cubic yards of cut and 436,875 cubic yards of fill.

[60] USGS topographical maps contain contour lines depicting the elevation above sea level. The contour interval is the vertical distance in elevation between the contour lines.

through which the line segments traverse is level when it is not, understating calculated earthwork quantities and costs.

iii) Restatement of Earthwork Quantities for Three Line Segments

Because of the compounding errors of subgrade elevation and natural ground elevations within CARDS, the data cannot be corrected to produce meaningful results. This is due primarily to CARDS' use of the manually input USGS topographical data and the need for a specialized digitizing tablet to record data into CARDS.[61] Rather than attempt to resurrect CARDS, the BNSF Engineering Consultants employed a DEM analysis using actual subgrade elevation information and digital natural ground profile for each of the three routes. Details of the program used by the Engineering Consultants, as well as the inputs used and outputs generated, are included in BNSF's workpapers.[62] Restated earthwork requirements for the three line segments for which Otter Tail utilized CARDS are 2,874,202 cubic yard for Dutch to Nerco, 3,084,415 cubic yards for Sarpy Junction to Kuehn and 4,407,190 cubic yards for Nichols to Big Sky.

(3) Big Horn Tunnel Line Change

The earthwork quantities reflected in the ICC Engineering Reports include investments for the now abandoned Big Horn Tunnel located at milepost 170.5 on the BNSF Forsyth Subdivision. The tunnel was abandoned by BNSF upon completion of construction of a line change around the tunnel. Because the OTRR would not replicate the abandoned tunnel and is instead assuming operations over the line change area, the earthwork quantities for the new line

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[61] The specialized digitizing tablet was not provided by Otter Tail.

[62] BNSF Reply electronic workpapers "III F 2 Sarpybranch.txt," "III F 2 Colstripbranch.txt," "III F 2 Deckerbranch.txt;" BNSF.RP.WP.F-0061.

construction need to be added to the OTRR earthwork quantities. Using electronic topographical maps from DeLorme, the BNSF Engineering Consultants estimate the earthwork quantities attributable to the line change construction and added those quantities to the earthwork requirements for the OTRR. Based on observation made in the field, the BNSF Engineering Consultants estimated the mix of earthwork classifications for the new line construction to be 80 percent solid rock, 10 percent loose rock and 10 percent common earth.

In addition, in order to avoid double counting OTRR earthwork quantities, the BNSF Engineering Consultants, again using Delorme topographical maps, estimated the earthwork amounts attributable to the approaches to the abandoned Big Horn Tunnel and deducted those quantities from the earthwork quantities reflected in the Engineering Reports. Details of the BNSF Engineering Consultants' Big Horn Tunnel line change calculations are set forth in the BNSF workpapers.[63]

(4) Yards and Interchange Tracks

Otter Tail assumes that OTRR will have five yards: Donkey Creek, Glendive, Converse, Campbell and Dutch. It will also have five locations to interchange trains with the BNSF . These locations are Moran Junction, Terry, Snowden, Fargo and Benson. With the exception of Dutch, Converse and Campbell, Otter Tail based the grading requirements for the OTRR yards on an assumed fill height of one foot and 15-foot track centers applied to the miles of track in each yard. Otter Tail argues that such small yard earthwork quantities are necessitated by the calculations performed by the parties to remove from the Engineering Report quantities earthwork attributable to yards from that attributable to the mainline section. However, Otter

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[63] BNSF Reply electronic workpapers "III F 2 Bighorn Tunnel Quantities.xls" and "IIIF2 OTRR GRADING.XLS." BNSF.RP.WP.III.F-0062-0072.

Tail misapplies the STB's prior finding relating to the adjustment for earthwork quantities for yards included in the ICC Engineering Report quantities. Unlike prior proceedings in which complainants located SARR yards in the same places they were when the ICC Engineering Reports were produced, here Otter Tail is proposing yards where no railroad yard ever existed. Because earthwork quantities for these new yards are not in the Engineering Report quantities, there is no linkage between yard and mainline earthwork quantities as there was in prior cases and thus no overstatement or double counting results from using actual earthwork quantities for these new yards.

Otter Tail argues that the assumptions underlying its adjustment to the Engineering Report earthwork quantities to separate quantities associated with yard and other tracks from mainline quantities should be applied regardless of whether the yard existed at the time the Engineering Reports were prepared. Otter Tail suggests that this is necessary because the parameters used to remove from the Engineering Report quantities the earthwork attributable to yard and other tracks might have understated those quantities, resulting in a possible overstatement of the residual main track quantities. First, Otter Tail provides no evidence that the assumptions used to remove yard and other track earthwork quantities – one foot of fill and a 15-foot roadbed – understate the quantities for the yards and other tracks in place at the time the Engineering Reports were prepared. Indeed, the yards and other tracks constructed in the late-1800's and early-1900's were likely in locations requiring minimal amounts of earthwork. As such, the one-foot fill assumption is not unreasonable. Second, Otter Tail chose its methodology for determining mainline quantities and it cannot now argue that the methodology overstates mainline quantities.

In the design of OTRR, by selecting yard locations where no yards ever existed previously, Otter Tail is placing yards where the original builders of the railroad – for whatever reason – did not. Otter Tail then asserts that its allegedly more sensible yard placements will produce operating efficiencies that are presently unachievable by the incumbent. Otter Tail cannot have it both ways. If Otter Tail selects yard locations where no previous yards ever existed, it is likely that the earthwork requirements at the new location are more onerous than at those locations where yards existed previously.[64] For each of these new yard locations, the earthwork required to build the OTRR yard should be based on existing topography.[65] Thus, for each of the yards on OTRR except Terry, where Otter Tail proposes an interchange track, and a portion of Glendive Yard, BNSF's Engineering Consultants developed earthwork quantities based on the track configuration determined by the BNSF operating experts and the existing topography. Because additional track likely existed at Terry at the time the Engineering Reports were prepared, BNSF's Engineering Consultants accept Otter Tail's assumption of an average of one foot fill for this yard. BNSF also has an existing yard facility at Glendive – although it is nowhere near as extensive as the yard proposed by Otter Tail for Glendive. The BNSF Engineering Consultants conservatively assumed the portion of the Glendive Yard that exists today would be constructed by the OTRR on a one foot fill.

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[64] This is confirmed by the analyses conducted by the BNSF Engineering Consultants to develop proper earthwork requirements for the OTRR yard locations selected by Otter Tail. As discussed in more detail below, the earthwork requirements for the new yard locations designated by Otter Tail are substantial.

[65] Any argument that this would result in a double counting of earthwork quantities is nonsensical because if the yard did not exist at the time the Engineering Reports were prepared, the quantities for that yard could not be included in the Engineering Report quantities. The existing topography takes into account the type of soil and any hills, mountains, rivers, creeks, roads or other natural or constructed elements in the proposed construction area.

BNSF's Engineering Consultants developed actual earthwork quantities based on the existing topography for OTRR's Donkey Creek, Glendive, Fargo, Snowden, Benson, and Moran Jct. For Converse, Campbell and Dutch, the BNSF Engineering Consultants adopted Otter Tail's method of using incremental earthwork quantities for second main track as a surrogate for quantities computed based on existing topography. The yard layouts used by the Engineering Consultants are based primarily on the yard layout proffered by Otter Tail with only the addition of a few tracks at certain locations as dictated by Messrs. Mueller and Wheeler. Table III.F.2-5 compares the yard earthwork quantities assumed by Otter Tail with the yard earthwork quantities included by BNSF in its restatement.

Table III.F.2-5
Comparison of Earthwork Quantities

Yard Location	Otter Tail Earthwork Quantities	BNSF Restated Quantities
Converse	268,529	12,548
Donkey Creek	72,218	475,315
Campbell	156,640	156,640
Dutch	36,471	54,456
Moran Junction	3,444	42,000
Glendive	79,321	957,939
Snowden	9,722	263,889
Fargo	19,667	112,933
Benson	5,111	42,222
Terry	N/A	5,111

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS;" OTP Errata electronic workpaper "OTRR GRADING.xls."

(a) Donkey Creek Yard

The proposed Donkey Creek Yard is located between MP 583 and MP 586.5 on the Black Hills Sub. BNSF does not have a yard at this location today. According to Otter Tail, this new yard is located on the north side of the east-west main line just east of CP East Donkey Creek on the residual BNSF. Field observations revealed that the main line is on an

embankment averaging about five feet above the bottomland of Donkey Creek. As a result, the entire yard will be placed on embankment. In addition, a number of existing roads will require relocation to allow for the placement of the yard.

In reviewing Otter Tail's proposed yard layout, the BNSF Engineering Consultants determined that the wye track and rip track design are flawed and cannot be constructed as designed. The wye track curvature is in the opposite direction of the turnout curvature. In order to be functional these wye tracks would need to be placed to the outside of the car repair yard. In addition, the car repair track lengths will need to increase by 500 feet to accommodate cars from clear point to clear point. In order to accommodate these necessary modifications, an extra 800 to 1000 feet of width would be required for the curvature (switch point to switch point) plus the 400 feet of tangent or tail track according to the Otter Tail design.

The earthwork quantities for this new yard were developed from contour maps provided by DeLorme's TopoUSA software package. DeLorme's mapping software is based on USGS quad maps. One 1000-foot station was located at each end of the proposed yard to account for the yard leads. All other stations were located 1000-feet apart. The cross sections were taken 500 feet out from the track location. The slopes were drawn in at a 1.5:1 rate (not to scale). The average end area method was then applied to arrive at total cubic yards of excavation. Overall the BNSF Engineering Consultants determined that the proposed yard at Donkey Creek would require nearly 475,000 cubic yards of earthworks for the roadbed, plus additional quantities for relocation of roads, clearing and grubbing, drainage and other items. Details of the BNSF

Engineering Consultants' Donkey Creek earthwork calculations are set forth in their workpapers.[66]

(b) Glendive Yard

Otter Tail's proposed Glendive Yard is located between MP 1.3 on the Forsyth Sub and MP 213.3 on the Dickinson Sub. The yard is located on the south side of the east-west main line at Glendive, MT on the residual BNSF. Although field observations revealed a fairly flat terrain within the existing yard limits, Otter Tail's proposal extends the yard well beyond the present yard boundaries. On the west end, Otter Tail extends the yard by approximately one half mile to the wye track area of the Sidney Sub connection. On the east end, Otter Tail extends the yard by approximately 2 miles, all the way to MP 213.3 on the Dickinson Sub. Total length of the yard proposed by Otter Tail is approximately 20,000 feet. The BNSF Engineering Consultants reviewed the yard layout depicted in Otter Tail's schematics and determined the minimum distance for leads, turnouts and clearance points based on standard design criteria. This review actually resulted in a reduction in the overall length of the yard of approximately 2000 feet, consisting primarily of lead tracks on the east end. Even after this size reduction, the east end of the yard is in a 2-degree curve and on a 1.2% grade, which is excessive for operating conditions within a yard. To accommodate the expanded yard, a number of existing roads will need to be relocated and some site demolition work will need to occur. In addition, the wye track and rip track design problems similar to those found at Otter Tail's proposed Donkey Creek Yard were remedied by the BNSF Engineering Consultants to accommodate the proposed yard.

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[66] BNSF Reply electronic workpaper "III F 2 Donkey Creek Yard.xls," BNSF.RP.WP.III.F-0074-0128.

The earthwork quantities for Otter Tail's proposed Glendive Yard were developed by the BNSF Engineering Consultants from contour maps provided by DeLorme's TopoUSA software package. DeLorme's mapping software is based on USGS quad maps. One 1000-foot station was located at each end of the proposed yard to account for the yard leads. All other stations were located 1000-feet apart. The cross sections were taken 650 feet out from the track location. The slopes were drawn in at a 1.5:1 rate (not to scale). The average end area method was then applied to arrive at total cubic yards of excavation. Excavation quantities to alleviate the excessive grade at the east end of the yard were not calculated. Overall the BNSF Engineering Consultants estimate earthwork requirements for Glendive Yard of nearly 2.4 million cubic yards plus additional quantities for relocation of roads, clearing and grubbing, drainage and other items.[67] The BNSF Engineering Consultants reduced these quantities to account for track that actually exists today at Glendive. In addition all of the yard area will need to be plowed, disked, conditioned (by drying or adding water) and compacted to a depth of one foot.

(c) Fargo Yard

The proposed Fargo Yard is located between MP 8 and MP 9.8 on the KO Sub. The tracks are to be located on both sides of the east-west main line at Fargo, ND on the residual BNSF. Field observations revealed a fairly flat track profile, however the track is elevated or grade separated through the city between MP-8 and MP-9. Otter Tail's proposal would require that the roadbed be widened by an additional 77 feet (average) for 9,000 feet to accommodate the tracks, buildings and access roads. Currently retaining walls and an underpass support three tracks and a narrow access road between MP 8 and 8.5. Additional right-of-way, site demolition,

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[67] BNSF Reply electronic workpaper "III F 2 Glendive Yard.doc," BNSF.RP.WP.III.F-0129-0170.

borrow, and retaining walls will need to be added to facilitate the construction of this yard. Earthwork requirements for Fargo Yard include approximately 100,000 cubic yards of embankment and nearly 8,000 linear feet of new retaining wall.[68]

(d) Snowden Yard

Otter Tail locates its Snowden Yard between MP 76.7 and MP 78.4 on the Sidney Sub. The yard must be placed on the south side of the east-west main line between the Missouri River bridge and the west leg of the wye to the Glasgow Subdivision. Field observations revealed that the main line is on a 15-foot fill coming off of the Missouri River bridge and about a 5-foot fill at the west leg of the wye track.[69] The tracks at Snowden cannot be constructed as configured by Otter Tail because there is not enough distance between the bridge and wye switch. Therefore the entire yard will be placed on embankment (100% borrow). Because the bottomland is very soft the embankment at this location would require considerable foundation conditioning. Construction of Snowden Yard will result in approximately 300,000 cubic yards of earthmoving activity.[70]

(e) Benson

The proposed Benson Yard is located between MP 133.6 and MP 135.5 on the Morris Sub. The yard is located on the west or south side of the east-west main line on the north side of Benson, MN. Field observations revealed that the main line profile is flat and the roadbed is on a 4-foot embankment.[71] The yard will be located just west of the west leg of the wye track. The interchange yard tracks at Benson are located on the same side of the track as a major grain

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[68] BNSF.RP.WP.III.F-0171-0184.

[69] BNSF Reply electronic workpaper "III F 2 Snowden.jpg."

[70] BNSF.RP.WP.III.F-0185-0202.

[71] BNSF.RP.WP.III.F-0203-0210.

industry. There is also a major grade crossing at this location. The track cannot be placed on the opposite side of the main track due to the parallel highway. The entire yard will be placed on a 4-foot embankment (100% borrow). Because of the deep layer of topsoil and the gumbo clay bottomland, the embankment at this location will require foundation conditioning.

(f) Moran Junction

The proposed Moran Yard is located between MP 826.2 and MP 828.1 on the Big Horn Sub. The yard is located on the south side of the east-west main line just west of Moran Jct. Field observations revealed that the main line profile is fairly flat and the roadbed is on at least a 4-foot embankment.[72] The yard will be located just west of the east leg of the wye or connection track. Otter Tail is showing a connection track or west leg of the wye departing from the east leg from Glendive that would need to connect to the Big Horn main line at least 100 feet east of the east switch to the yard. In order to fit this connection into the existing configuration the yard will need to be moved a minimum of 0.3 miles to the west. This will result in the yard being placed between MP 826.5 and MP 828.4. This area is mostly low laying cropland with irrigation channels. The entire yard will need to be placed on a 4-foot embankment (100% borrow). Because of the deep layer of topsoil and the clay bottomland, the embankment at this location will require foundation conditioning.

(5) Unit Costs

Based on a detailed review of Otter Tail's workpapers, BNSF's Engineering Consultants determined that the unit costs for earthwork Otter Tail posits are flawed in a number of respects. Most critically, the unit costs selected by Otter Tail from the 2002 Means Handbook are not correct for the type of earthwork activities necessary to construct the OTRR roadbed. This is

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[72] BNSF.RP.WP.III.F-0211-0225.

primarily the result of Otter Tail's scattershot selection of the earthmoving equipment, ranging from the smallest, lowest cost equipment for excavating materials to oversized off-road haulers that are too large to maneuver within the confines of the proposed OTRR right-of-way. In addition, Otter Tail overlooked in its development of earthwork costs several necessary elements, most of which were included as part of the WRPI construction, cited frequently by Otter Tail's construction experts.

In preparing its reply evidence, BNSF Engineering Consultants visited five construction sites in the vicinity of the proposed OTRR route and documented the types of equipment actually being used by contractors in the region. Thus, BNSF's reply to Otter Tail's selected earthmoving equipment is based on equipment actually being used by earthmoving contractors today.

Two of the sites visited were between Buffalo and Sheridan, WY. The other three sites were within ten to fifteen miles of Fargo, ND. The team also received information about typical grading equipment used in this region from a regional grading contractor and equipment supplier while in Fargo, ND. Notes and photographs from these visits are included in the BNSF Engineering Consultants workpapers.[73]

(a) Common Excavation

Common excavation includes more than the cost of excavating material classified as common earthwork at the time of the original ICC valuation.[74] It includes the cost to reuse a portion of those excavated materials in the OTRR roadbed as embankment as well as the cost to transport a portion of the materials that will not be used as embankment to a dump site to be

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[73] BNSF.RP.WP.III.F-0054-0060; BNSF.RP.WP.III.F-0226-0246.

[74] The instructions to the valuation engineers from the ICC were to classify all earthwork that did not meet the ICC's established criteria for solid rock or loose rock as common.

"wasted."[75] Otter Tail assumes that 70 percent of the earthen material excavated for OTRR will be reused as embankment. BNSF's Engineering Consultants adopt this assumption. However, as confirmed by their field observations, a number of different types of specialized earthmoving equipment are required to excavate the variety of materials classified as "common" along the OTRR route and to transform a portion of those materials into a finished roadbed (and trimmed waste sites). As explained below, Otter Tail's experts have ignored many of the necessary costs. Otter Tail's unit cost development of common excavation is summarized in the following table.

Table III.F.2-6
Otter Tail's Development of Common Excavation

Means Unit	Embankment	Waste	Weighted
Loading into scraper 3000' haul, common earth	$3.25	$3.25	
Compaction via Roller	*$0.46*		
Compaction via Sheepsfoot	*$1.05*		
Avg. Compacting (above)	**$0.76**		
Total	$4.01	$3.25	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$3.78

Source: OTP Errata electronic workpaper "OTRR GRADING.xls," worksheet "IIIF Unit Costs."

Otter Tail bases its unit cost for common excavation on the Means cost for an elevating scraper it assumes can excavate, haul, dump and spread excavation. The Means Handbook

[75] Waste is the term applied to material excavated during the construction of the roadbed that cannot economically be reused in the roadbed as embankment. Typical reasons for wasting materials are that the amount of excavation exceeds the amount of embankment required, or that the place where the embankment is required is far enough away from the point of excavation that it becomes too costly to haul materials to the embankment site. In some instances waste is material that is unsuitable for embankment.

includes unit prices for five different types of scrapers.[76] Otter Tail provides no explanation of the criteria it employed in selecting the elevating scraper. Indeed, the elevating scraper selected by Otter Tail is the lowest cost and lightest duty of all of the scrapers listed by Means and it is unsuitable for excavating the materials that will be encountered during construction of OTRR. The simple fact that the elevating scraper carries the lowest Means per cubic yard unit cost for the common excavation does not mean, as Otter Tail might assert, that it reflects the most efficient and economical choice for OTRR excavation. Rather, it means that it is the lowest cost, least versatile of the scrapers offered. Indeed, the lack of versatility of the elevating scraper will lead to reduced production, which would translate directly to higher costs per cubic yard.

Most contractors refer to the elevating scraper as a "paddle-pan," because it is essentially a big pan with a wide set of scrapers driven by belts on each side to elevate material and dump it into its own trailing pan. *The Track Cyclopedia* describes elevating scrapers, which are used for lighter work, as "designed for gathering and scraping up loose material" and notes that these scrapers can "work alone *in loose* materials where the additional cost of a cat tractor is not justified."[77] This equipment is generally used for very loose material that in most cases first has been windrowed by a dozer or motor grader. It is not practical, or in most cases possible, to use

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[76] Means includes unit costs for an 11CY elevating scraper, a 14CY self propelled scraper assisted by ¼ dozer, a 21CY self propelled scraper assisted by ¼ dozer, a 10CY towed scraper assisted by ¼ dozer and a 15CY towed scraper assisted by ¼ dozer. A "¼ dozer" refer to the ratio of dozers (push cats) to scrapers. Here ¼ means one dozer push cat for four scrapers to meet the production rates.

[77] *The Track Cyclopedia* at 60 (emphasis added). BNSF.RP.WP.III.F-0247-0248.

this type of equipment for the heavy excavation required for OTRR where the material will not be loose, but in its natural state.[78]

Based on their field analysis, the BNSF Engineering Consultants found that the excavation of common earth in the region is typically accomplished one of two ways. The first is to use twin-engine scrapers or hydraulic excavators. East of the Missouri River at Bismarck, where common materials consist primarily of heavy clay, the twin-engine scraper assisted by dozers is the primary choice among contractors. The two models supplied are the CAT 627 and CAT 637 scrapers. Their rated capacity is 21 cubic yards and 31 cubic yards respectively. Because of the heavy clays prevalent in the area it is necessary for these pans to be assisted by dozers. The equipment supplier puts dozers on the job ranging from a modest CAT D-7 to a much larger CAT D-10. The larger D-9 and D-10 models, as discussed in more detail below, can also be used economically for ripping operations because of their weight and horsepower. These dozers also need to be equipped with low ground pressure tracks (LGP), which increases the daily cost of the equipment by 15 to 20%. The preferred ratio is one dozer to two scrapers unless a long haul is involved.

The CAT 627 and CAT 637 scrapers were also observed on an interstate highway project between Sheridan and Buffalo, WY. The self-elevating elevating scraper chosen by Otter Tail was not employed on any of the projects sites visited by the Engineering Consultants. Interviews with contractors revealed that self-elevating scrapers would be used only for gravel. The self-elevating scraper would not work for common excavation because the heavy clays in this region would stick to the paddle blades.

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[78] The soils that will be encountered along OTRR are cohesive and semi-cohesive, *i.e.,* clay and silt. These materials are very small and when wet, they are sticky, but when dry, they are hard and difficult to crumble -- *i.e.,* they are not loose.

The second preferred alternative for excavating common earth is the hydraulic excavator loading off-road or highway trucks. The BNSF Engineering Consultants observed this operation on three of the five projects visited (two of these projects also employed the twin-engine scrapers). The supplier usually places a CAT-330 to a CAT-345 hydraulic excavator on the job for excavation and loading of material. These excavators are usually equipped with a 3-cubic yard bucket. The CAT D-300, 25-ton, articulated off-road dump truck is the most popular size off-road hauler for this operation. This Caterpillar off-road dump competes with the more popular Volvo off-road articulated dump. The 25-ton articulated off-road truck is more maneuverable on a roadway project and offers a tight turning radius needed to remain within the confines of the narrow right-of-way.[79]

Based on the field observations and contractor and equipment supplier interviews the following equipment and unit cost selections from the R. S. Means 2002 Cost Data represent the excavating activities and costs that would be incurred in constructing the OTRR:

Common Earth Excavation Process

- Dozers and scrapers working together for all excavation east of the Missouri River at Bismarck and one-half of the excavation west of Bismarck.
- Excavator and off-road hauler for one-half of excavation west of the Missouri River at Bismarck

Photographs depicting certain of the earthmoving equipment selected by the BNSF Engineering Consultants are included as BNSF Reply electronic workpaper "III F 2 Equipment.doc."

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[79] This combination of equipment can also be used for loose rock that has been loosened and piled by dozers as well as blasted rock that is loosened enough to be excavated and small enough to fit in the excavator bucket. This operation may be the more economical choice for the longer haul.

Following excavation, seventy percent of the common material excavated along the OTRR right-of-way will be used as embankment. Placing and shaping the embankment into the final roadbed cross section requires additional earthmoving equipment and additional cost. The spreading and shaping of materials by dozer must be included with either the unit cost of preparing the roadbed embankment or the unit cost of providing the water for compaction. Because this cost involves earthmoving equipment, BNSF's Engineering Consultants determined it more appropriate to include this cost as a component of the embankment preparation.

A dozer accomplishes the spreading and shaping of material on embankments and in waste pits. BNSF and DOT construction specifications call for the material placed in embankments to be placed in lifts not to exceed 8-inches. Scrapers and dump trucks are not capable of unloading and spreading the material in this manner.

Once spread, embankment material must be compacted to the proper density. For compaction, Otter Tail averages a steel wheel vibrating roller with a sheepsfoot roller. Sheepsfoot rollers are used to compact embankment material in this region and were found on every site visit the inspection team made to road building project work. The BNSF Engineering Consultants thus conclude that compaction for excavated material is primarily accomplished by the use of a sheepsfoot roller. The texture of the sheepsfoot is designed to break up dirt clods and push small rock down into the subgrade. Steel wheel rollers would bridge over these areas resulting in inconsistent compaction patterns. The steel wheel rollers proffered by Otter Tail are primarily used for the final shaping of the roadbed section and compaction of base stone.

Water is necessary for compaction of embankments. Distribution of water to the embankment requires labor, equipment, and the water itself. The BNSF Engineering Consultants

accept Otter Tail's cost for water, but as discussed below, correct the quantities of water it assumes.

Table III.F.2-7
BNSF's Development of Common Excavation – East of Missouri River at Bismarck

Means Unit	Embankment	Waste	Weighted
Self propelled scraper, 21CY, 1/4 push dozer, clay, 3000' haul	$6.65	$6.65	
Extra operator (Crew B-33E - $94.30 for 0.25 operator at daily output of 495 CY)	$0.19	$0.19	
Extra dozer (Crew B-33E - $284.35 for 0.25 dozer at daily output of 495 CY)	$0.57	$0.57	
Spread dumped material by dozer, no compaction	$1.43	$1.43	
Compaction via Sheepsfoot	$1.05		
Total	$9.89	$8.84	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$9.58

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

Table III.F.2-8
BNSF's Development of Common Rock Excavation – West of Missouri River at Bismarck

Means Unit	Embankment	Waste	Weighted
Self propelled scraper, 21CY, 1/4 push dozer, clay, 3000' haul	*$6.65*	*$6.65*	
Excavating Bulk Bank Measure, Common earth piled, Backhoe, hydraulic, crawler mounted, 3-CY capacity + 60% cost for heavy soil + 15% for loading	*$4.13*	*$4.13*	
Off highway hauler, 22 CY rear/bottom; 1/2 mile round trip; 4.2 loads/hr	*$2.28*	*$2.28*	
Average of scraper and excavator / off-road truck	**$6.53**	**$6.53**	
Spread dumped material by dozer, no compaction	$1.43	$1.43	
Compaction via Sheepsfoot	$1.05		
Total	$9.01	$7.96	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$8.70

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

(b) Loose Rock Excavation

Otter Tail builds its unit cost per cubic yard for excavating loose rock from the Means Handbook. Otter Tail has not provided any explanation of the process it used to select equipment appropriate for ripping, loading, hauling, placing, spreading and compacting the loose rock materials that would be encountered during the construction of OTRR. BNSF has reviewed Otter Tail's selections and concluded that most of the equipment chosen by Otter Tail would not, and in many cases could not, be used for ripping and hauling loose rock along the OTRR

proposed construction. Otter Tail's unit cost development of loose rock excavation is summarized in the following table.

Table III.F.2-9
Otter Tail's Development of Loose Rock Excavation

Means Unit	Embankment	Waste	Weighted
Ripping Trap rock, soft, ideal conditions	$2.02	$2.02	
Shovel, 3CY capacity	$1.07	$1.07	
Off Highway hauler 42CY rear bottom dump ½ mile round trip	$1.94	$1.94	
Spread dumped material by dozer-no compaction		$1.43	
Avg. Compacting	$0.76		
Total	$5.79	$6.46	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$5.99

Source: OTP Errata electronic workpaper "OTRR GRADING.xls," worksheet "IIIF Unit Costs."

As explained in the remainder of this subsection, the unit selections by Otter Tail are a clear indication that Otter Tail did not choose from Means the proper equipment for the job, but focused rather on picking the lowest cost option. Any perceived economies generated by this technique will quickly evaporate however, because the equipment will not be able to achieve its rated daily throughput in the OTRR construction environment. This will ultimately push unit costs above those for more suitable equipment.

Otter Tail selects the Means cost for "ripping soft trap rock under ideal conditions," using a 200 HP (D7 Caterpillar) dozer. There are two fundamental problems with Otter Tail's selection. First, Otter Tail has not established that the materials classified as loose rock that would be encountered during the construction of OTRR represent soft trap rock, nor has it

established that ripping conditions would consistently be ideal. Second, adjustable rippers capable of dealing with loose rock cannot even be attached to the 200 HP dozer. As explained in the Caterpillar equipment handbook, the 200 HP dozer can only be equipped with the Fixed Radial and Parallelogram linkage design. The Fixed Radial ripper, while adequate for "utility ripping close to walls, footings, and embankments," cannot be effectively used for ripping rock. The Fixed Parallelogram holds tooth angle constant at all ripping depths, limiting flexibility and making it unsuitable for the irregularly shaped materials encountered when ripping rock. A minimum requirement for ripping materials indigenous to the OTRR region is an adjustable parallelogram that allows the operator to adjust the angle of the ripper tip to the material for penetration at all ripping depths.

The BNSF Engineering Consultants confirmed through their field trip surveys that the equipment most commonly provided by equipment suppliers for ripping rock in this region is the larger D9 or D10 dozer. In their restatement of Otter Tail's loose rock unit costs, BNSF's Engineering Consultants reject Otter Tail's selection of a 200 horsepower dozer and use the unit price from Means for a 460 horsepower dozer - the type of equipment most commonly supplied for effectively and efficiently ripping rock along the OTRR route.[80] Based on their field observations the BNSF Engineering Consultants determined that ripping rock through the Yellowstone River Valley eastward to the Missouri River would be under adverse conditions. For the remainder of the OTRR route, the BNSF Engineering Consultants assumed ideal conditions.

Once the rock has been ripped loose, it must be gathered into piles suitable for loading into trucks. Otter Tail selects the Means unit cost for a 3CY shovel outfitted on a 75-ton crawler

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[80] BNSF.RP.WP.III.F-0433.

crane.[81] Such equipment is typically used in the construction of bridges and other structures, but not for earthwork excavation. The crane configuration that Means is referring to can be found in the strip mining operations of the Powder River basin, and possibly at stone quarries in the area. Such applications are manifest in the Means overall equipment production rates, which assume movement of 250 cubic yards per hour or 2,000 cubic yards per day. In order to achieve such lofty production rates, a 3CY bucket would have to make over 83 cycles per hour. Assuming an average of 50 productive minutes per hour, this translates into 1.67 cycles per minute or a dump cycle every 36 seconds. Unless the material has been stockpiled, and is not scattered like ripped rock, the 3CY crawler crane shovel - which is not the most mobile of earthmoving equipment - would have to be repositioned on virtually every cycle and would thus be unable to achieve its rated production. Because the Means unit costs are developed by dividing the total hourly cost by the hourly production, a drop in hourly production will result in an increase in unit costs. As such, the use of a crawler crane is unworkable for loading ripped rock.

The BNSF Engineering Consultants instead include cost for the only piece of equipment actually observed loading ripped rock on the roadway projects in this region – a large hydraulic crawler mounted backhoe equipped with a 3 cubic yard bucket. The selection of this equipment was confirmed by the equipment dealer interviewed by the BNSF Engineering Consultants.

Consistent with Otter Tail's assumptions the ripped loose rock materials will be excavated and loaded into trucks. Otter Tail fails to include two separate additives required by Means for such a loading operation. First, the piled common earth upon which the Means costs are developed is easier to excavate than piled loose rock. Means recognizes this by providing additives and deducts to the common earth excavation cost for excavating materials that are more

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[81] BNSF.RP.WP.III.F-0249-0251.

difficult and less difficult to excavate than common earth. Specifically, Means provides an additive to common earth excavation for "heavy soil or stiff clay" of 60 percent, an additive for "wet excavation with clamshell or dragline" of 100 percent and a deduct for "soft soil or sand" of 15 percent.[82] The ripped loose rock that will be loaded by the 3CY backhoe is more difficult to excavate than heavy soil or stiff clay, but is not as difficult as wet excavation with a clamshell or dragline. As such, BNSF's Engineering Consultants have used the 60 percent additive for heavy soil or stiff clay and applied it to the Means excavation cost for loose rock.

Second, Means clearly and unconditionally requires an additive of 15 percent for loading excavated materials onto trucks. The excavated loose rock will be placed in trucks for haulage to either embankment along the OTRR route or to a waste pit. Otter Tail does not explain why the 15 percent additive for loading bulk excavated materials onto trucks was not included in its unit costs. BNSF's Engineering Consultants have properly included the 15 percent additive in their restatement of loose rock excavation costs.

For the cost of hauling the excavated loose rock materials for placement as embankment along the OTRR roadbed or to a waste pit, Otter Tail selects an off-highway hauler with 42CY capacity. BNSF's Engineering Consultants demonstrate in their workpapers that a hauler this size is comparable to Caterpillar's 775D Quarry Truck. The Caterpillar 775D has a turning radius of 78 feet 9 inches, meaning it cannot turn within the 100-foot right-of-way specified by Otter Tail. This vehicle would require a right-of-way of at least 160 feet just to turn around.[83] Because the 42CY hauler is too large and cannot be used without inflicting damage on the adjacent landowner property, BNSF's Engineering Consultants selected a 22CY articulated off-

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[82] OTP.OP.WP.4337-38.

[83] Calculations of the turning radius of the 775D truck and drawings of the turning space needed are included in BNSF.RP.WP.III.F-0252-0253.

road hauler capable of both efficiently hauling excavated materials and staying within the 100- and 75-foot rights of way specified by Otter Tail.

Once the excavated materials have been hauled for placement in embankment or dumped as waste, the dumped material must be spread and shaped by a bulldozer. Otter Tail recognizes that the material dumped for waste must be spread by bulldozer. Otter Tail however provides no explanation of why this cost would be applicable to materials dumped from haulers for waste, but would not be applicable to materials dumped from the same hauling vehicles for use as embankment.[84] In fact, because materials dumped from haulers would end up in piles, a bulldozer is necessary in both circumstances. The need for a bulldozer to spread materials dumped for embankment is further confirmed by the WRPI construction specifications which state under § 204 - Embankment Construction:

> In the construction of embankment, starting layers shall be placed in the deepest portion of the fill. As placement progresses, material shall be deposited and spread in fairly smooth, uniform layers which are parallel to the finished grade, approximately 8" in loose depth, and cover the full width of the embankment. During construction of embankments, the outer portion of the embankments shall be kept lower than the middle to control drainage. The mounds and ridges caused by dumping and hauling shall be continuously bladed or leveled out in order to obtain a uniform thickness of layer to provide proper and uniform compaction. Earth moving equipment shall be routed uniformly over the entire width of the embankment.

WRPI Construction Specifications, § 204.03.8.[85]

These requirements could not be met by a dump truck alone without an accompanying dozer. BNSF's Engineering Consultants have added the necessary cost for spreading dumped

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[84] In fact, Otter Tail's failure to include a cost for spreading dumped materials to costs for materials used in embankment produces the counterintuitive result of higher loose rock costs for excavation that will be wasted than for excavation that will be used as embankment.

[85] BNSF.RP.WP.III.F-0254-0256.

material by dozer with no compaction to the cost of material used as embankment. BNSF accepts Otter Tail's use of an average compaction cost from Means.

The table below summarizes the loose rock excavation costs developed by BNSF.

Table III.F.2-10
BNSF's Development of Loose Rock Excavation – Adverse Conditions

Means Unit	Embankment	Waste	Weighted
Ripping Shale, very hard, 460 HP dozer, adverse conditions	$6.35	$6.35	
Dozing ripped material, 460 HP, 100' Haul	$1.21	$1.21	
Excavating Bulk Bank Measure, Common earth piled, Backhoe, hydraulic, crawler mounted 3CY capacity + 60% cost for heavy soil + 15% for loading	$4.13	$4.13	
Off highway hauler, 22 CY rear/bottom dump, ½ mile round trip, 4.2 loads/hr.	$2.28	$2.28	
Spread dumped material by dozer-no compaction	$1.43	$1.43	
Compaction via Sheepsfoot	$1.05		
Total	$16.45	$15.40	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$16.14

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

Table III.F.2-11
BNSF's Development of Loose Rock Excavation – Ideal Conditions

Means Unit	Embankment	Waste	Weighted
Ripping Shale, very hard, 460 HP dozer, adverse conditions	$5.65	$5.65	
Dozing ripped material, 460 HP, 100' Haul	$1.21	$1.21	
Excavating Bulk Bank Measure, Common earth piled, Backhoe, hydraulic, crawler mounted 3CY capacity + 60% cost for heavy soil + 15% for loading	$4.13	$4.13	
Off highway hauler, 22 CY rear/bottom dump, ½ mile round trip, 4.2 loads/hr.	$2.28	$2.28	
Spread dumped material by dozer-no compaction	$1.43	$1.43	
Compaction via Sheepsfoot	$1.05		
Total	$15.75	$14.70	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$15.44

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

(c) Solid Rock Excavation

As it does with other components of earthwork, Otter Tail builds its unit cost per cubic yard for excavating solid rock by starting with prices from the Means Handbook. Again, Otter Tail has not provided any explanation of the process it used to determine the type of blasting that would be required to remove the solid rock from its beds, nor does it provide any explanation for the equipment it selects for loading, transporting, dumping and compacting solid rock. It appears from its workpapers that Otter Tail used the Means Handbook to find the lowest unit costs for the solid rock components and selected them without any regard for the amount or type of rock that will be encountered during the construction of OTRR. BNSF reviewed Otter Tail's

selections and concluded that for most of the solid rock excavation components, Otter Tail chose the wrong component. Otter Tail's unit cost development of solid rock excavation is summarized in the following table.

Table III.F.2-12
Otter Tail's Development of Solid Rock Excavation

Means Unit	Embankment	Waste	Weighted
Drilling and blasting rock over 1500 CY	*$8.25*	*$8.25*	
Bulk drilling and blasting	*$5.00*	*$5.00*	
Avg Drilling and blasting	**$6.63**	**$6.63**	
Excavate and load blasted rock, 3CY power shovel	$1.40	$1.40	
Off Highway hauler 42CY rear bottom dump 1/2 mile round trip	$1.94	$1.94	
Spread dumped material by dozer-no compaction		$1.43	
Avg. Compacting	$0.76		
Total	$10.73	$11.40	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$10.93

Source: OTP Errata electronic workpaper "OTRR GRADING.xls," worksheet "IIIF Unit Costs."

The first problem is Otter Tail's selections from Means for blasting costs. Otter Tail selects the unit price for "drilling and blasting only, rock, open face, over 1500CY" and the price for "bulk drilling and blasting, can vary greatly, average" and then, without explanation, simply averages the two blasting prices. Otter Tail provides no explanation of why or how it determined the two unit prices it selects would be applicable to the OTRR construction and, indeed, they are not. Both unit costs selected reflect the economies attributable to large scale blasting operations. In fact, the bulk drilling and blasting average cost selected by Otter Tail typically relates to bulk blasting in quarry operations. The economies that produce these lower average unit costs will not be available to the builders of OTRR. The amount of solid rock along the route – even

before considering Otter Tail's solid rock unit cost adjustment[86] – is not great enough to generate such economies. Based on Otter Tail's earthwork calculations, solid rock excavation on OTRR will involve approximately 8,000,000 cubic yards spread over its 1,284 route miles, or an average of approximately 6,300 cubic yards per mile.[87] At these volumes, the economies attributable to the bulk drilling and blasting cost in Means could never be achieved and the use of that unit cost here must be rejected.

The appropriate blasting unit cost for OTRR is one that recognizes that while certain economies might be available in blasting larger beds of solid rock, most of the blasting that will occur will be less than 1500CY. BNSF's Engineering Consultants corrected Otter Tail's blasting price to conservatively reflect an average of the prices of "drilling and blasting only, rock, open face, over 1500 CY" and "drilling and blasting only, rock, open face, under 1500 CY."

Blasting of solid rock produces rubble of all shapes and dimensions, ranging from dust and pebble size fragments to large boulders. These large boulders present a number of construction related issues. First, standard engineering practice is to not permit rock greater than 24-inches in size to be used as fill. This practice is confirmed by the WRPI construction contract documents. § 204 – Embankment construction instructs:

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[86] As explained in more detail below, Otter Tail arbitrarily reduces the unit cost of solid rock excavation by asserting that half of the materials that were classified by the ICC valuation engineers as solid rock would be rippable by modern earthmoving equipment. On the basis of that assertion only, the unit cost applied by Otter Tail to the solid rock quantities developed from the Engineering Report data is an average of the solid rock and loose rock unit costs it develops from Means.

[87] Taking into account Otter Tail's assertion that half of what was classified as solid rock could be rippable by modern earthwork equipment would reduce the amount of material requiring blasting to only roughly 3,150 cubic yards per mile. OTP Errata electronic workpaper "OTRR GRADING.xls," worksheet "IIIF-13 EW Cost."

> When rock, cemented boulders, and other embankment materials are excavated at approximately the same time, the rock shall be incorporated into the outer portion of the embankment and the other material shall be incorporated into the center of the fill. Care shall be utilized during the placement of the fill to ensure that those materials containing rock also contain sufficient finer material to fill the voids and allow uniform compaction. The rocky fill material shall be placed in a manner that insures the rocks are uniformly distributed. No rocks larger than 24 inches shall be allowed in the fill. Rocks which hinder uniform compaction of the compactable materials shall either be reduced in size as necessary to obtain the desired compaction or shall be wasted. No rock fragments larger than 4 inches in their greatest dimension will be permitted in the upper 6 inches of the subgrade.

WRPI Construction Specifications, § 204.03.4.[88]

Second, large boulders cannot be handled efficiently by mechanical earthmoving equipment. Again, the WRPI construction contract documents are instructive. In § 213 – Blasting, the WRPI contract documents state:

> Blasting shall be in accordance with these specifications and the requirements of the General Conditions. Blasting shall be used in cut sections only as necessary to loosen rock or cemented material and to reduce those materials to sizes that can be handled by mechanical earth moving equipment.

WRPI Construction Specifications, § 213.01.1.[89]

In addition, Means recognizes that there is an added cost associated with handling large boulders of $13.80 per cubic yard. This cost is nearly ten times the cost of the $1.40CY cost used by Otter Tail to excavate and load blasted rock with a 3CY power shovel (crawler crane). The unit price selected by Otter Tail clearly assumes that the material that is left after drilling and blasting the solid rock is a suitable size for fill or waste and that the material will be small

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[88] BNSF.RP.WP.III.F-0254-0256.

[89] BNSF.RP.WP.III.F-0257.

enough to be easily excavated and placed into the trucks. Thus, Otter Tail basically ignores the cost of the additional effort required to deal with boulders.

There are two ways to correct this deficiency in Otter Tail's excavation unit costs. The first is simply to substitute the Means cost for excavating boulders in place of the excavation cost used by Otter Tail. The second is to add costs to reduce those boulders that are needed for embankment to a manageable size that will allow the 3CY shovel to achieve its rated production capacity. BNSF's Engineering Consultants have decided to substitute the Means cost for excavating boulders in place of the excavation cost used by Otter Tail.

The table below summarizes BNSF's restatement of solid rock excavation costs.

Table III.F.2-13
BNSF's Development of Solid Rock Excavation

Means Unit	Embankment	Waste	Weighted
Drilling and blasting rock under 1500 CY	$10.35	$10.35	
Drilling and blasting rock over 1500 CY	$8.25	$8.25	
Avg Drilling and Blasting	**$9.30**	**$9.30**	
Dozing ripped material, 460 HP, 100' Haul	$1.21	$1.21	
Excavating Bulk Bank Measure, Common earth piled, Backhoe, hydraulic, crawler mounted 3CY capacity + 60% cost for heavy soil + 15% for loading	$4.13		
Off highway hauler, 22 CY rear/bottom dump, ½ mile round trip, 4.2 loads/hr.	$2.28		
Excavate and Load Boulders 0.5 to 1.0 CY		$13.80	
Haul Boulders 25-ton off-highway dump, 1 mile round trip		$4.01	
Spread dumped material by dozer-no compaction	$1.43		
Compaction via Sheepsfoot	$1.05		
Total	$19.40	$28.32	
Embankment/Waste Split	70.0%	30.0%	
Weighted Cost			$22.08

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Unit Costs."

Otter Tail does not apply the solid rock unit price it develops from Means to the OTRR solid rock quantities estimated from the engineering reports. Instead, Otter Tail asserts that because modern earthmoving equipment is capable of ripping materials that were classified by

the ICC Valuation Engineers as solid rock, the applicable unit cost should be the average of the Means developed cost for loose rock and solid rock. BNSF's Engineering Consultants agree that modern day equipment is more capable than the vintage of equipment available at the time the engineering valuations were conducted and have accepted Otter Tail's assumption, based on their field observations, that 50 percent of the material classified as solid rock could be ripped. The weighted unit costs applied by BNSF's Engineering Consultants to the OTRR solid rock quantities are $19.11 per cubic yard of average solid rock and $18.76 per cubic yard of ideal solid rock (before location factor).

(d) Borrow

The table below sets forth Otter Tail's development of borrow costs from Means.

Table III.F.2-14
Otter Tail's Development of Borrow Costs

Means Unit	Embankment
Front end loader - wheel mounted 5 CY bucket	$8.10
Hauling 20 CY dump trailer - 1 mile round trip	$2.68
Compacting	$0.76
Total	$11.54

Source: OTP Errata electronic workpaper "OTRR GRADING.xls," worksheet "III.F Unit Costs."

BNSF's Engineering Consultants accept Otter Tail's development of borrow costs with one exception. As explained above under loose rock excavation, materials dumped for use as embankment require a bulldozer to spread the dumped materials in accordance with the engineering specifications for embankment. BNSF's Engineering Consultants have thus added the cost of a dozer to spread the dumped borrow material in the embankment. The table below summarizes BNSF's borrow cost.

Table III.F.2-15
BNSF's Development of Borrow Costs

Means Unit	Embankment
Front end loader - wheel mounted 5 CY bucket	$8.10
Hauling 20 CY dump trailer – 1 mile round trip	$2.68
Spread dumped material by dozer-no compaction	$1.43
Compacting	$1.05
Total	$13.26

Source: BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," workpaper "IIIF Unit Costs."

(e) Winter Construction

According to the construction expenditure schedule in the Otter Tail discounted cash flow model, nearly one-half[90] of the OTRR earthwork construction will occur in November and December 2000 and January 2001. Because Otter Tail has elected to build roadbed through the middle of winter, extra measures to keep the roadbed from freezing need to be initiated.

Not surprisingly, winters in the region of the OTRR are very severe. The World Climate web site shows that the average low temperature in this region is below freezing seven months of the calendar year. The average low temperature from November through February is only six degrees above zero Fahrenheit. According to the U. S. Naval Observatory, daylight from sunrise to sunset averages only eight hours and thirty-two minutes. During winter construction, production rates are hampered by the snow, ice, and frozen soil encountered during this severe weather period. BNSF and DOT specs prohibit frozen material from being used in embankments.[91] Water for compaction quickly freezes before it can be worked into embankments. Frozen soil must be removed from the roadbed on a daily basis. Plowing and

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[90] Otter Tail assumes 16.38 percent of the earthwork activity will occur in each of November and December 2000 and 16.90 percent will occur in January 2001 for a total of 49.67 percent in those three months.

[91] BNSF.RP.WP.III.F-0258-0272.

reconditioning of the subgrade will be a full time effort to assure the soil density needed to provide a stable foundation for the track structure.

In addition, the short periods of daylight will require that portable lights equipped with their own generators be established and maintained during nighttime operations. Generators will also be needed to keep diesel engines warm while equipment is shutdown. In extremely cold temperature any condensation in fuel tanks and lines will freeze, causing equipment to be difficult to start. Production during this period can easily be cut in half. Normally, earthmoving contractors do not even attempt to work during the winters in this region.

i) Removal of Frozen Material

Frozen material is prohibited from being used in subgrade by both the BNSF and local DOT specifications. Because most grading contractors do not work during the severe winter in this region the BNSF Engineering Consultants estimated the amount of material that would need to be removed from the constructed subgrade to comply with this specification. Material quickly freezes and must be worked continuously. Even after using the best techniques available throughout the winter months, the roadbed could turn to mush during the spring thaw if frozen materials are left in the roadbed. The cost of removal of frozen material and replacement with approved material would be higher than the cost for undercutting because special rippers would be required to remove frozen materials. The BNSF Engineering Consultants however conservatively apply the undercutting unit costs to their estimate of frozen materials quantities that must be removed from the roadbed. Of the approximately 50% of earthwork that would take

place during the winter, it is estimated that 10% of this amount will need to be removed and replaced due to freezing.[92]

ii) Snow Removal

All snow would need to be removed from the area where earthwork is taking place. Also all haul roads and other access roads to the job site would need to be cleared of snow. Because Otter Tail will need to have all grading done in a short period of time there will need to be a significant number of grading crews. It is estimated that a snow removal crew will be needed at least every 10 miles. Based on a 1,286 mile route Otter Tail would need 128 snow removal crews.

Snow removal crews will consist of four motorgraders two rubber tired front end loaders and trucks to haul snow drifts out of cut sections. Snow removal crews will remove snow for all operations. Winters or snow seasons are five months in this region. Although it does not snow every day, wind and below freezing temperatures cause drifting snow to continually fill cut or excavated sections. For example, snowfall during 1997 was over 100 inches in some areas along the OTRR route. To estimate the cost of snow removal during winter construction, the BNSF Engineering Consultants developed unit costs from Means and estimated that snow removal crews would be needed on average for 20 days during the winter construction. Cost for OTRR snow removal crews are $36.8 million.[93]

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[92] BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF_13 EW Cost."

[93] BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS, worksheet "IIIF_14Othr Cst."

iii) Additional Equipment

During winter grading and earthwork it is imperative that the soils making up the roadbed are continually conditioned to minimize freezing and frost heave. This is accomplished in the same manner as foundation and sub grade conditioning. Extra disks or scarifiers would be needed to continually turnover the material. Extra sheepsfoot roller would be needed to continually pound the subgrade in an attempt to keep it from freezing. At least two scarifiers and two large sheepsfoot rollers will be added to each 10-mile section for a three month period from November through January.[94]

iv) Construction Lighting

Working at night will require night-lights for the entire grading and construction period if the aggressive schedule is to be met. This becomes even more critical during the winter months as daylight last only a little over eight hours a day. This will require a lighting crew at night to move, setup and maintain lights for construction equipment and crews. The BNSF Engineering Consultants include costs for one lighting crew per grading crew for construction during the winter months.[95]

v) Additional Operating and Production Costs

The local earthmoving equipment dealer at Fargo estimates that costs to operate equipment in typical winter conditions would carry a 50% premium as compared to normal conditions. Production rates would also fall an estimated 50% to 75%. Normal hydraulic and motor oils would need to be replaced with thinner oils. Normal diesel fuel will have to be replaced with a more expensive arctic fuel. Steel bed liners would be required in scrapers and

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[94] *Id.*

[95] *Id.*

dump beds. Heated boxes (beds) would be required in order to keep material from freezing to the bed liners. Also during the winter months contractors experience problems with material freezing to the steel tracks and even the rubber tires of the equipment. While equipment is shutdown or being serviced it would need to be housed in a heated garage or at least hooked up to generators and heaters to keep the engine block warm enough to restart. Starting diesel equipment in winter weather has always been a major problem. The distribution of water for compaction with trucks would be limited to say the least. Water sources would literally freeze up. A markup of 50% to reflect the premium costs to operate and maintain equipment during winter construction could be justified. The BNSF Engineering Consultants do not apply any such markups.

(f) Fine Grading

Otter Tail's earthwork unit cost estimates fail to include the cost of fine grading.[96] Fine grading using specialized equipment is necessary to ensure that all cuts, fills and ditches are left in a neatly trimmed condition to the specified widths, elevations and particularly to the appropriate slopes. Fine grading eliminates ruts or depressions on the surface of the subgrade that cause water pockets, and is a vital step in avoiding future drainage problems. In seeking artificially to avoid costs for OTRR construction, Otter Tail's witness Mr. McDonald ignored the fact that fine grading was a requirement on the WRPI line. Indeed, the WRPI specifications particularly state that "[p]rior to placing any sub-ballast materials, the subgrade shall be prepared as specified in § 208, tested, and accepted by the Engineer. Any ruts, depressions, or soft spots shall be corrected with like subgrade materials and brought to the cross section and grades

[96] AREMA § 1.3.5.21. *See also* BNSF Specifications for Excavation and Embankments § 03200, subsection 3.7. BNSF.RP.WP.III.F-0273-0274.

detailed on the plans."[97] Since Mr. McDonald relies heavily on his WRPI accomplishments in modeling the OTRR, he cannot assume it would be constructed to lesser standards, as would clearly be the case if fine grading were omitted.

Otter Tail's unit costs for earthwork taken from RS Means do not include the fine grading of the subgrade, before subballast placement, and the finishing of the slopes.[98] When contractors form cuts and fills (embankments) they begin with slope stakes that define where the outside edges of cut and fill slopes intersect the natural ground line. The slope stakes define the area to be cleared and grubbed. After clearing and grubbing is complete and as the areas of excavation and fill progress, the engineers return to stakeout a centerline and final subgrade elevation for each track. The centerline stakes are set every 50 feet. The stakes are marked revealing the location of centerline (off-set) and design elevation.

Fine grading crews use these stakes to assure the roadbed is in the correct location and that grades are within 1/10 of a foot. This assures that the roadbed is being constructed according to the design criteria (grades, horizontal and vertical curvature, typical roadbed section). Incorrect curvature and abrupt vertical curves can create excessive draft forces in train and engine equipment. The roadbed must conform to the typical section designed, which includes roadbed crown, ditch line and slope. Although Otter Tail did not define a typical roadbed section in opening evidence, a 40:1 runoff (or crown) from the centerline of the roadbed is a railroad industry standard. Only a properly equipped finegrading crew can achieve the 40:1 crown.

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[97] BNSF.RP.WP.III.F-0275.

[98] In typical grading contracts, fine grading is included in the earthwork costs. BNSF.RP.WP.III.F-0276-0278. The Means Handbook costs these activities separately. BNSF.RP.WP.III.F-0426.

The finegrading crew is also responsible for assuring that the top 12 to 24 inches of subgrade is compacted to a laboratory prescribed 95-100% optimum density. This can only be achieved with an optimum moisture content prescribed by laboratory test. A 40:1 crown cannot be "roughly graded." It requires a motorgrader, steel wheel vibratory roller, and water. This is the industry standard to properly finish subgrade preparation. The 40:1 crown allows water to run off of the roadbed. The 95 to 100% optimal compaction achieved with the steel wheel roller provides bearing strength and helps seal the roadbed (providing a moisture barrier), promoting the water to runoff instead of penetrating the soil.[99] Nowhere does Otter Tail account for the equipment that it intends to use to form final grades and ditch lines. Also, in cuts where excavation takes place, the fine grading crew will construct the final shape of the roadbed surface as well as the ditch line.

Rock cuts will be excavated to an elevation one foot below subgrade and then select loose material will be placed, compacted, and fine graded to achieve the typical roadbed section. The fine grading crews normally consist of motorgraders, steel wheel vibratory rollers, water trucks, a ditching machine and a paddle pan to transfer material. The 40:1 crown specified for the top of roadbed can only be achieved using a motorgrader and steel wheel roller.

Water trucks must be available to achieve optimum moisture in the compacted soil and make the material workable. If the material is too wet it must be scarified and dried or removed. A foreman and at least one laborer must be available to check the design grades set by survey stakes as the roadbed nears completion. In addition, this crew would be responsible for shaping the ditch line in cuts as well as ditches that divert water away from the fill locations. Paddle pans

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[99] Interestingly, none of the equipment selected by Otter Tail is capable of finishing the roadbed to the required level.

(self-elevating scrapers) are used to transfer windrowed loose material from areas of the roadbed that are too high to areas along the subgrade that are too low.

Means lists a fine grading crew that only includes a motorgrader with operator and one laborer. This crew was used as a base, and then modified by adding a steel wheel roller with operator, a Gradall (ditching machine) with operator and one paddle pan with operator. The daily rates supplied by Means were applied for a total daily rate of $4,559.40 per day. A larger motorgrader was substituted for the smaller version supplied by Means. Production was also increased from 3500 square yards per day to 5000 square yards per day. The final cost for fine grading came to $.91 per square yard (1Q2002; no indexing applied). For a 24-foot wide roadbed this amounts to $12,839.27 per mile. Details of their calculations are included in BNSF's Reply electronic workpaper "IIIF2 OTRR GRADING.XLS."

c. Lateral Drainage

Lateral drains are typically under-drains (in trenches) that are used to artificially lower the water table, to intercept ground water (such as side-hill seepage) before it reaches the roadbed, and to drain water trapped in pockets beneath the roadway. Otter Tail develops the lateral drainage requirements for OTRR from the Engineering Reports and from the track charts for the newly constructed segments. Its unit costs for lateral drainage are developed from 2002 RS Means. Overall, Otter Tail has identified approximately $0.9 million in lateral drainage requirements for OTRR.

BNSF's Engineering Consultants reviewed Otter Tail's development of lateral drainage quantities for OTRR and the associated unit costs. They accept Otter Tail's lateral drainage quantities for OTRR but reject Otter Tail's unit costs because they are based on the wrong type of materials and do not include all of the cost items necessary to properly install lateral drainage

along the right-of-way. Specifically, Otter Tail's unit costs are deficient for the following reasons:

- They do not include the cost for trenching needed to install the drain pipe.
- They fail to include the cost for necessary geotextile materials.
- They are based on the wrong pipe material.
- They selected the wrong backfill material and compaction technique.

BNSF corrected the deficiencies in Otter Tail's lateral drainage unit costs.[100] Restated lateral drainage cost, for OTRR are approximately $1.5 million.

d. Culverts

A culvert is "an enclosed channel serving as a continuation of and a substitute for an open stream where that stream meets an artificial barrier such as a roadway, embankment or levee."[101]

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[100] Otter Tail's omission of these items is apparently based on the assumption that trenching is not necessary because the subdrainage pipes will be laid during the grading of the roadbed using conventional earthmoving equipment. Complainants in *PPL* made that argument on rebuttal and the Board accepted "PPL's less costly procedure" because BNSF had given no explanation of why the pipe could not be installed at the same time as the initial grading. *PPL* at 18. *See also TMPA* at 79. A complete explanation of the changes, along with a detailed description of the required lateral drainage installation process, is included in BNSF's workpapers. BNSF.RP.WP.III.F-0279-0297. Basically, in order for a subdrainage system to be effective over a long period of time, it must facilitate the interception or removal of water without becoming displaced or clogged. The recommended procedure for proper installation of lateral drainage is to (a) place pipe in a trench, (b) backfill the trench with finely-graded pervious material, and (c) seal the top of the subdrain to protect against silting. *Handbook of Culvert and Drainage Practice,* 1937; *The Track Cyclopedia* at 314-319. To install the pipes properly with conventional earthmoving equipment during the grading process, the cut would need to be over-excavated at least four feet to allow the equipment to operate efficiently. As Otter Tail made no allowance in its earthwork costs for such over-excavation, the only means of installing the underdrain is to trench it in after the cut or fill has been excavated or filled to profile grade. Otter Tail simply omits essential steps in the process.

[101] *Handbook of Steel Drainage & Highway Construction Products*, American Iron and Steel Institute, 1993, Ch. 5 at 301. BNSF.RP.WP.III.F-0298-0301.

Culverts are used to control surface drainage, primarily to prevent standing water on the surface of the roadbed. Various factors are involved in designing a culvert, but the objective is to design an economical structure to handle the flow of water along with any debris with minimum damage to the railway or adjacent property. Otter Tail assumes that there will be three different types of culverts on OTRR, corrugated metal pipe (CMP), structural plate pipe (SPP), and reinforced concrete box culverts (RCB). Overall, Otter Tail develops culvert costs for OTRR of $26.9 million as summarized in the following table.

Table III.F.2-16
Otter Tail's Culvert Costs

Type	Length	Cost/Foot	Cost
Standard			
CMP	208,379	$75.93	$15,821,545
RCB	16,293	$460.51	7,503,086
SPP	13,059	$258.06	3,369,960
Subtotal	237,731	$112.29	$26,694,592
Parallel			
CMP	3,438	$48.29	$166,007
Total	241,169	$111.38	$26,860,599

Source: OTP Errata electronic workpaper "OTRR Culverts.xls."

BNSF's Engineering Consultants agree with the types of culverts selected by Otter Tail, but have some minor disagreements with both the inventory of OTRR culverts and Otter Tail's development of culvert unit costs.

Based on their review of the culvert inventory produced to Otter Tail by BNSF in discovery and an analysis of the proposed OTRR route, the BNSF Engineering Consultants determined that seven culverts needed to be added to the OTRR culvert inventory. Specifically, consistent with Otter Tail's OTRR design assumption to replace bridges less than 20 feet in length with culverts, the BNSF Engineering Consultants replaced three seven foot rail top bridges with culverts. They also added three culverts that were included by Otter Tail in its

bridge inventory. BNSF recently replaced these bridges with culverts so they will be built by the OTRR as culverts. Finally the BNSF Engineering Consultants added a culvert at Glendive that is not listed in the culvert inventory produced by BNSF in discovery but does appear on the BNSF track charts. Details of the BNSF Engineering Consultants' culvert inventory additions are set forth in the BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Culvert List."

Otter Tail develops unit costs for all types of culverts from Means. The BNSF Engineering Consultants reviewed Otter Tail's workpapers and determined that while the majority of the unit costs selected by Otter Tail from Means are representative of the cost that would be incurred to place OTRR culverts, Otter Tail omitted certain necessary costs from its culvert installation. The Means unit costs referenced by Otter Tail state clearly that the culvert unit costs do not include costs for excavation or backfill.[102] In developing its unit cost for CMP and RCB culverts, Otter Tail includes costs for bedding material and compaction, but does not include costs for excavation and backfill. For SSP culverts Otter Tail also failed to include needed costs for bedding.

In their restatement of Otter Tail's culvert investment, the BNSF Engineering Consultants added costs for excavation and backfill to Otter Tail's CMP and RCB culvert cost and costs for bedding, excavation and backfill to Otter Tail's SSP culvert costs. Details of these calculations are set forth in the BNSF Engineering Consultant workpapers.

BNSF Engineering Consultants accept Otter Tail's cost for culvert transportation. However, Otter Tail did not include transportation costs for CMP culverts. BNSF corrected this omission to include CMP culverts which Otter Tail inexplicably omitted.

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[102] *See* OTP.OP.WP.4470-4473.

BNSF's calculations show a system-wide requirement of 233,183 feet of culverts for a total cost of $27.2 million. The table below compares BNSF's total cost of culverts with that of Otter Tail. The details of the calculations and unit costs, along with an inventory of the culverts on OTRR, are in BNSF electronic workpaper "III F OTRR Construction.xls," worksheet "Culvert List."

Table III.F.2-17
Comparison Of BNSF's Estimate Of Culvert Cost With Otter Tail's Estimate In Opening Evidence

	BNSF	Otter Tail	Difference
Total Feet	233,183	237,731	(4548)
Total Cost (Millions)			
RC Box Culverts	$7.18	$7.50	(0.33)
CMP	16.40	15.82	0.58
SPP	3.64	3.37	0.27
Total Cost ($Millions)	**$27.22**	**$26.69**	**$0.53**

Source: OTP Errata electronic workpaper "OTRR Culverts.xls"; BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Culvert List."

e. Other

(1) Drainage Ditches

Otter Tail uses trapezoidal ditches that are 2 feet wide and 2 feet deep, claiming that this is consistent with the Board's decisions in *WPL, PPL* and *TMPA* and that "[I]n some cases, this size ditch is larger than the existing ditches on the antecedent BNSF lines." OTP Nar. at III-F-27. The AREMA standard for drainage notes that ditches may be either trapezoidal or V-shaped. If a trapezoidal ditch is used, the AREMA standard specifies a minimum bottom width of three (3) feet.[103] At the time BNSF lines were constructed, they generally were constructed with "V"

[103] *See* AREMA § 1.2.4.2 d. at BNSF.RP.WP.III.F-0341.

ditches. Thus Otter Tail's comparison of the standard against BNSF's actual use is inaccurate and irrelevant. Because some railroads have constructed rail lines using ditches (presumably trapezoidal) with bottom widths of only 2 feet, the Board accepted that specification in prior proceedings as "feasible." While use of such narrow ditches may be feasible in some areas where surface drainage is not a critical problem, extended use of the narrower ditches is far from ideal or even pragmatic.

In excavated sections of the roadbed, drainage ditches parallel to the tracks are needed to drain water off the surface of the roadbed and to hold snow and eroded soil and debris away from the track structure. Ditches should be adequately designed to ensure that no water will remain on the roadway surface to cause injury to the roadbed or interfere with traffic. Because ditches are subjected to erosion, sedimentation, change of channel, and overflowing, they should be wide enough to have the capacity to contain soil erosions or rock fallout without clogging. Wide ditches also provide a place to accumulate snow away from the track structure itself. For these reasons, AREMA § 1.2.4.2d. specifies a *minimum* bottom width of 3 feet for trapezoidal ditches. The use of narrower ditches by some railroads -- and under circumstances or conditions not explained by Otter Tail -- should not be sufficient grounds to supplant the industry standard.

Nonetheless, in light of the Board's rulings in the prior cases, BNSF does not challenge Otter Tail's specification of 2-foot bottom ditch widths, but notes that the use of 2-foot ditches across the OTRR system will inevitably result in increased clogging of surface drainage systems, requiring increased maintenance to the damaged roadbed. The BNSF Engineering Consultants have taken that into account in restating the OTRR maintenance-of-way costs.

(2) Retaining Walls

Rather than build masonry retaining walls, Otter Tail proposes constructing OTRR with gabions (galvanized steel mesh boxes) filled with rock, which BNSF accepts. Otter Tail

correctly calculated the square yards of retaining wall materials listed under masonry, timber, ties and pilings in the Engineering Reports, but neglected certain other additional materials listed in the Engineering Reports under "Protection of Roadway."[104] BNSF's Engineering Consultants accept Otter Tail's calculation of the square yards of gabions needed based on the square yards of retaining wall materials found in the Engineering Reports for line segments covered by the reports, but add the additional materials as well.

The BNSF Engineering Consultants also adjusted the Engineering Report retaining wall quantities to accommodate the expanded roadbed section used by Otter Tail for the OTRR. In its opening evidence, Otter Tail increased the roadbed widths on embankments by 6 feet and in cuts by 16 feet from the original standard roadbed section upon which the Engineering Report quantities are based. Measuring from the center line of track this will move the break point of the slope out an additional 3 feet on embankments and an additional 8 feet in cuts. This shift will have a significant effect on the retaining wall requirements of the OTRR.

Retaining walls are deployed in special circumstances where there is not enough room to construct the full standard roadbed section. An adjacent roadway, building, side hill, stream or other obstacle encountered during construction, may dictate the need for a retaining wall. Widening the roadway does not relieve or move the constraint of the obstacle encountered. Therefore, the retaining walls will need to be enlarged to accommodate the wider roadbed. The BNSF Engineering Consultants calculated the amount by which the retaining wall quantities

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[104] BNSF Reply electronic workpapers "III F 2 Additional ICC quantities.xls," and "III F 2 Additional ICC descriptions.xls."

reflected in the Engineering Reports would need to be increased to accommodate Otter Tail's larger roadbed section. Details of these calculations are set forth in BNSF's workpapers.[105]

In developing unit costs for retaining walls, Otter Tail selected a unit cost from the Erosion and Sediment Control section of Means. Otter Tail has not explained why it selected a unit cost for gabions from that section rather than for gabions under the Retaining Wall section of Means. Gabions for erosion control are generally used to stop erosion and sediments from proceeding beyond a certain point. Otter Tail has not shown that such gabions would have the strength to structurally support earth where retaining walls are needed. Therefore, BNSF's Engineering Consultants use the unit cost for gabions specifically cited in Means to be used as retaining walls. That cost is R.S. Means 02830-100-6050 stone-filled gabions.

Otter Tail also omitted costs for installation of the retaining walls. The process for installing retaining walls, which includes trenching is demonstrated in a drawing in BNSF's workpapers.[106] Based on this process, BNSF Engineering Consultants added trenching costs from Means.[107]

The BNSF Engineering Consultants also selected from Means costs for the additional roadway protection materials identified in the Engineering Reports. Detailed calculations for retaining wall costs are in BNSF's workpapers.[108] The total costs for retaining walls are included in BNSF Exhibit III.F-1.

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[105] BNSF.RP.WP.III.F-0342-0375.

[106] *Id.*

[107] BNSF.RP.WP.III.F-0434.

[108] BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF_6 Othr EW."

(3) Rip Rap

Otter Tail bases its cost for rip rap on material quantities reported in the Engineering Reports and on the Masters testimony for the Orin Line data. It uses a unit cost from 2002 Means. BNSF accepts the use of these sources for OTRR rip rap costs, but because materials suitable for use as rip rap are not available locally, adds costs for transporting granite rip rap to the OTRR railheads. The costs for rip rap are included in BNSF Exhibit III.F-2. The details of the calculations are in BNSF electronic workpaper "IIIF2 OTRR GRADING.XLS."

(4) Utility Relocation

Otter Tail includes costs for utility relocation on the line segments of OTRR constructed in the past 40 years, but omits these costs on the remaining line segments on the theory that such costs constitute entry barriers. Relocation of utilities is a cost that is incurred when construction of the rail line requires the crossing of existing utility lines, including electrical power lines above and below ground, gas and oil pipelines, telephone lines and cables, fiber optic cables and water mains. For the most part, line segments of incumbent railroads replicated by the SARR in a SAC case were built before such utilities were in place. Thus, complainants have argued that the incumbent did not incur such costs and that they should be excluded as entry barriers. The Board has upheld that position, most recently in its decision in *TMPA.*

In light of the Board's refusal to allow relocation costs for utilities on anything but the newly constructed line segments, BNSF's Engineering Consultants accept Otter Tail's per mile unit cost for relocation of utilities and apply it to the miles of newly constructed segments. Calculations are included in BNSF's electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF_14 Othr Cst."

(5) Slope Stabilization (Topsoil Placing/Seeding)

Otter Tail includes costs for placing topsoil only in locations where BNSF included topsoil on the line segments of OTRR that were constructed within the past 40 years. Otter Tail asserts that it is allegedly using the same procedures as those accepted by Board in *WPL* -- *i.e.*, using the quantities and unit costs based on the testimony of Jerry R. Masters in *IPS* and a percentage of right-of-way methodology accepted by the Board in *WPL*. However, Otter Tail includes only costs for topsoil, not for seeding, claiming -- as complainants have done in prior cases -- that the cost of seeding is included in the topsoil cost. But none of the complainants, including Otter Tail, has offered any evidence that seeding was covered by the topsoil contract from the Orin Line, nor that that is a common practice.

BNSF, in prior cases, has explained that seeding was not included in the contract for topsoil for the Orin Line, because seeding of the Orin Line was separately contracted to a local entrepreneur.[109] The Board in *WPL* accepted the premise that the cost of seeding was included in the cost of topsoil. However, bid summary sheets for projects constructed over the past decade, including the bid sheets for the Gillette North specifications, support BNSF's position.[110] Each bid sheet lists topsoil placing and seeding separately.

The fact that the Orin Line specifications do not include seeding as a line item, or mention seeding in the description of topsoil, is not inconsistent with BNSF's position that the seeding was done at a later time under a separate arrangement. Seeding typically is done "in season," which may not coincide with the placing of topsoil. This distinction is clearly made in

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[109] In *WPL*, UP apparently believed that the term topsoil placement included seeding. *WPL* at 85 n.159. BNSF holds otherwise based on the recollection of Mr. Albin and his colleagues, who worked on that project, of how the seeding was undertaken.

[110] BNSF.RP.WP.III.F-0376-0377.

§ 801.05 of the WRPI specifications, which designates a specific time period during which seeding is to take place. Based on evidence of BNSF's contracting practices for topsoil and seeding, the explanation in the WRPI specifications of why topsoil and seeding are done separately, and the Board's own logic in *PPL,*[111] -- that placing topsoil without seeding is useless -- there is no reason either to exclude seeding costs or to assume that they are included in the topsoil cost. Thus, BNSF's Engineering Consultants added seeding costs for all of the recently-constructed line segments.

The total cost for topsoil and seeding on these line segments is $6.6 million.

On the remainder of the route, Otter Tail excludes virtually all topsoil and seeding as an entry barrier on grounds that BNSF did not incur costs for seeding when the lines were originally built. The BNSF Engineering Consultants adopt Otter Tail's methodology, but also add seeding cost to new OTRR yards.

In omitting these costs, Otter Tail elects to forego a valuable preventive measure that ensures that the slope will remain stable over an extended period of time. In the years before this practice became standard, continuous slope restabilization was necessary. Erosion of the embankment slopes causes instability to the track when shoulders are eroded to the point that the ballast section cannot be held and maintained. Erosion of cut slopes causes eroded material to fill the ditches, impeding drainage and causing soft track conditions. Because the exposed soils are loose, winds blow the fine sand and silt into the ballast section, further fouling the ballast section, impeding drainage, causing irregularities in the line and surface of the track, and eventually resulting in slow orders.

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[111] In *PPL*, complainants attempted to include topsoil on a newly constructed segment, but to exclude costs for seeding citing the Board's prior decisions. The Board rejected that approach, noting that placing topsoil without seeding is useless. *PPL* at 19.

Mr. Albin determined that, as a result of OTRR's failure to place topsoil and seeding on the entire route, the required yearly frequency of undercutting, shoulder ballast cleaning, switch and crossing undercutting on OTRR would increase by as much as 50 percent. Fouling of the ballast and sub-grade failures will require additional surfacing of the track, and the embankment and cut slopes will require periodic restabilization. Mr. Albin estimates that in the initial year, the increased costs for these maintenance activities would be approximately $3.4 million,[112] and would accelerate in future years as more extensive and costly repairs are needed due to slope failures. In fact, a recent article explaining the importance of using high quality machinery for these activities to protect the ballast and subballast notes that the cost to not do so -- *i.e.,* the costs associated with erosion -- can be as high as 809 percent of original construction costs.[113] Mr. Albin has taken additional undercutting and shoulder ballast cleaning into consideration in his MOW costs.

(6) Water for Compaction

Otter Tail correctly recognizes the need to ensure that the moisture content of the soil on OTRR's fills is within an acceptable range. Water for compaction will be needed for 70 percent of the common excavation (30 percent is waste) and 100 percent of the borrow quantities. Otter Tail includes water for compaction for 643 OTRR route miles Otter Tail considers to be in arid territory at a rate of 20 gallons of water per cubic yard and for 650 miles located in semi-arid territory at a rate of 9 gallons of water per cubic yard. Otter Tail develops the number of gallons per cubic yard from BNSF's actual experience in constructing the Orin Line and the Eagle Butte

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[112] BNSF.RP.WP.III.F-0378-0379.

[113] "Sub-Structure can add life to rail, ties," by Darrell D. Cantrell and Rainer Wenty, *Railway Track & Structures*, March 2003. BNSF.RP.WP.III.F-0380-0382.

Branch. Otter Tail uses a unit cost for water from Wyoming Department of Transportation (DOT) bids. OTP Nar. at III-F-30 and OTP.OP.WP.4386.

The BNSF Engineering Consultants accept Otter Tail's calculation of the number of gallons per cubic yard for the Orin Line and Eagle Butte Branch construction, and apply those amounts to the earthwork quantities attributable to those lines. They do not agree that gallons per cubic yard needed for these lines translate into the number of gallons per cubic yard needed in "arid" and "semi-arid" territory as Otter Tail asserts. The amount of water needed to achieve proper compaction is a function both of the amount of rainfall for a given region – which Otter Tail attempts to take into account – and the ability of the soil to hold that moisture content – which Otter Tail ignores. Based on their field observations, the BNSF Engineering Consultants conclude that the dry silty sand soils along the OTRR route would require substantially more water than the amounts needed in the vicinity of the Powder River Basin. Using standard engineering formulae, they calculate the OTRR soils would require 31 gallons per cubic yard to achieve proper compaction.

The BNSF Engineering Consultants accept the unit cost used by Otter Tail of $0.009 per gallon. Costs for water for compaction are included in BNSF Exhibit III.F-2.

(7) Road Surfacing

Road surfacing includes the cost for the construction of road detours that are built during construction, and the resurfacing of existing roads that are damaged during the construction process. As it did for utility relocation, Otter Tail includes road surfacing only for the rail line between Converse Yard and Donkey Creek, the five coal branches of relatively recent construction and the OTRR-owned portions of the mine spurs. Otter Tail omits these costs for all other segments as entry barriers.

For the segments for which road relocation costs were included, Otter Tail used information from the Jerry Masters' Orin Line testimony to derive a per-mile quantity of roads that were resurfaced and then applied the Means unit cost for "Bank Run Gravel, 6" to that quantity. This understates the costs because he did not include the quantities for hot bituminous pavement and base course for the paved road that are clearly indicated on the Bill to Orin quantity list. BNSF's Engineering Consultants added these costs for areas where they were clearly used. BNSF accepts the use of RS Means unit cost for 6" bank gravel. Total costs for road surfacing are included in BNSF Exhibit III.F-2.

Otter Tail's exclusion of road relocation costs on all other segments of OTRR is inappropriate. The fact that the road infrastructure is in place today is a substantial benefit to OTRR. The roads will be used extensively by OTRR construction and operating personnel both during the actual construction and once the railroad becomes operational. For example, because of the roads in place today, many of the construction materials can be efficiently trucked from the delivery points to the construction staging areas. Once operations begin, maintenance crews can use the road infrastructure to access portions of the right-of-way without tying up track time. Similarly, taxi drivers hauling relief train crews will make significant use of the road network to get crews to the "outlawed" trains.

To the extent that OTRR needs to have the roads in place to bring workforces and materials to the OTRR site during construction, and will continue to use these roads to its benefit after construction, it should not be allowed to assert an entry barrier. As with utilities, costs to relocate roads that the SARR would have to construct if they were not already there should be included in SAC costs.

Moreover, there is evidence that BNSF's predecessors incurred costs for roads even back before the Engineering Reports were developed. As described more fully in § III.F.6, the BNSF Engineering Consultants extracted from the Engineering Reports the material quantities for at grade crossings identified under ICC Account 15 – Crossings and Signs. They determined there were sufficient quantities of crossing materials to construct the equivalent of 1835 grade crossings along the OTRR route at the time the Engineering Reports were prepared.[114] The BNSF Engineering Consultants therefore include road relocation costs only for the relative proportion of the road crossings that will be built by the OTRR.

(8) Environmental Mitigation

Measures to control environmental factors are necessary expenditures in constructing a railroad and a natural outgrowth of preventive measures taken as part of the normal construction process. Otter Tail recognized this and has included $1.4 million for erosion control for the recently constructed line segments for which the railroad indisputably incurred such costs. OTP Nar. at III-F-30. Otter Tail calculated a cost per mile based on its assertion that the costs for environmental compliance on the Orin Line were $1.5 million in 1997 dollars. Otter Tail indexed that cost to 1Q02 and using the mileage from Caballo Jct. to S. Morrill and applied that unit cost to 179.6 route miles.

BNSF's Engineering Consultants found Otter Tail's unit cost of $6,846 indexed to the 1Q02 level acceptable, as well as Otter Tail's methodology for arriving at the $1.4 million dollar amount.[115]

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[114] BNSF Reply electronic workpaper "III F 8 Crossings.xls," worksheet "Crossings."

[115] BNSF Reply electronic workpaper "IIIF2 OTRR GRADING.XLS," worksheet "IIIF Summary."

(9) Land for Waste Quantities

Otter Tail assumes that 30 percent of the material excavated during the construction of OTRR will not be re-used as embankment and will instead be wasted along the right-of-way. OTRR includes costs for additional land along the right-of-way to accommodate the dumping of the waste material as well as costs for the dumped material to be moved and shaped by a bulldozer. OTP Nar. at III-F-31. BNSF's Engineering Consultants agree with the waste ratio and the inclusion of these costs. However, Otter Tail's calculation of the additional acres of land that would be required as set forth in OTP Opening Exh. III-F-14 is illogical because it implicitly assumes the waste pile would have 15-foot high vertical walls, which would be impossible to maintain without extensive retaining walls. A more reasonable approach is to calculate the acreage on the assumption that the waste pile would be shaped using a 1.5:1 slope. This would require a larger area to accommodate the waste, but would eliminate the problem of retaining walls. BNSF's calculations show that, when the proper slope is taken into consideration, the land requirement should be based on 14,300 CY per acre rather than 24,200 CY as calculated by Otter Tail.[116] Based on this measure, BNSF has included 1673 acres of land for waste in its land costs. The BNSF Engineering Consultants have accepted Otter Tail's proposed cost per acre.

(10) Donkey Creek and Glendive Yard Paving and Drainage

Otter Tail includes nine paved roadways of 8,000 feet between the inspection tracks in Donkey Creek and eleven paved roadways of the same length at Glendive Yard to allow car inspection. It also claims to include catch basins spaced 1,000 feet along each track and piping under the roadways to drain precipitation away from the yard. Otter Tail includes a total cost of $4.9 million for these items. The BNSF Engineering Consultants reviewed Otter Tail's yard

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[116] BNSF.RP.WP.III.F-0392.

paving and drainage offering and conclude both are severely deficient. They also conclude that these costs would be applicable to all OTRR yards, not just Donkey Creek and Glendive.

For yard paving the BNSF Engineering Consultants determined that the road design proposed by Otter Tail falls below the American Association of State Highway and Transportation Officials ("AASHTO") standard design criteria primarily due to the highly plastic clay subgrades prevalent in the region. They compute a standard design using the AASHTO formula and develop the amount of material needed for three different classifications of yard roads, heavy duty paved, light duty paved and base stone. They determined the type of road applicable to each yard based on anticipated activity levels. The BNSF Engineering Consultants developed costs for each of the yard road classifications from Means. Details of these calculations are set forth in the workpapers.

For yard drainage the BNSF Engineering Consultants determined that Otter Tail's proposed design of catch basins spaced 1,000 feet apart connected by 12-inch drainage pipe is inadequate for the anticipated runoff and will result in a saturated yard subgrade that will eventually lead to muddy track and derailment problems. The BNSF Engineering Consultants redesign Otter Tail's proposed yard drainage to provide adequate drainage for the proposed yards. Unit costs for the drainage components are developed from Means. Details of the BNSF Engineering Consultant yard drainage design and cost development are included in the workpapers.

(11) Summary

The table below summarizes the grading (roadbed preparation) costs that BNSF's Engineering Consultants determined would be necessary to construct the railroad to the specifications necessary for a railroad with the tonnage requirements of OTRR.

Table III.F.2-18
Summary of Grading Costs

Item	BNSF Total Cost ($Millions)	Otter Tail Total Cost ($Millions)	Difference
Line Segment			
Common	476,647,507	194,809,325	281,838,182
Loose Rock	232,864,496	75,518,528	157,345,968
Solid Rock	194,947,088	66,124,878	128,822,210
Borrow	271,724,950	226,937,869	44,787,081
Earthwork -- Yards			
Common	4,742,248	985,387	3,756,861
Loose Rock	1,165,763	0	1,165,763
Solid Rock	2,381,601	0	2,381,601
Borrow	15,181,715	4,193,176	10,988,539
Embankment -- Glendive	454,172	0	454,172
Earthworks -- Total	1,200,109,540	568,569,163	631,540,377
Water for Compaction	16,305,141	7,467,348	8,837,793
Clearing – Total	1,318,957	1,228,239	90,718
Grubbing – Total	347,093	341,069	6,024
Fine Grading	22,361,481	0	22,361,481
Stripping	4,557,707	0	4,557,707
Foundation Conditioning	39,937,881	0	39,937,881
Snow Removal	36,832,940	0	36,832,940
Additional Winter Equipment	43,849,265	0	43,849,265
Construction Lighting	16,483,268	0	16,483,268
Lateral Drainage	1,445,192	897,933	547,259
Retaining Walls	13,019,960	80,961	12,938,999
Rip Rap	14,912,274	11,514,699	3,397,574
Road Surfacing	5,389,791	4,932,550	457,241
Relocation of Utilities	1,029,713	1,024,684	5,029
Placing Topsoil	2,996,889	2,982,266	14,623
Seeding	3,555,584	0	3,555,584
Land for Waste Quantities	643,447	354,886	288,561
Environmental Compliance	1,407,021	1,400,150	6,872
Access Roads	2,358,003	0	2,358,003
Construction Site Access	1,472,543	0	1,472,543
Yard Demolition	1,911,719	0	1,911,719
Yard Drainage and Paving	31,900,749	4,869,978	27,030,770
Yard Seeding	34,747	0	34,747
Relocated Roadways from Yards	1,501,317	0	1,501,317
Yard Retaining Wall	2,347,708	0	2,347,708
Detour	18,370,708	0	18,370,708
Total	$1,486,400,637	$605,663,927	$880,736,711

F.3. Track Construction

There are many components that go into the actual track structure, including the geotextile fabric, subballast and ballast, rail, ties, tie plates, anchors, and spikes that are included in the track itself, and components for turnouts. The quantity of each component depends on the total miles of track constructed. In its Opening evidence, Otter Tail included 1,283.9 constructed route miles[117] and 1,560.4 mainline track miles.[118] In its Errata, it added 122.2 miles of track to double track portions of the Snowden to Glendive and Glendive to Fargo line segments and to add the necessary track to access the Coal Creek and Fort Union mines.[119] The net result was the addition of only 0.1 route miles for a total Otter Tail estimate of 1,284.0 constructed route miles and 1,682.6 mainline track miles.[120] Total track miles, including yard tracks and set-out tracks was 1,771 miles.

There are very few discrepancies between Otter Tail's estimate of total route miles and BNSF's estimate. Basically, Otter Tail omitted one leg of a wye at each of two locations, omitted in some instances and overstated in others certain turnout track and lead track owned and maintained by BNSF at the mines; omitted a branch line from Colstrip to the Energy mine division of ownership; and overstated track owned by OTRR from Sarpy Jct. to Kuehn. In addition, because of traffic changes made by BNSF witnesses, BNSF deleted the south entrances, double track and turnouts for the Reno Branch line. As a result of these corrections, additions and deletions, BNSF's track construction costs are based on its restated total of 1,286.2

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[117] OTP Nar. at III-B-4.

[118] OTP Nar. at III-B-5.

[119] OTP Errata at 8.

[120] OTP Errata at 9.

constructed route miles. BNSF capacity and operating witnesses made some adjustments to the track miles, including changes to yards. Based on those changes, BNSF Engineering Consultants have restated construction costs to include 1770 total track miles. BNSF Reply Nar. § III.B.2. These additional miles of track increase the quantities for all track components, as reflected in the BNSF Engineering Consultants' restatement of OTRR construction costs. Schematics comparing the track and yard configurations in BNSF's reply evidence with those of Otter Tail are included in BNSF Reply Exh. III.F.4.

Other than the adjustments for total miles of track, to minimize the level of dispute between the parties, BNSF accepts Otter Tail's calculation of quantities on all but a few track components. Of the 37 track material components identified in Otter Tail's Opening Exh. III-F-1, BNSF differs from Otter Tail on only nine items and adds five items that Otter Tail omitted:

- geotextiles
- subballast
- ties
- transition ties (omitted by Otter Tail)
- plant welds
- turnouts
- generators (omitted by Otter Tail)
- switch stands
- compromise joints (omitted by Otter Tail)
- rail lubricators
- rail lubricator environmental mats (omitted by Otter Tail)
- tie plates
- rail anchors
- derails/wheel stops (omitted by Otter Tail).

There is similar agreement with respect to unit costs. Most of Otter Tail's unit costs for track components were supplied by BNSF in discovery and are acceptable to BNSF. However, BNSF does dispute the unit costs for nine of the 37 items:

- ballast
- subballast
- 132-pound premium rail
- 132-pound standard rail
- field welds
- plant welds for second-hand rail
- 132-pound scrap rail
- switch heaters
- spikes for Pandrol plates.

The track material unit prices produced by BNSF in discovery and relied upon by Otter Tail do not include costs to transport those materials from the manufacturer or supplier to the OTRR construction railheads. Otter Tail recognizes that transportation costs must be added to these unit prices but, as discussed in more detail below, has understated the cost of that transportation.

Otter Tail also omitted some of the costs that should be included in the tracklaying labor and equipment costs.

The subsections below set forth BNSF Engineering Consultant George T. Zimmerman's analysis of each track component for which he disagrees either with the quantity or the unit cost proposed by Otter Tail as well as each item of track construction activities for which his estimates differ from those of Otter Tail's witness McDonald.

a. Geotextiles

(1) Specifications

Geotextile fabric is placed on the roadbed grade to protect the ballast and subballast from contamination and to provide additional stabilization and support in areas of poor drainage and soil quality, such as segments of the OTRR that cross the very flat, hard to drain areas of eastern North Dakota. Turnouts, road crossings and certain approaches to bridges where the backfill materials may settle under future loads are areas that generally require additional support as well.

Otter Tail proposes using geotextiles only under turnouts. As its reason for this limited usage, Otter Tail alleges that the use of geotextiles is a recent development in the railroad industry. OTP Nar. at III-F-32. While it is true that many of the current geotextile fabrics were not developed until the 1960's, there have been several other types of materials in the past that performed the same function. Often in early railroad construction, the track roadbed was underlain with brush and logs to create a wider support for the track in areas of poor drainage and poor soil quality such as that along areas of the OTRR. Thus, even if the specific materials used today were not in use at the time the predecessor lines were established, that does not mean that the lines being replicated by OTRR were not constructed with some material that performed a similar function as a geotextile type material.

Moreover, Otter Tail's reasoning is inconsistent with the practice in SAC cases to build the SARR to modern standards. If the SARR could only be built with materials that were in existence at the time the predecessor lines were built, as Otter Tail suggests, the SARR would not be allowed to use modern signal systems, electric switches, Pandrol plates and clips, rail lubricators, improved rail, concrete for bridges, diesel engines or even improved rail cars. The use of a modern method of roadbed stabilization in SAC cases based on using geotextiles is no different than the inclusion of any of these other improvements. The facts, as confirmed by

BNSF's field trip, show that roadbed stabilization is absolutely necessary in some areas on the OTRR line segments.[121]

For these reasons, BNSF witness Zimmerman concluded that geotextiles should be placed not only under each turnout as proposed by OTRR, but also at all grade crossings and at bridge approaches where the backfill materials will sometimes settle under future loads. In addition, approximately three to five percent of the length of the track from Bismarck, ND to Big Stone, SD needs to be stabilized by use of geotextiles after the undercutting process is completed.

With respect to bridge approaches and track, geotextiles would be used in localized areas to fix subgrade problems before the stone subballast is placed. The quantities of geotextiles used in these instances is included in the BNSF workpapers.[122] The quantities and placement of geotextiles under turnouts and roadways are discussed in the subsections below.

(2) Geotextiles Under Turnouts and Rail Crossings

Otter Tail calculated the quantity of geotextile fabric under turnouts by determining the quantity per turnout size using a formula set out in its workpapers OTP.OP.WP.4508-4509. Otter Tail's opening evidence showed the use of a 17-foot wide strip of geotextile at the point end of each turnout and a widened section at the end of the long ties of 24 feet. BNSF Engineering Consultants agree with this layout with the exception that the geotextile fabric should be extended to encompass the transition ties ahead of the point of switch. This would add a section 17-feet wide by 16-feet long at each turnout. Allowance for overlap must also be made

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[121] BNSF Reply electronic workpaper folder "III F Fieldtrip Photos" shows photos of areas requiring stabilization. *See also* the discussion in § III.D.4.b.iii.(j).

[122] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Quantities."

as the fabric typically comes in rolls that are 12-15 feet wide. This would be one longitudinal lap as detailed by AREMA Chapter 1, Part 10, page 1-10-7.[123]

BNSF Engineering Consultants calculated the quantities for each type turnout as follows:

Turnout No.	Ahead of POS +	Lap + Long Ties	POS to end	x SF to SY =	**Total**
#11	272 SF	282 SF	2454 SF	X11.1%	**334 SY ea.**
#15	272 SF	386 SF	3457 SF	X11.1%	**457 SY ea.**
#20	272 SF	490 SF	4492 SF	X11.1%	**584 SY ea.**

BNSF Engineering Consultants' calculations and supporting drawings and standards are included in BNSF's workpapers.[124] These corrected quantities were applied to the total number of turnouts on the final track configuration of the OTRR as determined by the BNSF capacity experts.

For each railroad crossing there should be a strip of geotextile fabric approximately 12 feet wide by 25 feet long under each track of the crossing diamond, which equates to 101 SY per diamond.[125]

Table III.F.3-1
Comparison Of BNSF And Otter Tail Quantities
Of Geotextiles Per Turnout Size

Turnout Size	Otter Tail Quantity per TO	BNSF Quantity per TO
No. 11	273 SY	334 SY
No. 15	384 SY	457 SY
No. 20	499 SY	584 SY

Source: OTP.OP.WP.4508; BNSF.RP.WP.III.F-474.

[123] BNSF.RP.WP.III.F-0473.

[124] BNSF.RP.WP.III.F-0474-0481.

[125] The computation for geotextiles under crossing diamonds is (12' x 25') + 12"(25'-12') x 11.1% x 2 diamonds = 101 SY.

(3) Geotextiles Under Road Crossings

At each place where a highway crosses the OTRR, there will be either an at-grade crossing or a separated crossing such as a bridge or underpass. It is becoming increasingly evident that in areas where there are subgrade problems the subballast at an at-grade crossing should be underlaid with a non-woven geotextile to add strength and to protect the subballast and ballast from the transmission of fine soil particles from the subgrade. The subgrade in a grade crossing is required to take a much more demanding loading than that of a typical track section. The drainage at a grade crossing is usually not optimal since railroad side ditches cannot be placed across the road. As a result, the water level in the crossing area stays higher after a rain than in a typical section. Not only does the subgrade stay wetter longer but it is also subjected to many more loading cycles since the grade crossing also has to handle the vehicular traffic.

Dr. Jerry Rose of the University of Kentucky, in his presentation to AREMA in September 2002, stated that he found that heavily loaded trucks can impart as much as a third the loading to the subgrade at a highway crossing as a heavily loaded train.[126] The loading is typically concentrated in one place in the track (where the wheel tracks are) and the number of truck crossings could be many more than the train loads at the same spot. To maintain ride quality and minimize future maintenance, geotextiles should be installed between the subgrade and subballast at each crossing.

BNSF Engineering Consultants used one roll width of geotextile fabric under each crossing for the length of the crossing plus an additional 10 feet on each side of the crossing.[127]

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[126] BNSF.RP.WP.III.F-0482-0486.

[127] The computation for geotextiles under grade crossings is 12' wide x [(Length of crossings) +(20' x number of crossings)] x 11.1%=SY.

(4) Geotextiles Under Roadbed

Soil samples for the area east of Bismarck showed evidence of clay and betonite material, which according to AREMA Chapter 1, Table 10-1, Geotextile Classification, indicates a bad subgrade with a tendency for very bad pumping action, poor to fair stability and very poor to fair compaction characteristics requiring extra heavy geotextile fabric.[128] Because of the combination of poor soil material and the extremely poor drainage due to the flat terrain, the BNSF Engineering Consultants conclude that the OTRR will requires geotextile fabric stabilization of approximately five percent of the roadbed east of Bismarck, ND.[129] Fabric would be placed at localized areas where needed.[130]

(5) Unit Cost

Otter Tail's pricing for geotextiles was taken from the RS Means 2002 handbook and includes materials, labor, and equipment. BNSF agrees with Otter Tail's unit price for geotextiles.

b. Ballast

(1) Ballast Specifications

As Otter Tail correctly states in its opening Narrative, ballast is needed to distribute the heavy track loads to the subballast and ultimately to the native subgrades. The ballast holds the track in place and allows for drainage of water away from the track. The ballast also allows for maintenance of the track surface and alignment. Otter Tail has proposed using ballast under all tracks on the proposed OTRR.

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[128] BNSF.RP.WP.III.F-0487-0488.

[129] The five percent level is minimal considering the soils of the area, which could arguably justify that the entire subgrade should be covered with geotextile fabric.

[130] BNSF.RP.WP.III.F-0456-0472.

For all mainline track and passing siding sections, except for light density lines, Otter Tail witness McDonald constructed OTRR with a 20-inch ballast/subballast section, consisting of twelve inches of ballast and eight inches of subballast. On light density lines from Fargo to Benson and the Kuehn, Big Sky and Big Stone branches, he used nine inches of ballast and six inches of subballast. For yards, he applied six inches of ballast and six inches of subballast. OTP Nar. at III-F-33. Otter Tail also adjusted the quantities of ballast for curved sections. *Id.*

BNSF Engineering Consultants computed the subgrade pressures for ballast/subballast sections using the procedures recommended in AREMA 16.10.11.1.[131] They concluded that the ballast/subballast depths specified by Otter Tail for all track were sufficient, but that the maximum permissible train velocity on light density lines using 136-pound continuously welded rail (CWR) and 6" x 8" x 8' 6" ties (as specified by Otter Tail) and Otter Tail's 15-inch ballast/subballst section would be 42.84 MPH. If 132-pound CWR were used, the maximum permissible velocity would be 40.24 MPH. For the branch line segments and yards, this speed restriction is acceptable. However, for the Fargo to Benson line segment, where Otter Tail's string diagram indicates average speeds of just under 50 MPH for loaded trains and 60 MPH for empties,[132] the fifteen inch ballast/subballast section in combination with other Otter Tail track specifications would require a reduction in the maximum allowable speed to 40 MPH.

In order to maintain the higher speeds proposed for the Fargo-Benson line segment, some modification would be necessary to the track section (subballast/ballast/ties/rail). After modifying various track specifications and recalculating the line track pressures, BNSF Engineering Consultants concluded that increasing the tie size to 7" x 9" x 8' 6" would allow

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[131] BNSF.RP.WP.III.F-0489-0495.

[132] *See* OTP Errata electronic workpaper "Route.dbf;" BNSF.RP.WP.III.F-0496-0508.

speeds of 61.83 MPH on light density lines using 136-pound CWR and 58.90 MPH using 132-pound CWR. BNSF Engineering Consultants therefore substituted the larger ties on the Fargo to Benson line segment.[133] This avoided the need to change the ballast/subballast section.

(2) Ballast Material Availability Along OTRR

Otter Tail's Errata electronic workpaper "OTRR Transportation.xls," worksheet "Distances" indicates that ballast for the OTRR will be delivered by rail from quarries that currently supply ballast to the BNSF line in this area. BNSF Engineering Consultants agree that there are sufficient sources of track ballast available along the OTRR. However, they made some adjustments to the sources and railheads on the OTRR to address track construction schedule and sequencing issues as discussed more fully in §§ III.F.3.1. and III.F.12.

(3) Ballast Quantities

Otter Tail did not provide a drawing or description of a typical ballast section in its opening evidence, but included in its electronic workpaper "OTRR Construction.xls" a spreadsheet with the formula it used to determine ballast and subballast quantities. For determining ballast quantities, BNSF Engineering Consultants generally agree with the formula developed by Otter Tail, including a 3:1 side slope used on the center ditch of the double track areas, which was plugged into Otter Tail's spreadsheet with no explanation.

(4) Ballast cost

The unit cost Otter Tail used for ballast is taken from a page of a BNSF document produced in discovery shown in Otter Tail's opening evidence at workpaper page 4488. This is one sheet of a four-page spreadsheet ("Ballast Data.xls") produced by BNSF in discovery.[134] To

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[133] BNSF.RP.WP.III.F-0509-0513.

[134] BNSF.RP.WP.III.F-0522.

determine the cost per cubic yard of ballast, Otter Tail selected three ballast quarries from the list provided by BNSF. It then multiplied the price per cubic yard from each location by the distribution percentage shown in Otter Tail's Errata electronic workpaper "OTRR Transportation.xls," worksheet "Distribution" for the typical distribution of the ballast and then derived a unit cost of ${ } per cubic yard from the average of those prices.[135]

As discussed more fully in § III.F.12 under the heading Construction Schedule, BNSF Engineering Consultants determined that an additional ballast quarry was needed to complete construction in North Dakota and therefore selected from the BNSF list of quarries an eastern source at St. Cloud, MN. Using BNSF's proposed construction sections as the distribution guide, the average price for ballast materials was recalculated in the same manner as proposed by Otter Tail.

BNSF's unit cost for ballast material (exclusive of transportation and installation) is ${ }/CY.

c. Subballast

(1) Subballast Specifications

As Otter Tail correctly states in its Narrative, subballast is needed to distribute the heavy track loads to the native subgrades. The subballast also helps in sealing out water that falls on the track and drains through the track ballast and keeps the finer grained subgrade materials from migrating into the track ballast. Otter Tail has proposed using subballast under all tracks on the proposed OTRR including the set-out tracks and yard tracks.

As discussed in § III.F.3.b under the heading Ballast, BNSF's Engineering Consultants checked the subgrade pressures using generally accepted AREMA methods for obtaining

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[135] OTP.OP.WP.4488.

subgrade pressures dependent on the details of the track section above the subgrade and found Otter Tail's proposed subballast depth for all track sufficient, although other track specifications (*i.e.,* tie size) required some modification to accommodate the Otter Tail proposed train velocities on the Fargo to Benson line segment.

(2) Subballast Material Availability Along OTRR

In its Narrative at page III-F-33, Otter Tail asserts that it will use subballast that consists of materials similar to the ballast, crushed and compacted to provide a well-graded, dense layer of crushed rock similar to a road base material. BNSF Engineering Consultants found several aggregate suppliers ranging from large national companies to local operations that are available to supply materials for the OTRR, and concluded that subballast could be supplied using locally available materials from established sources.

(3) Subballast Quantities by Roadbed Section

As discussed above under "Ballast," BNSF Consulting Engineers analyzed the formulas in Otter Tail's electronic workpaper "OTRR Construction.xls" for ballast and subballast. For determining subballast quantities, they agree in general with Otter Tail's formula except for the unsupported 2:1 subballast side slope. They disagree with this factor. The use of the flatter 2:1 slope for the subballast section is inconsistent with standard engineering practice and Class I railroad standard. For example, the BNSF typical section shown in BNSF/OTP18438[136] shows a 1.5:1 side slope for subballast even with a 2:1 roadbed side slope. BNSF Engineering consultants therefore concluded that new subballast values in cubic yards per track mile should be computed using the 1.5 factor for the side slope.[137]

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[136] BNSF.RP.WP.III.F-0521.

[137] BNSF Reply electronic workpaper "III F 3 Subballast Verification.xls."

The source for the unit cost of ${ } per cubic yard that Otter Tail used for subballast is shown on Otter Tail opening workpaper page 4489, which is one sheet of an eight page BNSF AFE produced in discovery (BNSF/OTP 39540). The cubic yard cost is determined by using the cost shown for { }. The item is shown in the same section as culvert work but the AFE is for a new connection track and signals in Orin, WY just south of the OTRR. Basing the unit cost for subballast from this one specific project is not indicative of the cost or amount that should be used when pricing a major line construction project.

Accepting Otter Tail's use of BNSF AFEs as a source for unit costs, BNSF Engineering Consultants investigated the costs of subballast from other AFEs produced to Otter Tail in discovery. They found that the price selected by Otter Tail was clearly aberrant when compared with all other subballast costs in the AFEs, as shown below:

AFE No.[138]	**Bates No.**	**Date**	**Location**	**Subballast Quantity**	**Subballast Total Cost**	**Comp. Price/cy**	**1Q02[139] Price/cy**
A001098	39556	1/16/02	Parachute,CO	6,100	${ }	${ }	${ }
A001098	39556	1/16/02	Parachute,CO	8,600	{ }	{ }	{ }
A001098	39565	1/14/02	Parachute,CO	8,600	{ }	{ }	{ }
A010232	39631	12/31/00	Seadrift, TX	40,000	{ }	{ }X	{ }
A990455	39842	3/16/99	Kirkland, TX	3,950	{ }	${ }	{ }
A001112	39574	3/14/01	Gallup Sub	27,500	{ }	{ }	{ }
A990448	39803	3/26/99	Valentine,AZ	1,885	{ }	{ }	{ }
A990449	39811	3/26/99	Berry, AZ	3,276	{ }	{ }	{ }
A990451	39820	6/29/99	Wichita Falls	3,175	{ }	{ }	{ }
A990452	39826	2/4/99	Griffith, AZ	745	{ }	{ }	{ }
A990007	39756	3/22/00	Clovis Sub	60,000	{ }	{ }	{ }
A990076	39765	3/16/00	Pamerton,TX	90,000	{ }	{ }	{ }
A000119 Used by Otter Tail	**39540**	**12/22/00**	**Orin Jct.,WY**	**14,000**	{ }	{ }X	{ }

[138] BNSF.RP.WP.III.F-0523-0545.

[139] BNSF Reply electronic workpaper "III F 3 Subballast Indexing.xls;" BNSF.RP.WP.III.F-0546-0551.

As can be seen from the above list, the ${ }/cy subballast cost cherry picked by OTRR is out of line with all the other subballast costs and clearly out of line with other projects where a larger amount of subballast has been required, as would be the case with the construction of the OTRR. Most of the above AFEs indicate a cost for subballast "in place," which means that the subballast is purchased, transported, shaped and compacted for this price. The AFE cited by Otter Tail notes only that it is a "contract," but gives no information as to what is included in the cost.

The installed price from the other BNSF AFEs as shown above includes these operations as most of them carried the notation of "In Place" after the quantity. As noted above, the AFE selected by Otter Tail states simply "contract" but with no evidence of what is included.[140]

Therefore, the other AFEs which provide installed costs for subballast are more appropriate for use in determining the subballast cost for the OTRR. BNSF Engineering Consultants used the unit cost derived from averaging the installed prices in the several AFEs produced by BNSF in discovery, after eliminating the highest (${ }) and lowest (${ }) prices. The two prices in the table marked with an "X" were discarded. The average installed unit price for subballast based on BNSF AFEs (after eliminating the outliers and indexing to 2002 levels) is ${ } per CY.

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[140] Although Otter Tail includes a footnote on spreadsheet "OTRR Transportation.xls," worksheet "Distances" stating that "Unit cost for subballast includes transportation," it offers no proof of this statement.

d. Ties

(1) Tie Specifications

In its opening evidence, Otter Tail proposes to use two types of wooden crossties for the construction of the OTRR. OTP Nar. at III-F-33-34. For the main track, Otter Tail proposes a 7" x 9" x 8'-6" Grade 5 tie and for the light density lines, yard and set-out tracks a 6" x 8" x 8'-6" Grade 3 tie.[141] BNSF Engineering Consultants accept the use of the 7" x 9" x 8'-6" crossties for all mainline locations at a spacing of 19.5 inches each for use on the OTRR. These ties will adequately support the track and distribute the train loading to the ballast and subballast sections as shown in the computations for subgrade pressures discussed in subsections b. and c. above.

As discussed above, after investigating the pressures passed along from the track structure to the ballast, subballast, and subgrade, BNSF Engineering Consultants determined that use of the smaller, lower grade tie on the Fargo to Benson line would restrict the velocity of the trains on the line to 40 mph, but using the larger Grade 5 tie would support higher velocities.[142] Since the OTRR proposed speed over this line segment is 50/60 MPH, the crosstie on that line segment was upgraded to the Grade 5 tie that is being used on the mainlines, with the tie spacing held at 21 inches as originally specified for light density lines. Use of the 6" x 8" x 8'-6" Grade 3 tie with a spacing of 21 inches in yards and set-out track locations is acceptable.

(2) Crosstie Quantities

The conversion factors used by OTRR of 3,250 ties per mile at the 19.5" spacing and 3,017 ties per mile at the 21" spacing are acceptable.

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[141] Otter Tail's Narrative says they used a 6" x 6" x 8'-6" Grade 3 tie, but it appears they meant to say a 6" x **8"** x 8'-6" Grade 3 tie since all other references and computation sheets show the wider 8" width crosstie.

[142] Details of the computations are included in BNSF Reply electronic workpaper "III F 3 Ballast.doc."

The Otter Tail spreadsheet "OTRR Construction.xls, sheet Quantities" uses the total quantity of rail as a base for the calculation of the number of crossties for each type rail and then summarizes them by the type of crosstie and spacing to arrive at the final quantity. This spreadsheet calculates the total number of crossties for the various sections, which are then summarized on OTP Opening Exh. III-F-1. There is an error on the Otter Tail summary sheet as 733,905 Grade 3 crossties were not included, thus understating total tie costs. BNSF's tie counts will account for these missing ties, but as discussed above, BNSF Engineering Consultants will substitute the larger Grade 5 crosstie on the Fargo to Benson line segment. As a result, the number of Grade 3 crossties will be reduced, while the number of Grade 5 crossties will increase.

BNSF also corrected an apparent overcount of crossties in Otter Tail's spreadsheet resulting from Otter Tail's failure to remove the corresponding crossties when installing a track turnout. While not a major deduction, BNSF adjusted the tie count to correct this error.[143]

(3) Crosstie Material Unit Costs

The mainline crosstie material unit costs for the OTRR were generated from a document produced by BNSF in discovery (BNSF/OTP 04075) in response to RFP No. 68 for material costs.[144] Otter Tail used the 2002 BNSF price for Grade 5 7" x 9" x 8'-6" wood crossties, which is ${ } each.

The light density, yard and set-out track crosstie material costs for the OTRR were generated from a Materials Price List produced by BNSF in discovery (Otter Tail workpaper page 4483). The price shown is from the February 2002 BNSF price list and shows the same pricing from four different locations. BNSF accepts the ${ } unit cost.

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[143] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Quantities."

[144] OTP.OP.WP.4476.

These ties prices are for materials only and do not include transportation. The BNSF Engineering Consultants accept these tie unit prices, but as discussed below, add transportation costs.

(4) Transition Ties

Otter Tail totally ignored the need for transition ties on the OTRR. The use of transition ties under areas such as road crossings and turnouts is well documented in both AREMA and BNSF standards. Because of the transition from a flexible track structure to a rigid one, the additional length tie is required to insure stability and minimize wear of materials at these locations.[145] AREMA Plan No. 913-52 [146] uses varying sized timbers to transition. To avoid having to purchase and stock several sizes of tie, railroads typically use a standard transition tie that can be used in various settings. The BNSF standard is to use a series of ten 10' long 7" x 9" wood ties ahead of each turnout point of switch and on road crossings where additional support for the track and for the crossing materials is required. The longer ties at railroad crossings spread the load and allow for the use of wider crossing surface materials that better withstand the highway traffic loads. The unit cost of ${ } for transition ties is taken from the BNSF February 2002 price list included in BNSF's CD BNSF/OTP 03960 produced in discovery.[147]

e. Track (Rail)

In its opening Narrative, Otter Tail specifies the use of new 136-pound standard CWR for the main track and passing sidings on the mainline between Converse Yard and Reno Jct., between E. Campbell and E. Donkey Creek, and between Glendive and Fargo. New 136-pound

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[145] BNSF Standards for Timber Crossing Panels for Heavy Rail Traffic on 10'-0" Wood Ties, and #11, #15, and #20 BNSF Turnouts are included in BNSF.RP.WP.III-F-0552.

[146] BNSF.RP.WP.III.F-0553.

[147] BNSF.RP.WP.III.F-0554.

rail is also used on the Eagle Butte and Reno branches. New 132-pound CWR is used on the mainline and passing sidings from Reno Jct. to Glendive, including the Snowden and Decker branches. Relay (second-hand) 132-pound CWR is used between Fargo and Benson, and on the Kuehn, Big Sky and Big Stone branches, set-out tracks and most yard tracks. OTP Nar. at III-F-34. Although there is no mention of premium rail in its Narrative, Otter Tail's cost spreadsheet includes premium 132-pound and premium 136-pound rail for use on curves greater than two degrees.

BNSF Engineering Consultants find Otter Tail's specifications for the weight and use of rail acceptable.

(1) Mainline

(a) New rail

BNSF Engineering Consultants accept Otter Tail's specifications for construction of mainline track, but adjust the quantities of rail to account for the miles of track specified by BNSF operating and capacity witnesses. Their construction costs are based on the additional 1.8 route miles and the 376.95 track miles identified by BNSF's operating and capacity witnesses, Messrs. Mueller and Wheeler. *See* §§ III.B.1 and III.B.2 above.

136-pound premium rail. Otter Tail's unit cost of { } per LF for 136-pound premium rail was obtained from the BNSF price list produced in discovery. BNSF accepts that cost for the rail material.

132-pound premium rail. BNSF Engineering Consultants do not agree with Otter Tail's use of a cost for 132-pound premium rail from the BNSF price list because the list specifically noted that BNSF "No longer purchased" that material and was marked "N/A" for years 1999 through 2002. BNSF consultants therefore obtained a 2003 price quote for this rail from L. B. Foster ($13.20 FOB Steelton, PA) and compared it to a quote that Otter Tail's consultants had

obtained from A&K Railroad ($14.30 FOB Pueblo, CO). They selected the A&K price because A&K was located closer to the construction site, thus reducing transportation costs.[148]

136-pound standard rail. Otter Tail used a unit cost of ${ }/LF for new 136-pound standard rail from the BNSF price list, which BNSF accepts as the materials cost for this rail.

132-pound standard rail. BNSF does not accept Otter Tail's unit cost for new 132-pound standard rail because, as with the 132-pound premium rail, BNSF's price list noted that it was "No longer purchased" and had not been purchased for the years 1999 through 2002. BNSF consultants therefore obtained a quote from L.B. Foster ($11.99/LF FOB Steelton, PA) and compared it to a quote Otter Tail had from A&K ($12.10/LF FOB Pueblo, CO) and selected the A&K price from the supplier located closer to the OTRR route.[149]

All new rail is delivered in eighty foot sticks to a welding facility in Moran Jct., MT, where it is welded into 1,440-foot continuous welded ribbons. The cost of the plant weld is added to the price of the new rail.

(b) Second-Hand Rail

Otter Tail uses second-hand 132-pound rail on branch lines. The second-hand jointed rail is delivered in thirty-nine foot sticks to the proposed welding facility. After the ends are cropped, the resulting thirty-six foot sections are welded into ribbons for delivery to the railroad. Otter Tail used a unit cost of $7.26/LF from a price quote it received for the rail material.[150]

BNSF Engineering Consultants accept the material cost for the second-hand rail, but that price does not include all the labor associated with the rail sticks. BNSF witness Zimmerman

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[148] BNSF.RP.WP.III.F-0555-0556.

[149] *Id.*

[150] OTP.OP.WP.4481.

added costs for offloading the sticks from railroad gondolas, cropping the sticks, and loading the CWR ribbons onto a rail train, for a total cost of $8.05/LF.[151]

(2) Yard and Set-Out Tracks

(a) Yard Tracks

Otter Tail specified that there would be two principal yards on OTRR, located at Donkey Creek and Glendive. OTP Nar. at III-B-8. Donkey Creek is the main yard and includes the headquarters buildings, as well as a locomotive repair shop and support tracks, and a locomotive fueling and service facility. It also has facilities for car inspections, running car repairs, removal of bad order cars, and placement of spare cars. Donkey Creek Yard serves as an interchange point with BNSF. OTP Nar. at III-B-9.

BNSF Engineering Consultants have estimated the cost for constructing Donkey Creek Yard based on realistic diagrams regarding space and congestion constraints. These design features include an increase from Otter Tail's 2 fueling platforms to 3 fueling platforms in order to fuel locomotives from all five of the tracks they provided. BNSF Engineering Consultants have also determined that an additional 7450 feet of track, including eight additional switches, are needed to support OTRR's locomotive fueling at Donkey Creek Yard, as opposed to the skeletal 3,500 feet proposed by Otter Tail. BNSF's redesign of the OTRR fueling facility, rooted in real world experience, also includes a wastewater treatment facility, a diesel fuel delivery and storage facility, a waste oil loading facility, a run-around track, and outbound locomotive storage tracks, all which the additional trackage supports. A maintenance office building has also been added.

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[151] BNSF.RP.WP.III.F-0557-0561.

The track design at the locomotive maintenance facility has been expanded, to provide through tracks rather than the stub ended as in Otter Tail's design. The modification of the tracks at this facility required an additional 8020 feet of track and 9 switches. This design will accommodate four locomotives on each of two 400 foot tracks, and three on each of two 300 foot tracks, for a maximum of 14 locomotives in the shop. (Locomotives are approximately 80 feet in length, and ten feet between locomotives is necessary to allow for workers access.) Two additional tracks 460 feet in length were provided for storage of locomotives (five on each) moving into and out of the maintenance facility. A 100 foot load test track is located outside of the maintenance building. A run-around track is also provided for movement of locomotives from one side of the shop to the other without disrupting work in progress in the shop.

Given the cold weather experienced at Donkey Creek, WY during November through March, the car shop was enclosed, as discussed more fully in § III-F-7.c. None of these practical features that promote efficiency and allow for all work required to be performed year around, as well as reduce congestion, were included in Otter Tail's bare bones proposal. Furthermore, BNSF Engineering Consultants redesigned and substantially improved the layout and access to the locomotive and railcar maintenance facilities by adding a lead track with appropriate crossover switches that are required to access and perform the necessary switching at these facilities without blocking the only running track on this side of the yard. A switching lead to service these facilities was not provided in Otter Tail's proposal.

Glendive Yard was designed by Otter Tail with facilities for car inspections, running repairs, removal of bad order cars, placement of spare cars as well as a locomotive fueling facility. OTP Nar. at III-B-9 and OTP Nar. at III-F-44. BNSF's witness Mr. Mueller determined that Otter Tail failed to take into consideration all of the functions that would have to be

performed at that yard as a result of the rerouting of certain trains. In addition to the inspections, power swaps, and interchange of traffic anticipated by Otter Tail, Glendive Yard will also have to perform the intra\inter-train switching of trains –sorting of cars within the trains by destination – of rerouted freight traffic that under the existing routing is performed at Minot, ND on BNSF's Northern Line. Mr. Mueller determined an additional eight tracks were required to handle this added switching.

The requirements for car repairs and the number of bad order cars that are expected daily at Glendive are basically the same as Donkey Creek. BNSF's engineering consultants therefore duplicated the Donkey Creek car repair facility at Glendive.

The OTRR has nine smaller yards at Converse, Campbell, Moran Jct., Mandan, Dutch, Terry, Snowden, Fargo and Benson, consisting primarily of interchange tracks. *Id.* at III-B-10-11. BNSF witnesses Mueller and Wheeler evaluated Otter Tail's yard configurations and determined that some of these yards did not have adequate capacity to perform the required functions and others could be reduced based on BNSF traffic changes.

Converse Yard as designed by Otter Tail is to serve as an interchange point with BNSF, anticipating that southbound coal trains would stay on the main track with OTRR crews stopping at Converse to effect run-through interchange with BNSF. *Id.* at III-B-10. However, as discussed in § III.A, BNSF traffic witnesses determined that the southbound traffic did not share facilities with the issue traffic and therefore excluded that traffic from the traffic group. As a result, BNSF operating and capacity witnesses determined that Converse Yard would need only one of the five proposed interchange tracks with facilities for fueling locomotives using a tank truck, as well as two approximately 1,000-foot tracks for setting out bad order cars and storage of spare cars.

Campbell Yard as designed by Otter Tail is used as a staging location to accommodate service to the mines north of Campbell and to stage helper locomotives used to assist loaded trains operating between the mines north of Campbell and the Belle Ayr Mine on the Orin Line. It has two staging tracks, two set-out tracks and one 3.2 mile section of passing tracks. BNSF witnesses have determined that the yard as designed is adequate to handle the proposed operations.

Moran Jct. is primarily an interchange yard and the facilities proposed by Otter Tail at that location are adequate.

Mandan was designed with only a track for interchange, but BNSF witnesses determined that a fueling facility is needed there for certain trains originating at Glendive that cannot make the trip to destinations and back to Glendive without refueling .

Dutch is a crew change point and also a helper locomotive location. BNSF witnesses extended one of the set-out tracks to accommodate a small fueling facility for helper locomotives.

Terry Yard is an interchange location and BNSF witnesses found the facilities proposed by Otter Tail adequate.

Snowden Yard is designed for the OTRR to interchange with BNSF. Otter Tail included only a westbound turnout to BNSF. BNSF operating witness Mueller added an east bound connecting track and two turnouts (one on OTRR and one on BNSF) to accommodate coal trains to Brandon.

Fargo Yard is another location added by Otter Tail for interchange with BNSF. BNSF operating and capacity witnesses made no change to the yard at west Fargo, but changed the

interchange with RRVW to Casselton. A turnout was installed at MP 12.77, JY Connector, for straight movement of eastbound OTRR to northbound BNSF for the Stanton coal trains.

Benson Yard is also primarily an interchange point with BNSF and has adequate facilities.

In all, BNSF constructed the OTRR with 3.4 additional miles of yard tracks.

Otter Tail specified the use of new and relay 132-pound rail for yard tracks. OTP Nar. at III-B-12. BNSF Engineering Consultants agree with the weight and use of rail specified.

(b) Set-Out Tracks

Otter Tail states that it intends to have the set-out tracks double as temporary storage tracks for maintenance-of-way equipment. OTP Nar. at III-B-8. This proposal is short-sighted because it will undoubtedly result in either maintenance-of-way equipment being blocked by bad-order freight cars, or the freight cars being blocked by the maintenance-of-way equipment. To avoid this dilemma, and the resulting blockage of the mainline, BNSF Engineering Consultants constructed the maintenance-of-way track as a 1,400-foot extension of one 600-foot long set-out track at each detector location where the track is double-ended. This is shown on the track charts in BNSF Reply Exh. III.F-4.

The reason for constructing an additional 1,400 feet on the double-ended set-out tracks is because that is the length of track needed to accommodate large pieces of MOW equipment, including ballast trains, welded rail delivery and pick-up trains, and other large production surfacing gang equipment consists.[152] Ballast and rail trains can easily be 1,300 to 1,400 feet in

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[152] In *TMPA*, the Board rejected BNSF's additional length because BNSF did not explain the need for lengthening the set-out tracks. As explained in Mr. Albin's discussion of maintenance-of-way issues in § III.D.4, it is important to have maintenance equipment stored close by. However, the equipment should be kept off the mainline to minimize disruptions to

length. All of this equipment must clear the main tracks and operating sidings to avoid delay of trains or reduce the capacity of the railroad. Thus, under this configuration, both the operating and maintenance needs will be efficiently accommodated.

(3) Crossing Diamonds

Otter Tail included the cost for two crossing diamonds which it claimed are located at Bismarck, ND and Valley City, ND. BNSF Engineering Consultants agree that there are two crossing diamonds on the OTRR, but disagree with the locations. The crossings are actually on the Morris Subdivision at MP 194.91 where the former Soo Line, now Canadian Pacific, crosses the line and on the Appleton Subdivision at MP 578.45.

BNSF accepts Otter Tail's unit price for crossing diamonds, but notes that the price does not include installation. Installation can be substantial depending on the particular angle of the crossing, the subgrade and drainage around the area. However, as there are only two crossings on the OTRR, BNSF adds only the per foot track construction cost, as discussed in § III.F.3.l.

f. Plant Welds

For second-hand 132-pound jointed rail that was cropped and welded at Moran Jct., Otter Tail added a price for plant welds based on a 1999 BNSF price indexed to 1Q02 for a price of ${ } to cover the cost of welding the cropped rail into longer CWR strands. The materials price list from which Otter Tail derived this cost noted that BNSF had not used that cost since 1999 as plant welds were now included in the price BNSF pays for new rail. The outdated BNSF price is a material price for welds that does not reflect the labor involved for preparation, welding, finishing and follow-up testing. The welding process requires the services of a flash

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traffic flows. This requires the construction of maintenance-of-way tracks sufficient to accommodate the longest MOW equipment. BNSF.RP.WP.III.F-0562.

butt welder, a crew to operate the equipment, and expendable materials. BNSF consultant Zimmerman obtained a 3Q03 quote from Holland Welding Company of $175 per weld for labor and equipment, plus $2.24 for fuel to operate the equipment and, after indexing, derived a 1Q02 plant weld cost of $172.[153]

Otter Tail also erred in its quantification of plant welds. There should be one less plant weld per 1,440 foot string than there are individual pieces of rail. The closure will be made in the field at each end of the ribbon. BNSF has corrected this error.

g. Field Welds/Compromise Joints

Otter Tail included the costs to weld rail joints as the rail is laid, but failed to include costs for compromise joints that are needed at locations where the rail changes from 132-pound to 136-pound rail.

As quarter-mile sections of rail are laid on the ties, they must be welded together to provide the continuous welded rail—*i.e.,* rail without joints. If the joints are not welded, they quickly become battered and chipped, and in heavy tonnage areas that could result in a broken rail. Otter Tail properly included field welds every 1,440 feet and used a unit cost produced by BNSF in discovery. BNSF Engineering Consultants made the same adjustments to the cost of the field welds as they made to the plant welds as the same equipment would be used and the same cost incurred in the field as in the plant.

Where Otter Tail's specifications call for the rail to change from 132-pound to 136-pound rail, Otter Tail failed to include compromise joints to join the two different rail sections. Compromise joints keep the tops of the two rails aligned and adjust for differences in height of rail and in the location of the bolt holes using a reinforced pair of individual joint bars so that the

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[153] BNSF.RP.WP.III.F-0565.

rail car wheel will feel no difference as it proceeds over the jointed area. While the two sections are very similar, there is enough difference to require the use of these joints. Each location will require two pairs of compromise joint bars to accommodate the rail section change on both rails. With the sizes being so close, there is no need for intermediate compromise steps.

Prices for a pair of compromise joints and for the bolts, nuts and washers needed for each pair are found in the February 2002 BNSF materials price list. The complete price for one pair of compromise joints and hardware is ${ }.[154]

h. Scrap Rail

In OTP Opening Exh. III-F-1, Otter Tail includes a credit for scrap rail cropped from the second-hand 132-pound stick rail. This credit is computed at the average scrap value of $85.00 per ton, which Otter Tail obtained off the internet from RecycleNet Scrap Metals Index. A check of the site showed that none of the "benchmark average prices" on the index indicated any change at all from May through August 2003, which casts doubt on the validity of the index. BNSF Engineering Consultants contacted Pacific Recycling, a scrap dealer located in Billings, MT, very near the site of the proposed rail-welding yard, and obtained a quote of $60/ton if delivered to the Pacific Recycling yard in Billings or $54/ton for pick up.[155] In their restatement of construction costs, BNSF Engineering Consultants revised the scrap metal credit to reflect the more realistic $54/ton cost.

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[154] BNSF.RP.WP.III.F-0563.

[155] BNSF.RP.WP.III.F-0564.

i. Switches (Turnouts)

(1) Turnout Specifications

Otter Tail proposes to use a mixture of standard AREMA design turnouts on the OTRR. A No. 11 turnout is used for set-out tracks and many of the slow speed areas within yards and terminals. For many of the light density mainline, interchange, and yards where speeds are moderate, they have chosen No. 15 turnouts. For mainlines on the heavier density segments a No. 20 turnout has been proposed. The No. 15 and No. 20 turnouts are either hand thrown or electric depending on the track signals used at the location. BNSF Engineering Consultants agree with the selection of the turnouts for the OTRR.

(2) Quantities

An analysis of Otter Tail's stick diagrams (OTP Opening Exh. III-B-1), which was the basis for its count of turnouts and other track structures, revealed that Otter Tail omitted several turnouts from its schematics. BNSF has corrected those errors and also included the additional tracks and turnouts at Mandan to facilitate run-through fueling. In addition, BNSF has added turnouts to new yard tracks and to a new connection to the Red River Valley & Western Railroad and for a new connection to the JY track near Fargo. BNSF's placement and size of turnouts are included on the restated stick diagrams on BNSF Reply Exh. III.F-4 and in BNSF Reply Exh. III.F.1.

(3) Unit Costs

Otter Tail's pricing for each size turnout is shown on its opening workpaper page 4476.[156] The prices were taken from a BNSF price list that specifically noted that the prices were for materials only. The complete materials package includes all stock and closure rail and

[156] OTP.OP.WP.4476; BNSF.RP.WP.III.F-0566A-0566B.

crossties and switch timbers. These would typically be built at a manufacturing facility and shipped in panels to the site. The prices do not include transportation[157] or installation.

Otter Tail does not address the labor required to install the turnouts at the construction site in either its Narrative or workpapers. Otter Tail's workpaper for its track construction unit cost makes clear that installation of turnouts is not included in the track construction costs. The track construction unit cost is taken from a page in UP's reply evidence in *FMC*.[158] The table identifies the costs for installation (labor and equipment only) of various components of UP's track construction cost, but does not provide any costs related to turnout components. There is no indication of any turnout installation cost in any of Otter Tail's spreadsheets.

The two options for installing turnouts would be to build them from scratch at the site or to ship a turnout in several prefabricated pieces for assembling in the field. Either way, the labor for installation of turnouts is a much higher cost per running foot than typical track installation because of the extra care that must be taken to make all adjustments to the switch points and mechanisms necessary to meet the FRA track standards pertinent to turnouts. Special tamping equipment also is required to surface the track within the turnout due to the diverging rails. Therefore, the application of the basic track construction labor cost to the installation of turnouts is not appropriate.

To determine the appropriate installation cost, BNSF Engineering Consultants contacted two track construction companies that regularly build track turnouts both from scratch and from

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[157] To confirm that the price did not include transportation, BNSF Engineering Consultants compared the prices to FOB costs from suppliers after backing out the transportation costs. BNSF.RP.WP.III.F-0566A-0566B.

[158] OTP.OP.WP.4502; BNSF.RP.WP.III.F-0567-0568.

panels.[159] Both contractors quoted a price of $15,000 for installation of a No. 11 turnout that included labor, but no material cost. For the No. 15 turnout, the installation prices from the two companies were $18,000 and $20,000, respectively, and for a No. 20 turnout, they were $25,000 and $28,500, respectively. Both contractors stated this was labor only and did not include the welding of any of the joints within the turnout in CWR track. They both also stated that welding the turnout joints would add $3,500 per turnout. Since there is no mention of joint bars in the OTRR price list, BNSF has assumed that all turnouts will be welded after installation. Using the common welding labor price and the lowest contractor's labor cost for each size turnout, BNSF added the following labor costs to the material cost of each size turnout:

No. 11 turnout, assemble and install, weld joints labor only =	$18,500
No. 15 turnout, assemble and install, weld joints labor only =	$21,500
No. 20 turnout, assemble and install, weld joints labor only =	$28,500

The above prices include the removal of the panel turnout from the rail cars, placing the panels, surfacing, lining, adjusting to FRA regulations and welding.

(4) Additional Turnout Components

Otter Tail also states that it provides switch heaters for all electronically controlled switches, and includes insulated joints at power switches and electric locks at all manual turnouts connected to the mainline and passing sidings. OTP Nar. at III-F-36. Otter Tail used prices from BNSF's price list as shown on OTP.OP.WP.4495 and 4499. BNSF accepts those unit costs for the materials.

Otter Tail did not include the appropriate cost for installation of switch heaters. In its opening evidence, Otter Tail provides a unit cost of $13,138.61 for switch heaters, but gives no

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[159] BNSF.RP.WP.III.F-0569-0570.

backup for that number. Its only workpaper (4496)[160] shows that Otter Tail indexed a 1999 cost of $8,000 for a Hot Air Blower to 2Q02 for a cost of $8,138.61. To that it added $5,000 with no further explanation.

BNSF Engineering Consultants accept the unit cost for the hot air blower, but as Otter Tail provided no back up for its installation estimate, they used an installation cost of ${ } obtained from BNSF.[161] The total cost for the material and installation for a switch heater is ${ }.

Otter Tail properly includes costs for a propane tank to fuel the switch heaters, but offers no support for its unit cost of $1,000. In response to a BNSF workpaper request for the source of that cost, Otter Tail responded that the unit cost was based on "Otter Tail's expert's experience."[162] Therefore, to develop their restatement of the costs for propane tanks, BNSF Engineering Consultants used a unit cost provided by BNSF of ${ }.[163]

(5) Switch Stands

Otter Tail uses high target switch stands on all non-electric turnouts on mainline and sidings and low target switch stands on turnouts in the yards. BNSF Engineering Consultants accept Otter Tail's specifications for the use of switch stands on hand thrown turnouts, but also include low target switch stands on all single switch point derails. BNSF accepts Otter Tail's unit costs for both models of switch stand.

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[160] Otter Tail Responses at 13; BNSF.RP.WP.III.F-0571.

[161] BNSF.RP.WP.III.F-0572-0573.

[162] BNSF.RP.WP.III.F-0578.

[163] BNSF.RP.WP.III.F-0590.

Table III.F.3-2
Comparison Of BNSF's Turnout Costs With
Otter Tail's Turnout Costs

ITEM	BNSF (1) (000s)	Otter Tail (2) (000s)	Difference
No. 20 Turnout (electric) w/ties ML	$22,782.44	$17,212.94	$5.57
No. 15 Turnout (electric) w/ties ML	5,647.62	5,638.16	0.01
No. 15 Turnouts (hand thrown) w/ties ML	84.28	125.56	-0.04
No. 11 Turnouts (hand -thrown) w/ties ML	15,824.16	4,553.66	11.27
No. 20 Turnout (electric) w/ties YD	999.23	0.00	1.00
No. 15 Turnout (electric) w/ties – YD	6,674.46	2,050.24	4.62
No. 15 Turnouts (hand-thrown) w/ties – YD	421.40	1,381.16	-0.96
No. 11 Turnouts (electric) w/ties- YD	5,736.26	5,454.91	0.28
Switch Heaters	8,454.30	4,740.54	3.71
Propane Tank	420.20	361.00	0.06
Switch Stands High Target (ML and Siding)	172.56	70.17	0.10
Switch Stands Low Target - (Yard)	140.94	73.98	0.07
Diamonds-90 Degree (RR at grade crossings)	135.46	135.46	0.00
TOTAL	**$67,493**	**$41,798**	**$25.7**

Source: Otter Tail Exh. III.F.1; BNSF Exh. III.F-1.

j. Other Track Materials (OTM)

(1) Rail Lubricators

Otter Tail placed rail lubricators on curves of two degrees or more. It selected the type of lubricators used from information produced by BNSF in discovery that provided the rail lubricator type and the installed price for single and double track lubricators.[164] BNSF accepts the lubricator types and unit prices. However, Otter Tail erred in calculating the number of double track lubricators required on the OTRR by placing a double track lubricator on each of

[164] OTP.OP.WP.4497.

the tracks in a double track curve. As a result, Otter Tail substantially overcounted double track lubricators. BNSF Engineering Consultants corrected that error.

An important item that Otter Tail omitted is the disposable environmental mat for each lubricator. This mat is needed not only to catch excess grease and debris at the lubricator, but also to protect the ballast track support, which helps minimize maintenance. BNSF Engineering Consultants calculated the cost of the mats using an April 2003 materials price list produced by BNSF in discovery (BNSF Discovery Item BNSF/OTP 18438)[165] and a labor cost from RS Means 2002 Heavy Construction Cost Data.[166] The unit costs for installed lubricators including environmental mats are:

Single track	${	} + 452 =	**${**	**} each**
Double track	${	} +2(452) =	**${**	**} each**

(2) Tie Plates, Clips, Spikes and Anchors

Otter Tail appropriately uses three spikes per tie plate on tangent and curves up to one degree, four spikes per tie plate on curves greater than one degree and up to three degrees, and Pandrol plates with four spikes per plate on curves greater than three degrees. It also uses box anchors on every other tie and 200 feet on both sides of bridges, crossings and turnouts. The unit costs for these items were taken from documents produced by BNSF in discovery. BNSF accepts these patterns and costs, with certain exceptions as discussed below.

14" Tie Plates. Otter Tail understated the number of new tie plates because as discussed above it failed to include in its summary sheet all the crossties on the light density lines. As a result, it also missed all the tie plates for those ties. Based on its originally stated opening evidence, Otter Tail omitted 733,905 crossties times 2 plates per tie or 1,467,810 tie plates. Otter

[165] BNSF.RP.WP.III.F-0591.

[166] BNSF.RP.WP.III.F-0592-0593.

Tail did not correct this error in its Errata. Based on Otter Tail's unit price of $4.68, which was a BNSF unit price produced in discovery, this means that Otter Tail's costs on opening were understated by $6,869,352. BNSF corrected this error. BNSF accepts Otter Tail's unit costs for both new and second-hand 14" tie plates.

Pandrol Plates and Clips. Otter Tail uses Pandrol plates on curves of three degrees or more. BNSF agrees with this use of Pandrol plates and accepts Otter Tail's unit costs for the plates and clips. However, in conversations with the makers of Pandrol plates, BNSF Engineering Consultants learned that Pandrol discontinued using "lock spikes" with their plates approximately four years ago and is now using 15/16" screw spikes.[167] BNSF engineering witnesses therefore replaced the lock spikes with screw spikes as recommended by the manufacturer. The manufacturer's July 2003 quote for screw spikes was $.90 each.[168]

Track Spikes. BNSF Engineering Consultants agree with Otter Tail's computation of the quantities of track spikes, except that where Otter Tail used Pandrol material, the lock spikes were replaced with 15/16" screw spikes, as discussed above.

Rail Anchors. Otter Tail uses four anchors per crosstie on every other crosstie and places additional rail anchors on grades above one degree using a crosstie spacing of 19.5 inches that corresponds with the mainline spacing. This is appropriate, as few areas on the light density lines would require the additional anchors.

Otter Tail also appropriately uses additional anchors at grade crossings, bridges, and turnouts, but its computations for turnouts are flawed. Otter Tail has omitted some of the necessary rail anchors for the sections of track adjacent to turnouts by including anchors on only

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[167] BNSF.RP.WP.III.F-0594.

[168] BNSF.RP.WP.III.F-0595.

two of the three 200-foot track sections that need to be fully anchored at each turnout location. Thus, for each turnout, anchors for an additional 200 feet of track need to be added to the quantities. Otter Tail's unit cost for rail anchors is from a document produced by BNSF in discovery and is accepted.[169] This cost is for materials only and does not include transportation.

Derails and Wheel Stops. Other track items that have been used by railroads in the past and are typically used today for any railroad operating in the United States are derails and wheel stops. These items are not addressed in Otter Tail's Narrative or pricing workpapers. Derails are typically used any place where there is a possibility that a rail car or locomotive could move from one track to another in an uncontrolled manner. An early manufacturer of derails described them over 100 years ago as

> . . . a device designed to limit the movement of free rolling, uncontrolled railroad cars. This is accomplished by guiding the flange of a car wheel up and over the railhead and deflecting it laterally, dropping the wheel clear of the rail on the field side (outside) of the rails. The wheels lodging in the tie cribbing and ballast halt movement of the car.[170]

They serve the same purpose today. Typically side tracks and set-out tracks that are not protected by the signal system would have either a hand thrown or sliding derail that would divert a car away from the main track should it roll or be pushed toward the track. This prevents cars from moving onto the mainline in front of another train. There are also single and double switch point derails that are a more positive method of protecting the mainline. Derails also are an important means of protecting personnel who are working under FRA "Blue Flag" protection on cars and equipment that have been placed into set-out or yard tracks. The blue flag alerts the engineer of a train pulling in that someone is working between cars. The derail together with the

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[169] OTP.OP.WP.4476.

[170] BNSF.RP.WP.III.F-0596-0597.

blue flag protects workers from getting caught between the couplers of the cars they are working on. FRA safety regulations in 49 CFR § 213.205[171] provide for inspection and application of the derail. At a minimum, all non-passing siding tracks should have derails located before the fouling point.

BNSF Engineering Consultants have added hinged or sliding derails at all set-out tracks, using a 1Q02 unit cost of $871.85 from RS Means.[172]

In more critical areas or where the possibility of higher speeds for cars would mean more extensive damage to trains or track, a switch point derail is used to positively derail the car or cars before they reach the mainline. Thus, on tracks along the route where defined separation is desired, BNSF has placed single switch point derails tied into the signal system. The unit cost for a single switch point derail was taken from BNSF's materials price list for February 2002 of ${ } each. An additional $792.20 each labor cost for installation was taken from 2002 RS Means.[173]

It is also standard railroad practice to use steel wheel stops at the end of each stub ended set-out track to keep rail cars from rolling off the end of the rail. Steel wheel stops are either bolted directly to the rail on which they sit or they are attached using a set of self tightening wedges that grab tighter when a car wheel rolls against the wheel stop. Wheel stops are used today in place of earth mounds that were constructed in the past to perform this function because with today's more advanced braking, train control and dumping functions, there is a much

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[171] BNSF.RP.WP.III.F-0598.

[172] BNSF.RP.WP.III.F-0599.

[173] BNSF.RP.WP.III.F-0600.

greater danger of dirt from a struck mound getting into bearing surfaces and causing excessive wear.

BNSF Engineering Consultants have included a pair of fixed wheel stops on each stub-end track using an RS Means unit cost of $550.90 each.[174]

The table below summarizes the track material items for which Otter Tail and BNSF developed different unit costs.

Table III.F.3-3
Summary Of Track Construction Items For Which BNSF's Estimate Of Unit Cost Differs From Otter Tail's Opening Evidence

Item	BNSF (1)	Otter Tail (2)	Difference
Subballast	$25.05	$8.00	17.05
Ballast	$10.22	$9.93	0.29
132 lb. premium rail	$14.30	$12.09	2.21
132 lb. standard rail	$12.10	$10.45	1.65
Plant welds for SH rail	$171.49	$50.51	120.98
Field welds	$171.49	$57.00	114.49
Screw Spikes	$0.90	$0.53	0.37
132 lb. scrap rail	$54.00	$85.00	(31.00)

Source: Otter Tail Exh. III.F.1; BNSF Exh. III.F.1

k. Materials Transportation

Materials transportation is an important component of track construction. It involves getting the track materials from the various suppliers' sources to the railheads along the railroad right-of-way. Otter Tail applies a unit cost of $0.033 per ton-mile for ballast[175] and $0.035 per

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[174] BNSF.RP.WP.III.F-0599.

[175] Otter Tail assumes that ballast for the OTRR will be moved to the OTRR railheads by rail cars and that the measure for the off-line transportation cost would be dollars per ton-mile. To convert the cubic yards of ballast to tons, Otter Tail used a conversion factor of 3,150 pounds per cubic yard. Otter Tail calculated the off-line transportation unit cost of $0.033 per ton-mile using the distance and cost per ton provided by BNSF for moving ballast from Granite Canyon to Cheyenne, WY. OTP.OP.WP. 4511. BNSF Engineering Consultants accept the conversion factor and unit cost.

ton-mile for other track materials[176] to the ton-miles associated with moving those materials from the various suppliers to its proposed OTRR railheads. OTP Nar. at III-F-32. BNSF Engineering Consultants accept Otter Tail's unit cost for transportation, but reject the mileages used in computing total materials transportation costs.

The transportation of materials for construction of the proposed OTRR will be primarily by rail due to the large quantity of material required and the economical shipping available by rail to the locations where construction will begin. Otter Tail has proposed using several railheads but has failed to take into account that its mileage is based on using the tracks that have not yet been built. Otter Tail uses the following as major connection points to the residual BNSF:

Converse Junction, WY
Moran Junction, MT
Fargo, ND
Donkey Creek, WY
Benson, MN

Of key interest here is that all rail will be shipped to Moran Jct. to be welded by the OTRR then shipped to the various construction points. From the transportation information supplied it appears that Otter Tail then ships the rail to the railheads and sometimes used portions of the route under construction as the direct shipping route.[177]

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[176] For transportation costs for crossties, BNSF accepted the sources selected by Otter Tail for its crossties -- Denver, CO and Superior, WI -- and used those same sources for the transition ties that Otter Tail omitted from its statement of tie costs. BNSF accepted the conversion factors Otter Tail used to convert the number of ties to tons. Otter Tail calculated the transportation cost for turnouts based on using both Salt Lake City, UT and Kansas City, KS as supply sources. However, BNSF Engineering Consultants were told by the supplier that it no longer builds turnouts in Salt Lake City due to quality control concerns and other problems. Therefore, BNSF used only the Kansas City source.

[177] OTP Errata electronic workpaper "OTRR Transportation.xls."

This was evident both for Otter Tail's mileages for shipping rail to Converse and Donkey Creek and its mileages for shipping the track ballast for construction. Otter Tail used the Ortonville Quarry as a ballast source but failed to recognize that ballast from this quarry could not be used until the rail line was built. While the ballast could be trucked, the price used reflects the cost for transportation of ballast by ballast train. Transportation by any other mode would drive up the total cost of ballast since ballast train is the most economical method of transporting ballast.

Otter Tail may attempt to argue on rebuttal that it is not moving these materials over the yet-to-be-built OTRR, but over the lines of the residual incumbent. This argument should not prevail. While in the hypothetical SAC world complainants may assume that the SARR and the residual incumbent co-exist with respect to splitting the incumbent's traffic base, such an assumption with respect to the development of construction costs is untenable. In developing road property investment costs, the SARR is permitted to build its railroad "on top of" the incumbent, in essence "replacing" the incumbent. This allows the SARR to avoid numerous large cost items. Most important, it allows the SARR to assume that the right-of-way is already clear of housing developments, commercial property and other encumbrances that would make it very difficult today to select and develop a 1,300 mile right-of-way. Any other route selected by the SARR would likely require much higher road property costs associated with purchasing improved properties and then converting those properties for use as a railroad right-of-way. These costs are avoided because of the assumption that this all replaces the incumbent.

Because it is assumed to have replaced the incumbent, the SARR can also assume it will have sufficient space for yards, tunnels, passageways through narrow gorges, and other areas that in reality can accommodate only one railroad. Moreover, the SARR is allowed to assume away

any costs that would arise from the continued presence of the incumbent – such as, for example, the numerous crossovers between the SARR and the incumbent that would have to be constructed if the two railroads did in fact run parallel to each other for more than a thousand miles encountering each others' yards, branch lines, and industrial tracks along the way. Because the SARR's costs are greatly reduced as a result of the hypothetical *replacement* of the incumbent, it should not be allowed to proffer simultaneously the physical and geographical *co-existence* of that same incumbent in order to garner even more benefits by avoiding the cost of transporting materials to the railroad during construction.

The off-line transportation mileages, therefore, must be calculated without reliance on the lines being replicated. In those areas where the mileages were based on using the replicated lines, BNSF Engineering Consultants made adjustments to the mileages to reflect the correct routings. In the case of the ballast from Ortonville, BNSF Engineering Consultants determined that there was an additional problem in that moving the ballast from Fargo westward toward Glendive, as assumed in the sequencing of construction segments proposed by Otter Tail, requires use of the large bridge at Valley City, ND. The Valley City Bridge is designated by Otter Tail as the longest project on the OTRR. That means that ballast from Ortonville could not reach Glendive by the route shown until after the bridge was completed. As discussed more fully in § III.F.12, to overcome these difficulties, BNSF Engineering Consultants revised the sequencing of construction, which required the establishment of a new railhead at Sanborn, ND and selection of another eastern ballast source from the BNSF list of quarries to serve that railhead. A fuller discussion of the sequencing issues is set forth in § III.F.12. Details of the

location of suppliers and BNSF's calculations of transportation miles and costs are set forth in electronic workpapers.[178] The total costs for off-line materials transportation is $120.3 million.

Otter Tail's evidence does not address the additional cost to transport the materials from the railheads to the construction sites, which can be done over the railroad's own lines as it is constructed. These *on-line* transportation costs are discussed below in § III.F.3.l.(3).

l. Track Labor and Equipment/On-Line Transportation

(1) Track Labor and Equipment

Another important aspect of track construction cost is the expense for labor and the rental of equipment used during tracklaying. Otter Tail relies on a unit cost for track labor and equipment that was taken from a table submitted as evidence by UP in *FMC* and indexed to 1Q02.[179]

BNSF Engineering Consultants reviewed the *FMC* figure and accept it as representative of the cost typically associated with track construction labor excluding placement of subballast and installation of turnouts. The itemization presented in the table confirms that these items were not included in the price. The turnout installation costs were added to BNSF Engineering Consultants' restatement of track construction labor costs.[180] Subballast placement costs were included in the subballast unit cost discussed above.

Applying Otter Tail's unit cost of $120,030 per track mile to BNSF's restated 1770 track miles results in a track labor cost of $212.5 million.

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[178] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Transportation."

[179] OTP.OP.WP.4502.

[180] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Total Cost."

(2) Cold Weather Labor Costs

In light of the climate through which the OTRR will be constructed, some additional costs must be incurred if construction is to continue through the winter. Otter Tail's assumed production rate of 0.7 miles per day is very aggressive, particularly for severe cold weather conditions. It is extremely difficult to tamp track when the ballast is frozen. In order to continue working through the winter as Otter Tail proposes, the contractors will have to undertake certain cold weather procedures to keep on schedule.[181]

According to the contractors in the region with whom BNSF Engineering Consultants spoke,[182] since ballast will be placed when the temperature is below freezing, there will be difficulties to overcome. Ballast is made by taking crushed rock materials and washing away the very fine materials from the crushed rock. The water used to wash away the fines wets down the remaining large ballast particles. When loaded into a hopper car to transport to the site, the material freezes in the rail car and any additional rain or snow during transportation adds moisture and creates even more ice. In order to dump the ballast, the crew must either (1) heat the ballast in the car to melt the ice (very expensive and slow), (2) mechanically stir the ballast using outside heavy equipment (slow and damages ballast and car), (3) spray the carload with chemical deicers (expensive, unreliable and environmentally unfriendly), or (4) send the car to a warmer climate to thaw out and let moisture escape (high transportation costs, requires more ballast cars, unreliable, no assurance of keeping dry during transport back).

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[181] This is particularly true with respect to the construction of and tracklaying on the large bridges at Snowden, MT and Bismarck, ND. Construction of these bridges must be kept on schedule so that construction of track in the western portion of North Dakota can begin as planned.

[182] BNSF.RP.WP.III.F-0601-0602.

There are six months during which the average minimum temperatures in the areas in and around Fargo, ND, Bismarck, ND and Billings, MT are below freezing.[183] According to the schedule proposed by Otter Tail in its opening evidence, this will affect work being done in the Sheridan, WY, Miles City, MT, Mandan, ND and Big Stone, SD areas. These four ballast operations would require eight ballast stirring operations by crews similar to RS Means Crew B-12H that includes a clamshell bucket to reach into the cars and two labor crews to assist with freeing up materials in the doors of the cars during unloading such as the RS Means Crew A-2 (one for each side of the train). The cost for each unloading crew would be

Crew B-12H	$1,485.85 per day
Crew A-2 (x2)	$2,103.10 per day

At these rates the daily cost for loosening frozen ballast would be $3,588.95 per day per location. With eight locations operating at one time the total daily cost to the project would be $28,711.60 per day for a minimum of five months for a total cost of $3,588,950. Details of the calculations are included in BNSF's workpapers[184]

(3) On-Line Transportation of Materials from Railhead to Installation Site

Track materials delivered to the major railheads are generally transported to the various construction sites for installation using the railroad's own line as it is constructed. There is no mention of the on-line transportation costs in Otter Tail's track construction costs. Interestingly, the *FMC* table that Otter Tail used to derive its track labor unit cost also included costs for transportation of track materials from the railheads to the installation sites, but Otter Tail ignored

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[183] BNSF.RP.WP.III.F-0603-0607.

[184] BNSF.RP.WP.III.F-0608-0615; BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Total Cost."

these costs. Since Otter Tail relied on *FMC* for so many of its costs, BNSF Engineering Consultants used the *FMC* cost for on-line transportation indexed to 1Q02 for a unit cost of $35,338 per track mile.[185]

Applying this unit cost to BNSF's restated 1770 track miles results in total cost of $62.6 million for on-line transportation of track materials during construction.[186]

m. Total Track Construction Costs

Because Otter Tail's opening evidence underestimates or overlooks certain track materials, track construction activities, and in some instances applies the wrong unit costs, its estimate of the cost for track materials, transportation, labor and equipment for the construction of OTRR are understated. BNSF's estimate of the total cost for all track work including track labor and equipment, special cold weather procedures for ballasting, and transportation of materials from the railheads to the construction sites is $1.1 billion.

F.4. Tunnels

There are no tunnels on the OTRR.

F.5. Bridges

Bridge investment costs for the OTRR were developed by Otter Tail's bridge expert, Dr. Vinaya Sharma. Dr. Sharma determined that the OTRR would require a total of 26,514 linear feet of single track bridge and 34,226 linear feet of multiple track bridge, at a total cost of $151.2 million.[187] BNSF bridge witnesses Mr. Paul Michiels and Mr. Rick Meredith analyzed the Narrative and Errata, design diagrams, quantity calculations and unit cost development

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[185] BNSF.RP.WP.III.F-0567-0568.

[186] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Total Cost."

[187] OTP Errata electronic workpaper "OTRR bridges V2.xls," worksheet "Bridges."

sponsored by Dr. Sharma and found them all to be lacking in both substance and credibility. The significant shortcomings identified by Messrs. Michiels and Meredith, which are described later in this section, result in bridge investment costs for the OTRR that are dramatically understated. Based on a thorough analysis of the bridge requirements along the proposed OTRR route, Mr. Michiels has developed a bridge investment of $367.1 million.

Otter Tail adopts an overly simplistic approach to developing OTRR bridge investment that fails to properly account for critical aspects of railroad bridge design and ignores key bridge cost drivers. Otter Tail's bridge costs are further understated by its failure to include in its OTRR bridge inventory all of the bridges BNSF owns and maintains along the lines replicated by OTRR.

Otter Tail's Narrative, which devotes slightly more than one page to its explanation of how bridge investment costs for the OTRR were developed, provides little insight on how Dr. Sharma's expertise influenced its determination of OTRR bridge investment costs – if at all. The Narrative explains only that Dr. Sharma grouped the BNSF bridges along the OTRR route into three classes, that costs per linear foot for each bridge class were developed from information reported in the Means Handbook and from suppliers, and that walkways and inner guardrails are assumed to be placed on certain bridges.[188] The Narrative does not explain how Dr. Sharma established the OTRR bridge classes or how the unit costs from Means and suppliers were selected as appropriate for the OTRR. Further, for each class of bridge, Otter Tail develops a unit cost for a "typical" bridge within the class. Otter Tail provides no explanation of the characteristics of the typical bridge within each class or any assurances that its typical bridge is indeed representative of the bridges it places in each class. The Narrative is also silent on bridge

[188] OTP Nar. at III.F-39.

construction techniques or how Otter Tail plans to address critical real-world bridge construction challenges related to transporting of bridge materials to remote construction sites, increased construction costs for cold weather construction, controlling water flow for construction of bridge piers and excavation. The builders of the OTRR will incur costs associated with these and other items that Dr. Sharma has ignored.

Listed below are the bridge categories used by Otter Tail along with a general description of the typical bridge Otter Tail selects as the basis for its unit cost.

Class 1: Wood trestles, concrete trestles, box beam and beam spans 40' or less in length

Otter Tail Typical: Prestressed concrete slab spans with ballast deck, average bridge length of 74 feet, average span length of 18 feet, and average height of 15 feet, 3 piers, 2 abutments, and 200 lb./CY reinforcement for substructures.

Class 2: Deck plate girder, concrete slab and beam spans greater than 40' in length

Otter Tail Typical: Two deck plate girders with concrete ballast deck with an average bridge length of 202 feet, average span length of 63 feet and average height of 33 feet, 2 piers, 2 abutments, 200 lbs/CY reinforcement for substructures, and 300 CY of rip rap.

Class 3: Through plate girder and truss

Otter Tail Typical: Through plate girder span with steel ballast deck pan, with an average bridge length of 253 feet, average span length of 112 feet, average bridge height of 26 feet, 2 abutments, 2 piers, 200 lb/CY reinforcement for substructures, inner guard rail and 300 CY of rip rap.

In the subsections below, Messrs. Michiels and Meredith discuss in detail their critique of the following aspects of Otter Tail's bridge evidence:

Bridge Classifications. As explained in more detail below, although they agree with the general classes of bridge, Messrs. Michiels and Meredith do not agree with Otter Tail's development of an assumed typical or average bridge for costing each class. The assumed

average bridge selected by Otter Tail is not representative of the range of bridges falling within each category, producing a mismatch of inventories and unit costs. Not surprisingly, this mismatch produces an understatement of bridge components used in developing costs, and therefore an understatement of costs. Instead of developing an average class composite bridge (*i.e.*, superstructure, piers, and abutments), Messrs. Michiels and Meredith developed separately a superstructure (span type) for each class and the substructures (piers and abutments) for each class.

Superstructures. Messrs. Michiels and Meredith are in general agreement with the types of superstructures Otter Tail specified for each class of OTRR bridge, with certain exceptions explained in the remainder of this section. Specifically, they agree with the following span types to be constructed on the OTRR:

Class 1 Prestressed concrete slab spans

Class 2 Deck plate girder spans

Class 3 Through plate girder spans.[189]

Messrs. Michiels and Meredith designed their superstructures to conform to design loads and clearance requirement guidelines provided in the AREMA Manual. The Class 1 prestressed concrete slab will conform to Part 17 of Chapter 8 - Concrete Structures and Foundations. The Class 2 and 3 steel superstructure spans will conform to AREMA Manual Chapter 15 - Steel Structures. Bearing designs for superstructures conform to AREMA Manual Chapter 19 - Bridge

[189] The maximum length for Class 3 spans is 155 feet, which is slightly longer than the 150-foot maximum suggested for through plate girders by AREMA Chapter 15, Article 1.2.3a, but still acceptable.

Bearings, and waterproofing requirements will conform to AREMA Manual Chapter 29 - Waterproofing.[190]

Piers. Messrs. Michiels and Meredith also accept in general Dr. Sharma's proposed multi-column concrete pier types, but all of the proposed piers are under-designed as shown in their supporting documents.[191] The piers and the steel H-pile foundations have been redesigned for each class to support loads conforming to the design guidelines of AREMA Manual Chapter 8 - Concrete Structures and Foundations.

Abutments. Messrs. Michiels and Meredith do not agree with the abutment types used for the construction of the OTRR bridges because they are incomplete. The abutments shown in Dr. Sharma's drawings do not have bridge seats to support the span; a backwall to retain the earth from spilling onto the bearings and to support the approach tracks; or the wingwalls to retain the earth behind the abutments.[192] The proposed Otter Tail abutments are very tall, which would require long wingwalls that would need to be designed for earth pressure and surcharge loads. The abutments and the steel H-pile foundations have been redesigned for each class to support loads conforming to the design guidelines of AREMA Manual Chapter 8 - Concrete Structures and Foundations.

Inner Guard Rails and Walkways. Messrs. Michiels and Meredith accept Otter Tail's specifications for placement of inner guardrails on all through plate girder bridges. They also agree with the provision of walkways on bridges longer than 50 feet for single-track bridges;

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[190] BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at pages 417-464.

[191] *Id.* at pages 63-123.

[192] OTP.OP.WP.4600, 4604 and 4608; BNSF.RP.WP.III.F-0617-0619.

however, for safety reasons, walkways should be provided on the outermost sides of bridges for locations with multiple tracks.

In the remainder of this section, BNSF bridge engineering experts explain the errors found in Otter Tail's inventory of bridges on the OTRR, the deficiencies attributable to Otter Tail's bridge classifications and its determination of the appropriate typical bridge within each class, the problems with Otter Tail's determination of bridge material quantities and unit costs, and the shortcomings with Otter Tail's treatment of bridge walkways. They then restate the bridge investment requirements for the OTRR.

a. Bridge Inventory Errors

Otter Tail alleges that it based its total linear feet of bridges on "information provided by BNSF in discovery and publicly available track charts for the OTRR lines in Minnesota and Montana. OTP Nar. at III-F-39. However, its restated bridge inventory is replete with errors that significantly impact its final bridge costs. These include omissions of bridges, failure to correct obvious inconsistencies in bridge inventory data, and inconsistencies between data used for the OTP Opening Exh. III-B-1 schematics and the data used to develop bridge costs.

(1) Bridges Omitted from the Inventory

Otter Tail excludes from its OTRR bridge inventory railroad bridges that cross over only roads on the mainline between Donkey Creek and Big Stone and the Snowden Branch based on its unsupported assertion that these bridges were built to accommodate highway traffic after the line was put in place and were not paid for by BNSF's predecessors. In all, Otter Tail has excluded investment for 34 bridges, comprising a total of 5,855 bridge feet on this theory. The Board appears to have accepted this argument in *TMPA*, even though complainants have the burden of proving that BNSF did not incur any cost for these bridges. The Board did concede that it is likely that BNSF and its predecessors have, over time, incurred replacement and

maintenance costs for bridges that cross over roads, but dismissed that as a maintenance issue. Otter Tail did not, however, add maintenance costs for these excluded bridges in its OTRR maintenance of way costs.

As the Board acknowledged in *TMPA*, BNSF incurs costs to maintain and replace these bridges. Failure to include any cost for these bridges – either as capital investment or maintenance of way – will understate stand-alone costs. BNSF has included the cost of the bridges excluded by Otter Tail as crossing over only roads in its restatement of the OTTRR bridge investment costs. The inclusion of cost for bridges crossing over only roads is also supported by the ICC Engineering Reports which identify a number of bridges as "over highway" or as crossing only specific streets (*e.g.*, 4th Street).[193] Copies of the ICC Engineering Reports are in the BNSF workpapers.

In addition to excluding bridges that cross over only roads, Otter Tail improperly excluded several other bridges from the OTRR bridge inventory. A comparison of BNSF's bridge inventory produced in discovery and the publicly available track charts used as the bridge source for the OTRR lines in Minnesota and Montana with the OTRR bridge inventory Otter Tail developed shows that Otter Tail excluded seven other bridges along the OTRR route:

- Bridge 28.529, Comstock, MN
- Bridge 11.9, Kent, MN
- Bridge 6.06, Wahpeton, MN
- Bridge 0.25, Benson, MN
- Bridge 600.5, Ortonville, MN
- Bridge 825.5, Ballantine, MT
- Bridge 0.75, Huntley, MT

[193] BNSF.RP.WP.III.F-0645-0646.

Each of these omitted bridges crosses a natural boundary or ditch along the proposed OTRR route and thus should have been included by Otter Tail. Photographs taken during BNSF's Engineering Consultants' field trip of four of the bridges – Wahpeton, Benson, Ortonville and Huntley -- show that these bridges are over ditches and not over roads.[194] For the other three bridges, the inventory clearly notes that they were over waterways. BNSF Engineering Consultants provide aerial photos and copies of topography maps that show that these bridges are over waterways.[195] Otter Tail does not explain why it has excluded these bridges. Mr. Michiels includes these bridges in BNSF's restatement.

(2) Obvious Inconsistencies in Inventory

Otter Tail made no effort to correct obvious errors in the bridge inventory where the span lengths in the "Description" column did not match the total bridge length in the "Length" column. In sixteen instances, it was fairly obvious that the span descriptions and associated lengths were inconsistent with the total bridge length.[196] In those instances, Otter Tail incorrectly used the sum of the span lengths rather than the total bridge length. The bridge "descriptions" on the BNSF bridge inventory are intended to describe generally the characteristics of each bridge, including the approximate length of each span at a particular crossing. It is common to use center-to-center bearing support lengths rounded to the nearest foot, but most superstructures have some amount of overhang that is not used in describing the overall length of the bridge.

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[194] BNSF.RP.WP.III.F-0620-0628 and BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf"at 3-11.

[195] *Id.*

[196] BNSF Reply electronic workpaper "III F 5 Bridge.xls," worksheet "Bridges."

The information in the "Length" column, however, is the measure of the overall bridge length as measured from abutment to abutment. Thus, the information in the "Length" column is the appropriate measure for determining the overall track length on a railroad system. In one instance, Bridge 76.45 in Dore, MT, the difference between the sum of spans and the bridge length was 234 feet.[197] Otter Tail made no effort to seek additional information to correct such errors or to make adjustments for them.

(3) Otter Tail Inconsistencies

There were seven instances where the "Otter Tail Tracks" column in Otter Tail's Opening Evidence Bridge Inventory did not match the Otter Tail schematics in OTP Opening Exh. III-B-1, resulting in the total number of tracks being understated. This occurred for the following bridges:

Line Segment	Bridge	Otter Tail Tracks	Otter Tail Schematic Tracks	OTP Exh. III-B-1 Page Number
40	86.02	2	1	15
40	38.43	2	4	15
40	0.41	2	13	16
39	118.302	1	3	19
39	40.1	1	2	20
38	93.1	2	3	22
191	5.2	2	1	3

(4) Railtop Structures Converted to Culverts

BNSF's bridge inventory showed three seven-foot "railtop" structures on Line Segment 306 near Glendive, MT. In its opening evidence, Otter Tail included these structures in its bridge inventory. These structures are three-sided timber boxes with fill and ballast located in areas with shallow ditches. Because these structures are sized and function like culverts, BNSF

[197] *Id.*

witnesses reclassified them as culverts. The structures are included in BNSF's restated culvert inventory and the costs are included in culvert costs.[198]

b. Bridge Classification Deficiencies

Although Otter Tail did not provide any explanation of its derivation of OTRR bridge classifications,[199] Messrs. Michiels and Meredith determined the general pattern of Otter Tail's classifications from Otter Tail's electronic workpapers.[200] Otter Tail assigned each bridge in the inventory to one of its three bridge classes. It then developed its "typical" bridge for each class based on the simple average of the heights, lengths, and spans of the bridges and used that assumed average bridge to develop a unit cost per bridge foot.

There are two basic problems with Otter Tail's methodology. First, it ignored all multiple track bridges in its development of the average bridge which skews the average. Second, in thirty instances where a bridge is compromised of various classes, the use of the assumed average class bridges without taking into consideration the adjustments that need to be made to match the individual class spans within the bridge results in miscalculation of quantities and costs of the substructures.

(1) Deficiencies Resulting From Failure to Account for Multiple Tracks

The assumed average class bridge is based on a single-track bridge rather than including multiple track bridges to determine the average bridge lengths, average span lengths and pier heights for each class. There are 98 multiple track structures on the OTRR, including a 3,856-

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[198] BNSF Reply electronic workpaper "III F OTRR Construction.xls," worksheet "Culvert List."

[199] Otter Tail's "bridge classifications" are more appropriately defined as "span classifications" as several classes are combined within a single bridge crossing.

[200] OTP Errata electronic workpaper "OTRR bridges V2.xls."

foot bridge in Valley City, ND; a 1,483-foot bridge in Bismarck, ND; and a 1,214-foot bridge in Dore, MT.[201] According to the Otter Tail inventory, these bridges have pier heights that exceed 150 feet, 100 feet and 50 feet, respectively. These three bridges (counting double track) account for 174 spans. These significant structures, along with the other multiple track structures on the OTRR, are not reflected in the assumed average class bridge.

By not considering multiple tracks in developing the assumed average class bridge, Otter Tail also understates the actual number of piers in determining the total number of piers and average pier heights for each class. Otter Tail's cost for Class 1 piers is based on a total of 959 piers (assuming 3 piers for 313 bridges) versus the actual number of 1,183 piers accounting for multiple track as indicated on Otter Tail's inventory. Similarly, there are 137 Class 2 piers and 39 Class 3 piers based on Otter Tail's method versus 229 piers for Class 2 and 59 for Class 3 when multiple tracks are taken into account.[202]

The table below shows the impact on the number of piers and average pier height for each class when all tracks are taken into account.

Table III.F.5-1
Comparison of Methods

Class	Otter Tail Single Track Method		Multiple-Tracks Method	
	No. of Piers	Ave. Pier Height	No. of Piers	Ave. Pier Height
Class 1	959	15 feet	1,183	16 feet
Class 2	137	33 feet	229	105 feet
Class 3	39	26 feet	59	54 feet

Source: OTP Errata electronic workpaper "OTRR bridges V2.xls"; BNSF Reply electronic workpaper "III F 5 Bridge.xls," worksheet "OTP_BNSF Inv. Comparison."

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[201] OTP Errata electronic workpaper "OTRR bridges V2.xls."

[202] BNSF Reply electronic workpaper "III F 5 Bridge.xls," worksheet "OTP_BNSF Inv. Comparison."

As can be seen from the table above, while taking all multiple tracks into account does not significantly affect the design of the Class 1 average pier, it does significantly affect the *quantity* of Class 1 piers. Both the *design and quantity* of Class 2 piers are substantially affected by the number of piers, while for Class 3, the *design* is substantially affected by the number of piers. The footings, piles and column diameters of the multi-column Class 2 and 3 piers will increase significantly based on the properly weighted average pier heights shown above. The increase will then affect the assumed average bridge cost for each class.

(2) Deficiencies/Discrepancies Resulting From Mixing Various Class Spans in a Single Bridge

Mixing class types within a single bridge also skews the averaging. In developing the cost for the assumed average Class 1 bridge, Otter Tail asserts that there is a total of 23,167 feet of bridge comprised of Class 1 spans. There are 288 bridges that are made up of only Class 1 spans and 313 instances where bridges have at least one Class 1 span. Based on an analysis of Otter Tail's Errata bridge inventory, BNSF witnesses Michiels and Meredith determined that Otter Tail developed the average length of a single-track Class 1 bridge by dividing 23,167 feet by 313 instances of Class 1 spans to get an average of 74 feet. Otter Tail then developed the average span length for a single-track Class 1 bridge by dividing the 23,167 feet by 1,272 single-track spans to get its approximate 18-foot average span length. This is clearly erroneous. If the span lengths are 18 feet, then 18 feet multiplied by 1,272 spans totals 22,896 feet and not 23,167 feet as Otter Tail claims. The difference is 271 feet or 3.66 bridges at 74 feet.

Using similar procedures, Messrs. Michiels and Meredith found that there are small differences in the total bridge lengths for Class 2 and 3 spans, although not as significant as the

difference in Class 1.[203] However, if the average span length for a Class 2 span is 63 feet and the number of spans for the assumed average bridge is three as Otter Tail proposes, then the average bridge length would be 189 feet rather than 202 feet used by Otter Tail in costing its Class 2 bridge.[204] For Class 3 bridges, the average bridge length would be 336 feet instead of the 253 feet used by Otter Tail.[205]

These discrepancies exist because Otter Tail mixes classes of spans on 30 bridges. The greatest errors exist with Class 1 and 3 spans because Class 1 spans are used in 28 of the 30 mixed bridges and Class 3 spans are used in 12 of the 30 instances. Class 2 spans are mixed with Class 1 spans 19 times, but because there are many more Class 1 spans than Class 2 spans in those instances, there is less of an impact on Class 2 span lengths. Because Otter Tail uses "instances" rather than a more accurate count of spans, the discrepancies in lengths exist and the costs are thus misleading.

(3) Correction of Bridge Classification Deficiencies

Creating an assumed average bridge type based only on single-track structures and with mixed class spans as Otter Tail has done produces misleading results, especially for bridges of significant length and height. Correcting the errors and deficiencies in Otter Tail's method for costing its assumed average class bridges will not only affect how the bridge costs are determined, but will also result in changes to design, which are directly related to the cost. Specifically,

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[203] *Id.* The total length of Class 2 spans is within 23 feet of the asserted 12,514 feet of Class 2 bridge feet and the total length of Class 3 spans is within 10 feet of the asserted 7,840 feet of Class 3 bridges.

[204] BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at page 66.

[205] *Id.* at page 77.

- Multiple tracks should be taken into consideration when determining an average cost for each class structure since the total track length for superstructures must be accounted for when using an assumed average bridge cost.

- The number and height of piers should also be accounted for when using an assumed average bridge cost.[206] The pier heights for each class will differ so much that it is difficult to accept costs for an assumed structure that is approximately 15 feet in height to be used with an assumed structure that is approximately 50 to 100 feet tall.

A more appropriate way to approach bridge costs for the OTRR is to eliminate altogether the assumptions for a "typical" complete bridge and instead take into account all of the structural units of the bridges on the OTRR and develop designs based on the weighted average span lengths, weighted average pier heights and weighted average abutment height for each class. Thus, instead of assuming a typical bridge with a superstructure supported by two average abutments and two or three piers. Mr. Michiels separately developed the cost for the superstructure by using the actual number of spans and the actual lengths for each class. He similarly developed the cost for the piers of each class based on the actual heights of the bridges as provided in the inventory and deducting the average superstructure depth to determine the height for design and cost purposes. The cost for the abutments of each class is based on the average superstructure depth and class for the structure it is to support. This allowed him to develop costs based on the actual characteristics of the OTRR bridges falling into each classification. Developing the costs based on the weighted average (rather than the simple

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[206] Interestingly, Otter Tail's spreadsheet provided the total number of spans, total heights and total length for each class, but did not provide the total number of piers. Otter Tail offered no explanation for the omission. However, the omission undoubtedly was due to the fact that the total number of piers in the assumed bridge cost for each class does not add up to the actual number.

average as Otter Tail had done) provides more accurate representations of the actual bridges on the OTRR.

For example, to cost the structures for a Class 1 bridge, Mr. Michiels took into consideration the average superstructure depth for a Class 1 span. The average superstructure for a Class 1 span at 18 feet in length is 35" which includes the 20" slab span, 8" ballast and a 7" tie. The average pier height to support Class 1 spans is then determined by deducting the 35" from the inventory height to get the average pier height. The loads are determined for design of the pier caps, columns, footings and piles. The abutments are shelf type abutments with backwalls and wingwalls that will accommodate the 35" superstructure depth. The cost for Class 1 structures is then based on the actual Class 1 superstructure lengths, actual number of Class 1 piers and the actual number of Class 1 abutments. Other appurtenances and construction items are then added to the cost for the structures that require them.

In developing the total costs for the substructure, the unit cost for each class pier is multiplied by the actual number of piers required in all of the bridges using the class pier. Thus, where classes of spans are mixed within a single bridge, each span within the bridge is evaluated to determine the class pier needed to support each end. This design method is more consistent with actual industry practice and actual conditions involving construction of bridges with multiple types of structures.

(4) Unique Bridge Structures

Where there are unique construction challenges for a very large or unusual bridge, Mr. Michiels removed those bridges from the Classes assigned by Otter Tail and created a special category in which each bridge is costed separately. There are two complete bridges and a lift span on the OTRR that require the development of a special class category. Both the Valley City

Bridge in Valley City, ND and the Bismarck Bridge in Bismarck, ND were treated as special structures as well as the lift span of the moveable span bridge in Snowden.

Mr. Michiels treated the Valley City Bridge as a special bridge because of its great height and very tall piers. To include these pier heights in developing the average Class 2 pier would skew the weighted average of those piers, as shown in Table III.F.5-1. In developing the costs for this Class 2 Special bridge, Mr. Michiels used the basic design for the Class 2 span type, but designed the piers as single stem shafts to support the double track spans. The single shaft pier is more economical than the multi-column concrete pier type that was assumed by Otter Tail, which would have required larger diameter columns and column struts. Mr. Michiels developed the costs for that bridge based on the average span length for Class 2 spans and using the same procedures as described above for the Class 1 example.

The Bismarck Bridge, which is currently a truss bridge, was treated as a special structure because of its great length and the need for efficiency in the design of this bridge as a through plate girder bridge. Ten through plate girder (TPG) spans at 148 feet in length will span the 1,483-foot crossing of the Missouri River. To meet the AREMA clearance requirements, the TPG spacings will be wider and the overall span will be heavier than the typical Class 3 spans. The span arrangement was selected to maximize the span lengths within the maximum permissible length of 155 feet for the through plate girders. Since Otter Tail calls for the crossing to have two tracks, a common pier will be constructed to support the dual spans.

The average water depth of the Missouri River at this location is estimated to be 20 feet. For the design and costs of special piers, BNSF engineers have added an additional 20 feet to the inventory height to account for the estimated depth of the river. The high water elevation and low water elevation difference is approximately 20 feet. For the construction of the piers,

cofferdams averaging approximately 56 feet in height will be required for each pier. The Bismarck bridge pier will be a solid stem pier, generally similar to the Valley City bridge special pier; however, it will include ice breakers (pier protection) as part of the pier configuration. The special abutments will be sized to account for the superstructure depth and loads for the superstructure span.

The vertical lift span bridge at Snowden, which Otter Tail did not replace in-kind with a similar movable span in its Class 3 bridge, is included in the BNSF Reply Inventory as a Class 3 bridge for the fixed spans while the lift span portion was treated as a special structure. Otter Tail improperly replaced the vertical lift span with two through plate girder spans and an additional Class 3 pier. This change, however, is not permissible because federal law requires the bridge to be opened upon demand.[207] Although the lift span is not moved at present, it is still required and could be ordered open at any time in the future.[208]

Otter Tail's opening Narrative and workpapers provide no explanation for failing to construct the lift span nor any evidence that a movable bridge is not required at this site. In fact, Otter Tail's opening evidence is entirely silent on this subject. As BNSF has not been relieved of its affirmative obligation to maintain this lift span and be prepared to open it upon demand, the bridge must be included in the OTRR inventory.

Mr. Michiels has developed costs for this bridge as a Class 3 span, but separately developed the cost of the lift span using cost data for a 340-foot vertical lift span being

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[207] U.S. Coast Guard regulation 33 CFR § 117 states that any movable bridge over navigable waterways shall be maintained to open upon demand, unless there is a special provision listed specifically for that bridge. There is no special provision for this or any other bridge in Montana. BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at page 430.

[208] BNSF's predecessor's request to remove the movable span was denied by the War Department in 1945 and again in 1958. BNSF.RP.WP.III-F-0629-0633.

developed for { }.[209] The cost has been prorated for a 300-foot bridge and indexed to 1Q02 for a cost of $25.74 million. The cost is then doubled since the crossing requires two tracks based on the Otter Tail Opening Evidence Errata Inventory.[210] BNSF Engineering Consultants provided two separate structures to provide redundancy so that if one movable span is unable to be raised or lowered, or needs to be repaired, the other span could be used to maintain rail operations.

c. Bridge Design Deficiencies

Otter Tail did not provide any meaningful back up for its typical bridge designs. It includes in its workpapers a handful of oversimplified drawings of piers and abutments for OTRR bridges, but provides only limited details or other calculations to show how it determined the dimensions for its piers and abutments or that they are sufficient to support the loads and forces created by trains, wind, ice and stream flows.

(1) Superstructure Design

Generally, slab spans will not work structurally for railway spans greater than 25 feet in length, but since the average span length is approximately 18 feet, Messrs. Michiels and Meredith accepted the Otter Tail superstructure selection for costing Class 1 spans. In accordance with common industry practice, they included bridge bearings in the linear foot cost for the slab span.

BNSF Engineering Consultants also accepted the proposed steel section and estimated weight for the Class 2 deck plate girder spans. The miscellaneous steel for this class includes all necessary items in the miscellaneous weight of steel, including bridge bearings.

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[209] BNSF.RP.WP.III.F-0634-0644 and BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at pages 474-484.

[210] OTP Errata electronic workpaper "OTRR Bridges V2.xls."

Messrs. Michiels and Meredith did not find the Class 3 spans adequate. For its Class 3 through plate girder spans, Otter Tail omitted several structural steel components from the miscellaneous steel calculations, thereby significantly understating the weight of steel used in its calculations. This has a direct effect on the capacity, constructability and cost of this class' superstructure span. In response to a workpaper request, Otter Tail asserts that miscellaneous steel is 250 pounds per linear foot.[211] Otter Tail did not define miscellaneous steel other than as "(braces, etc.)." Based on analysis of Otter Tail workpapers, BNSF determined that the miscellaneous weight includes kneebraces (floorbeam brackets), connection angles, connection plates, and lateral bracing members. The remaining items that need to be included in the miscellaneous weight are intermediate and bearing stiffeners, girder web and flange splice plates, and steel bridge rocker bearings. The bearings and intermediate stiffeners are required for through plate girders based on AREMA Manual Chapter 15, Articles 1.7.7 and 1.7.8. Stiffeners contribute 135 pounds per linear foot to the miscellaneous steel weight.[212]

Otter Tail also failed to take into consideration plate length limits with respect to Class 3 bridges. The average length for the Class 3 spans is 111 feet. Since there are maximum plate lengths that can be manufactured by a steel fabricator, which range from 60 feet to 85 feet, field splice plates for the girder web and flanges may be necessary for plate girders. Plate thicknesses and specifications also limit plate lengths, as do state law restrictions on the lengths that can be transported over highways. Since during construction of the railroad, most of the material will be transported by roadways to the bridge construction sites, state transportation limits on the

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[211] Otter Tail Response to Defendant's First Request for Workpapers, Response No. 32, July 14, 2003. BNSF.RP.WP.III.F-0583.

[212] BNSF Reply electronic workpaper "III F 5 Bridge Unit Costs.xls," worksheet "Cost by Class."

lengths and weight of plates girders that will be allowed on state roadways and bridges will determine the size of the plates. Mr. Michiels' design of splices conforms to AREMA Manual Chapter 15, Articles 1.7.5 and 1.7.6. Splices contribute 68 pounds per linear foot to the miscellaneous steel weight.[213]

Steel bridge bearings for Class 3 structures will be steel rocker bearings as suggested by AREMA Manual Chapter 19, Articles 1.1.2, 1.1.3b, and 1.1.4. The design of the steel bearings for the Class 3 structures conforms to AREMA Manual Chapter 19, § 1.3. This section also covers minimum requirements for anchor bolts, which are also included in the weight for structural steel.[214] The steel rocker bearings are significant since they have an estimated weight of approximately 1,400 pounds each.[215] Bearings and anchor bolts contribute 52 pounds per linear foot to the miscellaneous steel weight.[216]

On a number of bridge crossings, where Otter Tail mixed the different class spans, some adjustments were necessary to match up the different bridge sections.[217]

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[213] BNSF Reply electronic workpapers "III F 5 Bridge Superstructure.xls," worksheet "Class 3 Steel" and "III F 5 Bridge Workpapers.pdf" at page 46.

[214] BNSF Reply electronic workpapers "III F 5 Bridge Superstructure.xls," worksheet "Class 3 Steel" and "III F 5 Bridge Workpapers.pdf" at page 50.

[215] BNSF Reply electronic workpapers "III F 5 Bridge Superstructure.xls," worksheet "Class 3 Steel" and "III F 5 Bridge Workpapers.pdf" at page 47-49.

[216] BNSF Reply electronic workpaper "III F 5 Bridge Unit Costs.xls," worksheet "Cost by Class."

[217] Otter Tail uses ballast decks on all three classes. The outline of the deck and ballast curbs is called the ballast trough. The ballast troughs as designed by Otter Tail were different for each class of bridge. Where Otter Tail mixed class spans on a bridge, it failed to take into consideration the need to align the ballast troughs for drainage purposes. To accomplish this, and at the same time meet the AREMA clearance requirements as defined in AREMA Chapter 15, Article 1.2.6a, Mr. Michiels adjusted the Otter Tail defined class spans. The Class 1 span ballast trough was adjusted with the out-to-out width of the curbs remaining the same. The Class 2 span ballast trough adjustment resulted in a decrease in the out-to-out width of the deck to 15'-0". The center-to-center spacing of girders for the Class 3 spans were widened to accommodate

(2) Pier Design

In analyzing the Otter Tail piers for AREMA design loads based on the Otter Tail span lengths and pier heights, Mr. Michiels found that the Class 1, 2 and 3 piers were structurally inadequate to support these loads. The Class 2 pier as designed by Dr. Sharma was substantially inadequate to support the very large Valley City Bridge, so that bridge's pier was redesigned and redesignated as a Class 2 Special pier. The Class 3 Special pier for the Bismarck bridge is similar to the Class 2 Special pier since a multi-column structure would be inappropriate for the duel spans and the required 121-foot tall pier. Details of Mr. Michiels' calculations are included in BNSF's electronic workpapers.[218]

Since Otter Tail chose to mix spans, Mr. Michiels adjusted his piers to accommodate the various superstructures, which all have different depths and bearing requirements. Class 2 piers are designed to support a Class 2 span, which is the deepest superstructure, so Class 2 piers need to be able to support Class 1 and Class 3 superstructures as well. When a Class 1 span meets a Class 2 span, one of the piers needs to drop out. Since the average Class 2 span is deeper than the average Class 1 span, the Class 2 pier needs to be used. The difference in the superstructure depth between Class 1 and the other two classes is approximately five feet. To account for the height difference, mini steel bent frames must be installed on the Class 2 pier cap to support the Class 1 spans. Except for the Class 3 Special piers, BNSF engineers included two feet of ground cover or two feet of water to the pier heights for each class pier to account for cover above the top of pier footings.

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the AREMA clearance requirements. BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at pages 191-215.

[218] BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at pages 216-223.

In addition to ignoring the necessary pier cap adjustment for superstructure changes, Otter Tail also failed to take into account the superstructure depths in determining the pier heights. The structure heights in the BNSF inventory are measured from the top of tie to the top of ground surface or mean water elevation for rivers. Mr. Michiels has adjusted the pier heights to account for the weighted average span depth for each class. Thus, the Class 1 piers support only Class 1 superstructure spans, Class 3 piers support Class 1 and 3 superstructures, and Class 2 piers support all three classes of superstructures.

(3) Abutment Design

Mr. Michiels disagreed with even the concept of Dr. Sharma's design for abutments because his proposed abutments are missing critical components. Dr. Sharma included the abutment, footing and steel piles, but completely ignored the bridge seat to support the span; the backwall to retain the earth from spilling onto the bearings and to support the approach tracks; and the wingwalls to retain the earth behind the abutments.[219]

In addition, Dr. Sharma's design would require very tall abutments. Such tall abutments would require long wingwalls that would have to be designed to account for both the earth pressure and surcharge loads. The wingwall lengths would require additional footings and piles to support these loads. Most of the existing bridges on the proposed OTRR line have small abutments with fill slopes. Constructing the tall abutments required under Dr. Sharma's design would alter the existing fill slopes and also require additional excavation, which were not accounted for by Otter Tail. Finally, Dr. Sharma's abutments are all cantilever types, which

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[219] BNSF Reply electronic workpaper "III F 5 Bridge Substructure.xls," worksheet "Abutment Wingwalls."

typically are not very economical because of their size. The footings would be larger and there would be more piles in comparison to shelf type abutments.

In addition to being uneconomical, Dr. Sharma's design is inconsistent with the pattern of the existing bridges on the BNSF, which have small abutments with fill slopes and would result in altering the existing lay of the land.

Mr. Michiels has resized and redesigned the Class 1, 2 and 3 abutments to include the common and necessary features and to support more efficiently and effectively their respective superstructure spans. Details of his analysis and calculations are included in BNSF's electronic workpapers.[220]

(4) Pile Design

Dr. Sharma provided limited and incomplete details about the pile design he proposed for his typical bridges. From the workpapers, Mr. Michiels determined that Otter Tail's Class 1 piers used four piles per unit, Class 2 piers had six piles and the Class 3 piers had eight piles. The same number of piles were used for similar class abutments. This pattern for piles is not sufficient to support the superstructures, wind forces and loads created by trains. As noted earlier, none of Dr. Sharma's typical design configurations met the standards for supporting the loads that would result from the weight of the superstructures, the substructure and the train loads that would be put on them.

Mr. Michiels redesigned the average superstructures, piers and abutments for each class based on a weighted average to capture more precisely the characteristics of the bridges on the OTRR. Based on his new design, the average heights for Class 1, 2, and 3 piers are 14 feet, 26 feet and 27 feet, respectively. Steel piles assumed to be 40 feet in length are required to support

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[220] BNSF Reply electronic workpaper "III F Bridge Workpapers.pdf" at pages 283-377.

these structures. In determining the number of piles that are needed, it is necessary to take into consideration the braking and traction forces that are transferred down to the piles, as well as the wind loads. Otter Tail ignored these forces in its calculations. To account for the moments (forces that cause the structure to rotate), Mr. Michiels reduced the capacity of the piles and then developed the number of piles needed to support the vertical loads of the structures. The reserve capacity of the piles would be able to withstand the moments that the structure would have to support.

Mr. Michiels determined that Dr. Sharma's use of the non-representative typicals resulted in an understatement of the number of piles that would be needed to support the actual bridges on the OTRR in all classes. Dr. Sharma's use of a typical bridge based on a simple average using only six piles for Class 2 piers was especially inappropriate for the large Valley City bridge, which has a height of 153 feet. Mr. Michiels determined that it would take 47 piles per pier to support that bridge and he also determined that it would take 88 piles to support the Class 3 Special piers for the Bismarck bridge. To construct the bridge according to Dr. Sharma's multi-column pier design would have required larger diameter columns and column struts. The BNSF Class 2 Special and Class 3 Special piers were designed as single stem shafts to provide better support for the double superstructure spans on this large bridge.

d. Missing Structural Components and Neglected Construction Practices

Dr. Sharma has overlooked a number of structural components in his bridge types as well as failed to take into consideration requirements for the actual construction of these bridges.

(1) Missing Structural Components

Otter Tail's bridge designs and therefore its bridge investment costs failed to include several essential bridge components in each of the three bridge classes. The omitted

superstructure items for all three classes include deck expansion joints, deck drains and deck waterproofing.

Deck expansion joints[221] are needed to allow the bridge to expand and contract with thermal changes and to accommodate for changes in the span under a live load, as set forth in AREMA Manual, Chapter 8, Articles 2.23.2 and 17.7, and Chapter 15, Article 1.13.[222] Expansion joints also act as a protection system for the superstructure and substructure members, including bridge bearings. The expansion joints limit water, debris and ballast from falling into the open joint and otherwise preventing proper bridge movement. They also reduce corrosion of steel members. There are various types of expansion joints ranging from compression sealers to very expensive modular expansion dams. For the OTRR, ballast deck bridges would require compression sealers with steel cover plates. The steel cover plates protect the rubber joint sealer from the overlying ballast.

Drainage pipes are needed to remove water from bridge decks. Six-inch diameter pipes are used to channel the water off the deck and away from the structure. Drainage pipes or downspouts are typically placed at a maximum of 15 feet on center of drains along the span near the interface of the deck and ballast curb. As a minimum, there are four drains per span, one near each corner of the span. The drains will extend a minimum of one inch beyond the base of the concrete or steel ballast decks or the base of the prestressed concrete slab span surface.[223]

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[221] BNSF Reply electronic workpaper "III F 5 Bridge Unit Costs.xls," worksheet "Cost by Class."

[222] BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at pages 417-464.

[223] BNSF Reply electronic workpaper "III F 5 Bridge Unit Costs.xls," worksheet "Cost by Class."

Deck waterproofing on bridge decks provides two functions: (1) it protects the concrete or steel surfaces from standing water; and (2) it protects both the ballast and the deck surface from damage due to the enormous pressure that occurs when the train loads are transferred from the ballast to the deck. In climates that are susceptible to freezing temperatures, the top surface of concrete decks and spans must be protected to prevent water from entering cracks in the concrete. In freezing temperatures, water in the cracks will widen and deepen the cracks increasing the risk of corrosion of the reinforcing steel or prestressing strands in the concrete. Corrosion of the steel in concrete will weaken the carrying capacity of the structure. In determining the waterproofing needs of the OTRR bridges, Mr. Michiels followed the principles and recommended practices in AREMA Manual Chapter 29.[224]

Another important and unique feature of the OTRR is that it will have bridges over rivers that are likely to freeze in cold weather and therefore will have to be constructed in a way to facilitate breaking up the ice to protect the bridge structures. Otter Tail does not even acknowledge the adverse conditions under which these bridges will be built, much less the unique problems that will require continuing measures for ice control throughout the life of the bridges. Mr. Michiels has evaluated the weather conditions on the major rivers along the OTRR and has included pier protection to be cast with 131 piers on 31 bridges. The Missouri, Little Missouri, Yellowstone, Big Horn, Little Horn, Red, Hearth, Powder, Tongue and Minnesota Rivers are large enough to experience deep sheets of ice (otherwise called floes). State transportation agencies, specifically the North Dakota DOT, require the design for substructures to include protection against floes as deep as four feet. Pier protection will also help lower

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[224] BNSF Reply electronic workpaper "III F 5 Bridge Unit Costs.xls," worksheet "Cost by Class."

maintenance costs for debris clean-up, prevent concrete damage or failure due to the dynamic forces from ice floes and minimize the scour potential that may be created from build-up against the pier.[225]

Otter Tail's omission of these critical components has resulted in a substantial understatement of bridge costs.

(2) Neglected Construction Practices

With respect to construction of the bridges, Dr. Sharma and Otter Tail ignore the fact that where bridges are constructed over large waterways such as the sizeable Missouri and Yellowstone Rivers, special consideration must be given to constructing the footings to the bridges in the waterway, as well as to complications in installing the superstructures on lengthy bridges with sizeable spans. Otter Tail's opening evidence did not include any discussion or costs relating to the causeways, barges, cranes or land bridges that would be needed to construct these bridges. At a minimum, Otter Tail would need to construct cofferdams.

Cofferdams are temporary retaining structures that are used to support the soil of deep excavations where water is present. These temporary structures usually consist of vertical sheet piling, a bracing system composed of wales and struts or prestressed tiebacks, and a bottom seal course if required to keep out water. Contractors require cofferdams in situations where soils may settle or slide during construction of piers or abutments that may be in water. The cofferdams are installed and excavations are usually taken to the base of footing depths. Over excavation is sometimes specified to compensate for heave of soil material caused by pile driving displacement. The footing area is either dewatered by pumping the water out of the

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[225] BNSF Reply electronic workpaper "III F 5 Bridge Substructure.xls," worksheets "Pier Quantities" and "III F 5 Bridge Workpapers.pdf" at page 395 and 397.

enclosed cofferdam or a seal course is placed to prevent subsurface water from entering the cofferdam. The seal course may consist of concrete slab and/or slurry placed underwater.[226]

Steel sheet piling is commonly used with wales and struts and would be utilized for construction of bridge piers on the OTRR. The steel sheet piles have interlocks, which are connections for sheets to maintain alignment. There are various types of sheets depending on need. BNSF experts used Z-shaped section type sheets which have greatest resistance because of some of the large structures that are proposed on the OTRR and because it is readily available from steel manufacturers and distributors. Mr. Michiels included costs for steel type cofferdams for bridge pier construction of piers located in waterways such as rivers and streams. The sheet piles are assumed to be shore driven, except the sheet piles for Class 3 Special piers will be barge driven.

To construct the piers that are in water, tremie concrete is used. Tremie concrete is a method of placing concrete under water through a pipe or tube (tremie). The concrete flows through the tremie by either gravity with a hopper located at the top of the pipe or by direct connection to a concrete pump. The key to the operation is to place a monolithic surface of concrete underwater without creating turbulence. The discharge end of the tremie is embedded in the concrete as it is placed. A crane supports and maneuvers the tremie as concrete is placed. Tremie concrete is also used in cases where concrete is not allowed to freely drop when it is placed. The cost of the Tremie concrete is included in the cost for cofferdams. BNSF engineers assume that a minimum 1-foot thick concrete seal course will be pumped at each location.

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[226] BNSF Reply electronic workpaper "III F 5 Bridge Substructure.xls," worksheet "Pier Quantities."

Construction of bridges in climates with freezing temperatures also requires the use of winter concrete. The quantity of total concrete that requires winterizing is the fraction of concrete poured during the months of average freezing temperatures cited from the U.S. National Climatic Data Center in Asheville, NC. A weighted average is calculated by taking the track miles times the fraction of freezing days over a calendar year. The fraction or percentage of days freezing for a calendar year is applied to the total volume of concrete to determine the volume that requires winterizing. AREMA Manual Chapter 8, Article 1.17.1 requires that winter concrete be quantified on days when low temperature drops below freezing. The percentage and cost for the winter concrete is provided in BNSF Reply electronic workpapers.[227]

Another important construction specification for the bridges on the OTRR is access to the sites during construction. Much of the area on the proposed OTRR route is very remote. On certain segments of the OTRR the proposed bridges are far from the roadways. Access roads must be constructed from the roadways to the railroad sites in order to provide materials for bridge construction and to keep to the construction schedule and construction plan for the OTRR. Mr. Michiels determined that a total of 36 access roads would be required to construct bridges in remote construction areas along the route. The total length of access roads is 94,557 feet or 17.9 miles. Locations and costs for the access roads are included in BNSF's workpapers supporting the roadbed preparation costs in § III.F.2.

e. Quantity and Unit Price Deficiencies

In addition to the changes in quantities required as a result of Otter Tail's structural design deficiencies, BNSF witnesses Michiels and Meredith found Otter Tail's cost data

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[227] BNSF Reply electronic workpaper "III F 5 Bridge Unit Costs.xls," worksheet "Winter Factors."

deficient as well. They disagree with the unit costs used by Otter Tail as well as with Otter Tail's omission of components and construction activities.

(1) Cost Index

For the items that Otter Tail did include in its costs, Otter Tail relied on RS Means 2003 edition and then derived 1Q02 unit costs using the Historical Cost Index, which is itself derived from the Engineering News-Record Construction Cost Index History. ENR builds the index through a complex process that includes using 200 hours of common labor at the 20-city average of common labor rates, plus 25 hundred weight of standard structural steel shapes at the mill price prior to 1966 and the fabricated 20-city price from 1996, plus 1.128 tons of Portland cement at the 20-city price, plus 1,088 board feet of 2x4 lumber at the 20-city price. A more accurate way of determining 1Q02 unit costs is to extract the individual items from the 2002 Edition of RS Means. The BNSF Reply unit costs were obtained from a 2002 Edition of Means.

(2) Omitted Items

As noted above, Otter Tail omitted the following items:

- Winterizing concrete was not included in Otter Tail's costs. BNSF included winter concrete in accordance with the guidelines in AREMA Chapter 8, Article 1.17.1.
- Deck waterproofing was not included in Otter Tail's costs. BNSF included adequate protection of the deck surface from standing water and based its design on guidelines in AREMA Manual Chapter 29, § 1.2.
- Expansion Joints were not included in Otter Tail's costs. BNSF included expansion joints as a necessary component on concrete deck slabs to retain ballast and allow proper expansion of bridge spans due to temperature shrinkage.
- Structural excavation was not included in Otter Tail's costs. BNSF included the volume of the footing plus an 18-inch offset to allow for formwork.

- Pile points were not included in the Otter Tail costs. BNSF included pile points to prevent premature buckling and other deformities in the piles due to the impact from pile driving and to provide stability when in contact with a rocker layer.

- Deck drains were not included in the Otter Tail costs. BNSF included 6-inch deck drains to provide adequate drainage of standing water and lessen the possibility of development of hydrostatic pressure head on top the bridge deck slab.

- Ice floe protection. BNSF provided for ice floe protection where required.

- Prestressed Concrete deck slab span was not included in Otter Tail's costs. The RS Means item cited in Otter Tail's opening evidence was for a cast-in-place slab designed for 125 PSF live load. The concrete deck required to endure an E80 load typically must provide a design strength for approximately 1800 PSF. A prestressed, precast concrete slab span 20" deep x 7'-6" wide (2 each with ballast curbs) must be constructed. To determine an equivalent precast concrete deck from RS Means, BNSF engineers used RS Means:

  03410-100-1650 Beams, Rectangular, 40' span, 18"x52", $5,925, prorated for the equivalent volume of the 20"x7'-6"x18' slab span plus the volume for the ballast curb ($5,665)

- Cofferdams were not included in Otter Tail's costs. BNSF included cofferdams for pier construction in streams and bodies of water.

For all of these costs, BNSF relied on 2002 RS Means.[228]

(3) Pedestrian Overpass

BNSF owns and maintains a pedestrian overpass on Line Segment 4, Bridge 597.2 in Gillette, WY. The unit cost for this pedestrian bridge was determined by obtaining historical bid-tab data for this specific structure and deriving a cost by taking the linear foot cost for the superstructure and a unit cost for the substructure. In this case, a newly constructed pedestrian

[228] BNSF Reply electronic workpaper "III F 5 Bridge Workpapers.pdf" at pages 398-416.

bridge in Alexandria, VA (near Arlington, VA., May 2002) over CSXT was used to determine a unit cost.[229] An index and location factor were applied to derive a 1Q02 unit cost of $684,227. Calculations and bridge components are described in BNSF's workpapers.[230]

f. Walkways

Otter Tail states in its Narrative that it includes walkways on one side of all bridges longer than 50 feet. OTP Nar. at III-F-39. Mr. Michiels concurs that walkways are needed on only one side of single-track bridges, and limiting that to bridges longer than 50 feet. However, safety considerations mandate that bridges with two or more tracks and greater than 50 feet in length have a walkway on the outmost bridges. A walkway on only one side of a multi-track bridge would be dangerous for crewmen, contractors and others walking on the structure with trains occupying an adjacent track. For multi-track bridge locations greater than 50 feet in length, two walkways are included, with a walkway on the outermost sides of a bridge crossing. BNSF accepts Otter Tail's unit cost per linear foot for walkways and includes the cost for walkways as part of its bridge investment costs.

The table below summarizes the differences between BNSF's bridge costs and those of Otter Tail.

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[229] *Id.* at pages 465-473.

[230] *Id.* at pages 470-473.

Table III.F.5-2
Comparison of BNSF's Estimate Of Bridge Costs
With Otter Tail's Estimate In Opening Evidence

Bridge Category	BNSF		Otter Tail		Difference	
Class	**$/LF**	**Total Cost**	**$/LF**	**Total Cost**	**$/LF**	**Total Cost**
Class 1	$3,211	$104,741,337	$1,982	$57,045,924	$1,229	$47,695,413
Class 2	$3,727	$61,294,788	$2,374	$47,971,418	$1,353	$13,323,370
Class 2 Sp.	$6,902	$53,231,126			$6,902	$53,231,126
Class 3	$5,412	$52,546,833	$3,931	$46,193,181	$1,481	$6,353,652
Class 3 Sp.	$12,540	$37,194,809			$12,540	$37,194,809
Misc.	N/A	$58,068,093		4,611,601	N/A	$53,456,492
Total		**$367,076,986**		**$155,822,124**		**$211,254,862**

Source: BNSF Reply electronic work paper "III. F. 5 Bridge Unit Costs.xls," and OTP Errata electronic workpaper "OTRR Bridges V2.xls."

An inventory of the bridges on OTRR is included in BNSF's electronic workpapers.[231]

F.6. Signals and Communications

a. Signals

(1) Centralized Traffic Control System (CTC)

Otter Tail equips the OTRR with a CTC system on all mainline track other than Benson to Big Stone and the Kuehn and Big Sky branches. Otter Tail developed its costs for the CTC system based on costs accepted by the Board in *FMC,* indexed from 3Q97 to 1Q02. Based on data in *FMC,* Otter Tail calculated a per mainline mile unit cost for the base CTC system, a per CTC track mile unit cost for the dispatch center, and a per mainline mile unit cost for the provision of power to signal locations. It applied these unit costs to the pertinent mileages on OTRR.

[231] BNSF Reply electronic workpaper "III F 5 Bridge.xls."

As Otter Tail provided no information as to what was included in those costs or why they would be applicable to a system that would be built today for the OTRR, BNSF Engineering Consultant Price reviewed the components and costs associated with a CTC system and with all signal related components. He determined that Otter Tail's cost for CTC system based on the CTC network, dispatch center and powers to signals was acceptable.

(2) Hot Bearing Detectors/Dragging Equipment Detectors

To prevent damage to trains and track as a result of equipment failures, railroads install detectors along the route to identify and remove problem equipment before any damage occurs. Hot bearing detectors (HBDs) notify the crew when roller bearings are overheated. Dragging equipment detectors (DEDs) alert the train crew to defective and/or dragging equipment that could cause the train to derail or cause damage to the track, bridge or tunnel structures.

Otter Tail states in its Narrative that 44 automatic roll-by "hot bearing and defective equipment detectors (DED)" were located on the mainline, including 38 single track and six double track DEDs. OTP Nar. at III-F-41. Mr. Price agrees with the number and placement of the detectors.

DEDs perform both signal and communications functions. The signal indication alerts train crews of dragging equipment or overheated bearings. The immediate output of the DED is an audio voice message transmitted to the train crew over the two-way radio of the DED, which has the same frequency as that used on that territory. When no defects are detected, the DED will transmit a simple message -- "Defect Detector Milepost #, No Defects" a few seconds after the last axle in the train. The locomotive engineer cannot proceed unless he hears a message from the DED. If there is no message, the crew must stop and inspect (walk) the entire train to ensure that there is no problem. As discussed under § III.F.6.b. Communications, there is also a

communications component of the DED that transmits information back to management. Only the signal portion of the DED is included in Mr. Price's restatement of DED costs for the OTRR.

b. Communications

In its opening Narrative, Otter Tail states simply that "the communications system for the OTRR consists of a 6 GHz microwave backbone network that spans 45 sites along the OTRR route," with microwave towers to "support locomotive communications, two-way radio communications, general voice communications, general data communications, AEI reader data transfers, and FED alerts." OTP Nar. at III-F-40. It further states that it included additional microwave sites where "the BNSF microwave site locations did not facilitate adequate coverage for the OTRR microwave network," *id.,* and that for tower heights where there was no BNSF information as to the height (*i.e.*, the ones they added) "tower height was over-engineered." *Id.* at III-F-41. Otter Tail further states that it relies on an 800 MHz Land Mobile Radio network to provide "communication access via mobile and portable radios for operating crews, supervisory and track maintenance personnel that need to communicate with the railroad's operating headquarters and central dispatching facility." *Id.*

The Narrative would suggest that Otter Tail has improved on BNSF's microwave system, but the truth is that it has not even come close to presenting a communications system that would be operable in the railroad industry. Otter Tail's proposed microwave and radio system is simply an amalgamation of information off the internet that has no relevance to railroads and is completely lacking in design. It gives no specifications, no standards, and no explanation of how it supposedly "over-engineered" the microwave towers or the impact of such "over-engineering."

Analysis of Otter Tail's workpapers reveals that Otter Tail witness Mullan is proposing an all digital all wireless system for the railroad based on specifications for a bid request by the State of Colorado Department of Transportation (CDOT). Based on the accompanying

workpapers, the CDOT system appears to be a part of an Enterprise Program established in 1991 between four U.S. states with common interests in Intelligent Transportation Systems (ITS), a pool-fund study set up in conjunction with the Federal Highway Administration of the U.S. Department of Transportation.[232] BNSF's witness Joseph Walton III, who at the time the ITS program was being developed was Chairman of the Technological Subcommittee for AEI for AAR and was the railroad representative to the early planning for ITS, is well aware of the limitations of that system and its irrelevance to railroad communications. The ITS system does not meet, or even attempt to meet, the standards for railroad communications because it does not involve anything near the types of systems that are needed for railroad communications. The ITS Systems are generally within a limited jurisdiction and involve such things as timing of intersections, cameras for enforcing traffic signals and speed limits, and coordination of emergency vehicles within one or more jurisdictions in a metropolitan area, or traffic message boards. It does not involve the rapid two-way communications required over an entire railroad system, and inter-railroad communications where railroads interchange or run over trackage rights.[233] Railroads require a system with a much larger voice channel capacity, a much higher level of reliability, and much greater rapid response capability.

Based only on the general information on microwave tower sites that BNSF provided to Otter Tail in response to its discovery request and the general specifications for the components for the system ordered by the CDOT, Otter Tail purports to fashion an all digital, all wireless system for the OTRR. Glaringly lacking, however, is any physical architecture or system

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[232] OTP.OP.WP.4640-4688.

[233] BNSF.RP.WP.III.F-0680-0682.

engineering design documentation for the proposed system, or any reference whatsoever to specifications and railroad standards.

The OTRR must replicate a railroad communications system that meets the standards for a coal hauling and mixed commodities railroad. The communications system proposed by Otter Tail witness Mullan for the OTRR does not account for the reality of rail operations in the northern Great Plains' terrain of the United States. Simply put, the Otter Tail proposed system is not suitable for the complex radio communications in the railroad environment.

(1) Critique of Otter Tail's Specifications

Otter Tail's proposed communications system has two major flaws. First, the equipment it relies on cannot provide the reliability that is required on a railroad the size of the OTRR. Second, its microwave system does not take into account the proper tower spacing and heights for the OTRR route.

(a) Otter Tail's Proposed Equipment Does Not Provide Sufficient Reliability

Reliability is the most important requirement of a railroad communications system because of the high priority given to safe train operations. Reliability means that the system has good coverage with minimal interference and virtually no downtime. FRA regulations require railroads to maintain reliable and clear communications throughout their entire system and to pay stiff penalties for any failure to comply with its regulations. As the author of one article on railroad communications notes

> A PMRS licensee, such as a manufacturer, is told by the FCC (or the frequency coordinator): 'Thou shalt not exceed certain limits in your coverage.' (And if you have dead areas, that's your problem.) A railroad is told by the Federal Railroad Administration (FRA): 'Thou shalt cover everything you've got.' (And if you have dead

areas, you're going to have a problem, to the tune of $11,000 a day, until you fix it.)[234]

FRA regulations at 49 CFR § 220 require that railroad employees have "working radios," which it defines as "a radio that can communicate with the control center of the railroad (through repeater stations if necessary to reach the center) from any location within the rail system" (with limited exceptions for localized areas of extreme topography) and in the case of joint operations on another railroad, "able to reach the control center of the host railroad." 49 CFR § 220.5. The FRA further requires that all trains be equipped with a working radio in the controlling locomotive and also have communications redundancy, meaning "a working radio on another locomotive in the consist or other means of working wireless communications." 49 CFR § 220.9. Roadway workers also must have "immediate access to a working radio." 49 CFR § 220.11(b). All railroad communications must be clear and complete before any action can be taken. 49 CFR § 220.45. Failure to comply with FRA regulations carries penalties of up to $11,000 per day. 49 CFR § 220.7.

Otter Tail's proposed system does not provide the level of reliability that is needed on a nearly 1,300 mile railroad interchanging with another Class 1 railroad at various locations on its system. Otter Tail's proposed 800 band UHF system does not provide either the coverage or inter-operability that is necessary for major rail operations such as those of the OTRR, which is assumed to operate across five states. All major railroads in the U.S., Canada and Mexico have agreed to use dedicated VHF band channels in order to ensure reliability and inter-operability. UHF is ultra high frequency. The higher the frequency of the wave, the more easily it is affected by natural phenomenon such as thunderstorms, rain, thermal energy changes, sun spots and other

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[234] "Challenges for Railroad Radio", by D.A. Keckler, *Mobile Radio Technology*, (May 1, 2000). BNSF.RP.WP.III.F-0683-0686.

phenomenon such as passing over bodies of water. UHF waves travel in a straight line through space and thus lose their strength within a relatively short distance. In contrast, VHF waves use the earth as part of their propagation, which gives them very good coverage. Because railroads must maintain instantaneous and uninterrupted communications between headquarters, dispatchers, yard masters, train crews, remotely controlled locomotives within a train consist, maintenance crews across their entire systems as well as with other railroads with whom they interchange or over whose lines they have trackage rights, they must use a frequency band that is strong and reliable. The UHF bands do not provide the necessary coverage or reliability.

Second, because reliability is essential, interference must be minimized. For that reason, the FCC assigned the railroad industry 96 channels for their exclusive use. The FCC and railroads agree that keeping these channels in the private sector -- *i.e.,* free from interference from non-railroad users -- is the best way to ensure the reliability and rapid response that are absolutely essential to a railroad's day-to-day operations. These 96 VHF channels play a vital role in railroad communications not only within an individual railroad system, but in communications between railroads as well. Canada and Mexico have dedicated these same two-way radio channel frequencies to exclusive railroad use to provide compatibility for railroads throughout North American. The use of trackage rights, where one railroad operates over the tracks of another, is a standard component of modern railroading, and thus it is quite common for locomotives or trains of one railroad to pass from the operations of one railroad to another. For that reason, all major railroads in the U.S., Canada and Mexico use these same 96 VHF channels in order to ensure inter-operability and to make possible the safe and efficient operation of many trains and crews operating within proximity of one another. Because the railroad industry relies on VHF, railroads have equipped their locomotives and control centers with VHF equipment.

An individual railroad that will be interchanging with other railroads or using trackage rights over other railroads cannot unilaterally switch to UHF because UHF is incompatible with other railroads' systems. Since the OTRR will be interchanging with BNSF, its locomotives must be able to communicate with BNSF dispatchers and yardmasters using a reliable radio with instant response.

Third, Otter Tail proposes using microwave radio equipment Alcatel MDR 8500 6 GHz., which according to the price ($22,427) is equipment with Hot-Standby having a capacity of 2 ea. DS1 signal designation. A DS1 has a bit rate of 1,544 (kb/s) or 24 voice frequency channels. Thus, the capacity for the microwave system proposed by Otter Tail would be 48 channels for the entire system which is totally out-of-line with reality. That size capacity could not handle the more than 200 signal control points on the OTRR. At a minimum, the capacity should be a DS3 with a bit rate (kb/s) of 44,736 or 672 voice frequency channels. As discussed more fully below under the description of Mr. Walton's proposed system, the use of two-way radio communications with rapid response -- *i.e.,* a system that requires pushing a single button or just speaking to activate -- over 672 voice frequency channels allows the railroad to assign radio channels in a way that separates the various rail operating functions and personnel and thus to ensure the safety of personnel and the proper handling of cars.

(b) Otter Tail's Proposed Microwave System Does Not Take Into Consideration the Actual Needs of the OTRR

Although the general microwave information provided by BNSF in response to discovery indicates that BNSF's existing system is a mix of digital and analog microwave systems, it is clear from Otter Tail's workpapers that it intended to design an all digital all wireless system for OTRR. Mr. Walton accepts the specification for an all digital all wireless system, but costs a system that meets the reliability and compatibility requirements of the railroad. This means a

high speed wireless communications system with fully integrated subsystems that are activated by a rapid response mechanism such as a "push-to-talk" button or "simply speak" feature.

The microwave system proposed by Otter Tail does not take into account the specific terrain of the OTRR. A brief analysis of the information provided by BNSF[235] and of how Otter Tail ignored that data demonstrates the flaws in Otter Tail's proposed system. For the purposes of this analysis, Mr. Walton used the State of North Dakota because the heights and spacing of the towers and the general terrain across the entire state is representative of the entire railroad.

- Otter Tail listed 15 microwave tower locations between Sentinel Butte and Fargo, ND. Only five of those towers were included on the list of microwave sites provided by BNSF. The other ten were selected by Otter Tail based on its assumption that there would be a clear line of sight every 35-40 miles. (Otter Tail workpapers at 4636-4639 indicate "microwave line of sight 35-40 miles.")

- In the real-world, the only way to accurately determine a clear path or proper distance between microwave towers is to use the latitude/longitude information for the particular sites. BNSF provided that information for its existing sites, but as Otter Tail chose to set up an entirely new system of towers, it had such information only for the five sites it selected from the BNSF data. Thus, Otter Tail used a simplifying methodology: it relied on an average line of sight based on irrelevant information and calculated the number of microwave towers and approximate locations based on that average. An analysis of the actual path between two of the BNSF sites used by Otter Tail -- Antelope and Dickinson -- shows that the microwave path between those points is 24.29 miles, significantly less that Otter Tail's assumed path.[236]

- The data provided by BNSF showed 17 actual microwave tower locations between Sentinel Butte and Fargo with a total microwave path of 350.44 miles. Thus, an average tower spacing in ND based on the actual data for making such determination would be 21.90 miles per path (350.44 divided by 16).

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[235] BNSF.RP.WP.III.F-0687-0691.

[236] In calculating the microwave path, Mr. Walton used the software programs DeLorme Street Atlas, USA, version 8.0 and DeLorme Street Atlas USA 2003 Plus.

- BNSF also listed the actual heights of each of the 17 towers. These heights are as follows:

▪ Sentinel Butte	60 feet
▪ Fryburg	150 feet
▪ Dickinson	140 feet
▪ Dickinson Depot	70 feet
▪ Antelope Hill	60 feet
▪ New Salem	189 feet
▪ Lincoln	198 feet
▪ Angora	170 feet
▪ Mandan	60 feet
▪ Tappen	260 feet
▪ Cleveland	170 feet
▪ Jamestown	150 feet
▪ Spiritwood	240 feet
▪ Peak	218 feet
▪ Wheatland	260 feet
▪ Arthur	298 feet
▪ Fargo	150 feet

  The average height of these microwave towers is 167 feet (2,843 feet divided by 17).

- Otter Tail appears to be assuming that the railroad mileage is the same as the microwave path mileage. The railroad mileage from Sentinel Butte to Fargo is 349.57 miles and the microwave path mileage between those points is 350.44 miles. While the two mileages in this instance are just about the same, the railroad mileage and the microwave path mileage are not always the same between any two points. For example, the railroad mileage between Sentinel Butte and the next microwave station at Fryburg is 32.7 miles, but the microwave path mileage between those points is only 24.80 miles.

Thus, Otter Tail's average space between microwave towers and average tower heights are based on materials that have no relevance to railroad communications systems and have no relevance to the actual route upon which they are placed.

(2) BNSF's Proposed System

As Otter Tail witness Mullan did not provide documents showing the physical architecture of his proposed system, BNSF witness Walton independently developed a digital wireless system for the OTRR based on the actual BNSF data for the OTRR line segments.

In today's railroading, the communications network will be made up of digital wireless sub-systems that operate at very high speeds. As more capacity is added, the microwave towers must be sited closer together in order to achieve high speed communications, As noted above, railroads require at least 672 channels (DS3) for operations within their systems.

There are two fundamental functions that drive the operational design of railroad communications: (1) the loading, unloading, interchange and switching of railcars into and out of trains and (2) the safe movement of trains from the assembly point to final destination. Each of these functions requires a communications system that is characterized by rapid response capabilities and a very high reliability for continuous uptime.

Generally, cars are placed for loading and unloading, interchanged, inspected and switched by railroad employees. The communications tool used by these railroad crews is a two-way radio communication.

Rail yard operations provide a good example of how two-way radio communications enable all rail employees to perform their duties safely and properly. It is not uncommon for a Yardmaster, who is in charge of building trains and shepherding them through yards, to have control of many radio channels. These various radio channels represent the many people who have individual responsibilities for rail operations. The channels are assigned in a way that separates the various rail operating functions so that there is no confusion as to whom instructions are directed and what the instructions mean. This separation of functions ensures both the safety of personnel and the proper handling of loaded and empty cars.

Communication systems in railroad yards are made up of many sub-communication systems. These sub-systems require wireless radio communications that cover a wide range of radio spectrums. The physical communications plant requires towers, antennas, radio base stations, radio consoles, copper wires (cables), AC power, generators, telephones, telephone exchanges, portable radios, mobile radios, locomotive radios, batteries, computer work stations, servers, routers, modems, audio systems, voice recorders, video and monitors, battery chargers, beepers, cellular telephones, end-of-train-devices, head-of-train-devices, distributed power radios, weigh-in-motion scale radios, automatic equipment identification radios and a whole host of other electronic equipment. Generally, all the above equipment must coexist within the space of several miles. Radio or wireless communications when confined become very complicated because of the levels of output power of each radio system, the frequency compatibility of each system, and the interference caused by other radio or wireless systems. All of these things must be taken into consideration in developing a reliable radio communications system.

For example, the OTRR rail yard at Donkey Creek will have the following radio communication sub-systems:

- One or more Road Channels
- One or more Foreign Road Channels
- One or more Yard Switching Channels
- One or more Car Inspection Channels
- One or more Signals Channels
- One or more Mechanical Channels
- One or more Maintenance--of--Way Channels
- One or more Communications Channels
- One or more Special Services Channels
- One or more Distributed Power Channels
- One or more End-of-Train-Device Channels

- One or more Automatic Equipment Identification Channels
- Administrative Radio Network (radio to telephone) Channel
- Wireless Modems (various) Channels
- Wireless Video Channels
- Intermodal Channels.

The various components of a railroad communications system are discussed below. While the costs for some of these components, such as the locomotive control systems, are included in other portions of the SAC evidence, they are described here because the equipment must be fully integrated into the overall railroad radio communication system and therefore must be fully compatible with all other sub-systems.

(a) Microwave System

The microwave radio communications network connects all facilities and functions of the OTRR into an operational rail enterprise. A terrestrial microwave tower is located next to the Dispatch Center.

As noted above, in creating a hypothetical railroad microwave system, some reliance on an average system is necessary to avoid the monumental task of calculating the optimal placement of each tower site using the proper latitude and longitude for each site. However, unlike Otter Tail's estimates that have nothing to do with railroad standards, Mr. Walton relied on averages based on actual information about the microwave paths between BNSF's existing sites and the heights and placement of the existing towers. Estimating the number of terrestrial microwave towers along a railroad right-of-way depends in large part on the terrain. He sampled the railroad and found that the microwave sites in North Dakota were representative of the entire railroad. Using the actual latitude and longitude of the ND sites, and the actual heights of all towers within that state, he determined the average spacing between sites and the average tower height.

Tower spacing in the terrain of the northern Great Plains states requires closer spacing than in flat terrain. This is because the line-of-sight frequencies used in terrestrial microwave take into account the curvature of the earth while clearing the foliage of trees growing below the path. Often in mountainous terrain the backbone microwave paths are from mountain peak to mountain peak. But when railroad tracks are located along the river banks, it is necessary for microwave towers to have additional paths looking down into the valley. Since Otter Tail replicated portions of the existing BNSF's right-of-way, the OTRR microwave system needs to replicate a similar route using similar microwave paths.

As noted above, because he found North Dakota representative of the entire railroad, Mr. Walton used the North Dakota average spacing of 22 miles for microwave towers to determine the total microwave towers. Based on the 1,286 route miles for the OTRR he determined that 58 towers would be required for the OTRR microwave system. As an average tower height, he took the average of the actual heights of BNSF microwave towers in ND and calculated an average height of 167 feet.

A microwave radio station at the end of a path is often referred to as a terminal station (only one path) and (as in this case) the backbone microwave stations can require many paths. As an example, several microwave towers have more than two microwave paths. The station serves as a hub for the various directions that are necessary to reach important railroad operational infrastructure. The radio communications microwave network is very much like the rail network itself: it connects the entire railroad together (end-to-end) and supports the operational control and management that takes place 24 hours a day, 7 days per week.

(b) Dispatch System

Otter Tail used the Alstom Dispatching system located in the Dispatcher's Center at Donkey Creek, which Mr. Walton finds acceptable. In addition, the Dispatch Center is equipped

with a Dispatch Voice Recorder System. The mainline train dispatchers oversee the movement of trains. The focal point for train control is the Dispatch System, where through the microwave system, dispatchers remotely control the wayside signal system and communicate information to all field personnel involved in handling and moving trains. In addition to controlling train movement, the dispatchers coordinate the daily maintenance of roadway work by track crews, bridge crews, signal maintainers as well as the various activities of outside contractors and vendors that occur along the right-of-way. The antennas of VHF two-way radio stations and the antennas of the base stations of signal data radios focused in the direction of microwave towers that connect to the dispatcher's center make coordination in "real-time" possible. This is the least-cost and most-efficient deployment of technology for the safe and systematic movement of trains.

The OTRR has three around the clock dispatcher positions. The division of workload is determined by dividing the entire rail network into three distinct sections. The three sections or divisions generally will use different two-way radio frequencies on the mainline to reduce the likelihood of interference. Interference could result in the transmission of misinformation. A message intended for one crew that was mistakenly transmitted or overheard by another could have disastrous results. Terminology used by crews setting out/picking up cars is quite often similar to that of crews involved in general train operations, although pertaining to different tasks. A lack of well-understood terminology and a proper understanding of instructions and the activities to which they pertain could lead to accidents and personal injury. Use of distinct radio frequencies for greater separation of voice and rail activities coupled with rapid response capability is an important tool for successful communications.

Using the dispatcher's party line, the yardmaster informs the dispatcher when a train has made the brake test and is ready to depart. At that point the dispatcher, using the signal system, accepts the responsibility for train movement on to the mainline. In some cases a local train operator will have control of the signal control points at the entrance and exit of rail yards or interchange points where the safe train movement transfers from one entity to another. The OTRR uses both dark and signal territory operating rules to govern the safe movements of trains. Strict adherence to the operating rules by all employees is key to avoiding misunderstandings.

(c) Locomotive Control

Other Critical components of the railroad communications system are the sub-systems for train control. Each train (which may include a single locomotive) is assigned a train number and each locomotive is assigned a locomotive number. It is important to understand the difference between the locomotive number and the train number, particularly when communications are directed to the train crew operating the lead locomotive in trains with distributed power (DP).

The OTRR will have a locomotive fleet equipped with VHF two-way radio (AAR 96 Channels), a 4 frequency distributed power two-way radio system and a head-of-train-device (HOTD).[237] This onboard radio communication equipment is basic for mainline travel. The distributed power (Locotrol) is a two-way radio system that provides a radio communication link between two locomotives where the controls of one locomotive (the lead unit in consist) remotely control a second locomotive located on the end or in the middle of the same train. The remote locomotive mimics the lead. For example, if the lead locomotive goes into throttle position three (power), the rear remote control locomotive will go into throttle position three

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[237] Costs for the locomotive EOTD, HOTD, VHF radios and DP system are included in locomotive lease costs discussed in § III.D.3.

(power). A train operating in DP will have continuous automatic radio communications between the remote and the lead. When the lead locomotive changes status, a radio transmission is sent to the remote. The remote receives the data message, acts on it, and then transmits a message back to the lead unit acknowledging the original set of instructions. When the radio signals (radio link) between these two locomotives fail, an air brake application causes the remote locomotive to throttle down to idle. It is crucial that trains using DP equipment not lose the radio link between the lead unit and the remote unit, particularly when handling heavy tonnage coal unit trains. There are several locations along the OTRR right-of-way where loss of DP radio signals occurs and DP radio repeaters are required. These repeaters are designed to prevent loss of radio signal continuity. The OTRR will operate approximately 31 non-coal overhead trains per day, which will require a total of 33 End-of-Train-Devices (EOTD). This total includes spare EOTD at interchange locations. The costs for radio communications for the DP, EOTD and HOTD are included in the locomotive lease costs discussed in § III.D.3.

(d) DEDs

The OTRR will have 38 Defective Equipment Detectors (DED) in single track and 6 Defect Detectors in double track locations. The DEDs will require 51 two-way radios using the mainline frequency of the division where located. The DED can transmit anytime after a train movement turns on the system (using wheels detection devices, first axle) in order to enable it to detect a defect anywhere along the train. As noted above, the DED system includes both a signal component for direct communication to the train crew and a communication component for relaying data back to management. The signal component notifies the locomotive engineer when he can proceed. If there is no message, the crew must stop and inspect (walk) the entire train to ensure that there is no problem. The communications component of the DED sends a message from the DED to the dispatcher alerting management of any problems. At the same time data is

transmitted from the DED to the IT archive system to ensure that the event is recorded. The communications portion of the DED is included in the communications cost.

(e) Control Points

In addition to its communications function, the Alstom Dispatch System is designed to send controls to signal control points and receive indications from the signal control points. The OTRR has 219 signal control points (CP) that use data radio to transmit/receive from the CP to the nearest microwave tower. At the CP location a data radio system with antenna mounted on a tower co-located adjacent to the CP connects the field equipment to the Alstom office dispatching system riding the microwave radio communication system. The dispatcher will use the microwave system to interface in the field to the signal data radio system to clear signals at the control points. The CP location will send back signal indications every time a change in status occurs. The control messages sent out by the dispatcher include changes to reverse or normal position of power switch (s), clear a signal (s), turn on snow blowers, call a signal maintainer, etc. The indications from CP (s) include such things as changes in status of train occupancy (track circuits on/off), power switch locked-up, signal cleared, AC power on/off, and snow blowers on/off.

(f) AEIs

Another important component of railroad communications is the Automatic Equipment Identifications (AEI) system. Otter Tail listed six AEI scanners located in single track and two located in double track. OTP Nar. at III-F-42. The data communication message from the AEI is sent 20 seconds after the rear of train has passed the location. The telephone message is a data format using an AAR railroad standard. The AEI will automatically call and download to the IT data network via a data radio co-located at the AEI location to the nearest microwave station. From there the data is routed to the IT center at Donkey Creek. The IT data network will use the

data to verify and/or correct any errors in a train consist. The AEI system provides the electronic identification of each rail vehicle in the train. This electronic train list includes locomotives, railcars and EOTD (End-of-Train-Device). Dynamic AEI transponders are also mounted on the sides of locomotives to measure the amount of fuel onboard, which is valuable information for the refueling of locomotives.

(g) Telephone System

Telephones are another component of the communications system. The OTRR has its own private telephone network riding the digital microwave radio communications system with PBX Telephone Exchanges located at headquarters and major rail yard locations. The microwave system also enables train employees to use the Teleconference System and thus reduce travel expenses.

The ARN (Administration Radio Network) two-way radio system provides all operating personnel using company vehicles equipped with mobile VHF radios access to the OTRR telephone network at any point over the entire right-of-way. All portable VHF radios used by operating employees equipped with the ARN frequency can place calls to the private railroad telephone network or to the public telephone networks of their customers. When necessary, field operating personnel and management level personnel can handle company business by radio, by telephone and with wireless equipped laptop computers.

The railroad communications system also facilitates rapid and thorough investigation of incidents on the railroad, such as accidents, derailments, washouts or other emergencies. When an incident has occurred, the OTRR management investigating team has full access to the Dispatcher Voice Recording System where all train movement radio channels are monitored 24 hours a day.

As safety of trains and personnel is the top priority of any railroad, the OTRR must be equipped with a communications system that provides the clearest, most reliable, and most rapid response communications possible. While Otter Tail in its opening evidence asserts that it has included these components in its proposed communications system, the fact is that it has merely used the terminology, but failed to provide any engineering data or design that supports the quality and capacity of components required to meet railroad standards. As a result, its proposed system is meaningless and understates the costs associated with providing a viable and reliable railroad communications system.

(3) Quantities and Unit Costs

Mr. Walton based his quantities of each component of the OTRR communications system on two terminal (1 path) microwave stations and 56 backbone stations including a microwave management system based on his analysis. He included all components of the communications system in his restatement. The table below summarizes total communications cost. Details of the equipment selected and the costs are included in his workpapers.[238]

[238] BNSF.RP.WP.III.F-0692-0858.

Table III.F.6-1
Communications Costs

Description	Cost
58 Station Digital Microwave System	**$31,272,754**
Microwave Management System	**162,900**
Dispatching System (Comm. & Signals)	**520,000**
Dispatcher Voice Recording System	**148,943**
Dispatcher Equipment Battery & Charger	**24,235**
Teleconference System	**300,000**
PBX Tel. Exchange – Headquarters	**123,859**
PBX Tel. Exchange - Field Locations	**804,013**
Data Radio Tower & Equip. Control Points	**19,358,943**
Data Radio Tower & Equip. FED, Single	**3,359,086**
Data Radio Tower & Equip. FED, Double	**626,922**
Data Radio Tower & AEI Equip. Single	**837,432**
Data Radio Tower & AEI Equip. Double	**311,324**
EOTD Yard Repeaters	**137,280**
EOTD Battery Chargers	**49,104**
DP Tunnel Repeaters, between 1000' & 7,200'	**0.00**
DP Tunnel Repeaters, between 500' & 1,000'	**0.00**
Mobile Two-way VHF Radio, Opr. Personnel	**1,203,352**
Portable (HH) two-way VHF Radio, Personnel	**1,165,864**
TOTAL	**$60,406,011**

Source: BNSF Reply electronic workpaper "III F 6 Microwave System.xls," worksheet "Costs Summary."

F.7. Buildings And Facilities

Otter Tail includes a cost estimate of $31.9 million for buildings and facilities on the OTRR. In its opening Narrative, Otter Tail asserts that the OTRR will have its headquarters at Donkey Creek. In addition to the 24,000 square foot headquarters building, Otter Tail designated additional facilities at Donkey Creek including a fueling facility, locomotive shop, tracks for car inspection and running car repairs, and a 4,500 square foot building for operating and MOW crews.[239] In addition to the facilities at Donkey Creek, Otter Tail proposed another

[239] OTP Nar. at III-F-42-43.

fueling facility at Glendive, crew facilities at eight other locations[240] and MOW facilities at thirteen other locations.[241] BNSF operating, capacity and MOW witnesses analyzed Otter Tail's proposed facilities and found them inadequate to meet the needs of the OTRR traffic base and to house its personnel. Based on their instructions, BNSF Engineering Consultant James Primm constructed a significantly larger headquarters building, additional fueling facilities at Converse, Mandan and Dutch as well as the waste water treatment plants for those facilities, and more substantial locomotive and car repair facilities. BNSF accepted the nine locations of crew change facilities,[242] but sized them to meet BNSF operating crew sizes. BNSF MOW witness Albin stationed MOW crews at seven major headquarters and 22 additional locations. BNSF witness Primm developed building costs to house these additional crews.

In addition to the inadequacies of the types and sizes of the Otter Tail proposed facilities, BNSF witness Primm found Otter Tail's methodology for calculating building and facilities costs seriously flawed. As discussed below, using industry accepted building standards, BNSF witness Primm independently calculated the costs to construct facilities sufficient to meet the service requirements of the railroad as determined by Mr. Mueller in his operating plan. Each category of buildings and facilities is discussed in more detail in the subsections below.

BNSF's estimate of the cost for each category of these facilities is set forth in Table III.F-7-1 below and in BNSF Reply Exh. III.F-1. Details of the calculations are included in BNSF's

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[240] Otter Tail proposed crew locations at Donkey Creek and Converse Yard, Dutch, WY; Moran Jct., Snowden, and Glendive, MT; Mandan and Fargo, ND and Benson, MN.

[241] Otter Tail's proposed MOW facilities would be located at Donkey Creek and Reno, Kendrick, and Sheridan, WY; Rowley, Hysham, Shirley, Sidney and Glendive, MT; Dickinson, Mandan, Jamestown and Fargo, ND; and Herman, MN. OTP Nar. at III-F-43.

[242] BNSF home terminal crew locations are at Converse, Donkey Creek, Dutch, Glendive, Fargo and Benson; away terminals are located at Moran Jct., Mandan and Snowden.

electronic workpapers.[243] The acreage needed for yards and buildings also was calculated and that information was provided to Mr. Tesh for inclusion in his restatement of land costs.[244]

Table III.F.7-1
Comparison Of BNSF's Estimated Of Facilities Cost
To Otter Tail's Opening Estimate ($Millions)

	BNSF (millions)	Otter Tail (millions)	Difference (millions)
Fueling Facilities	39.68	13.50	26.18
Wastewater Treatment Plants	4.10	0.00	4.10
Locomotive Shop	13.47	8.98	4.49
Car Repair Facilities	4.63	0.00	4.63
Station & Office Buildings	6.09	4.74	1.35
MOW/Roadway Buildings	9.18	4.29	4.89
TOTAL*	**77.16**	**31.50**	**45.66**

* The totals may not represent the sum of the parts due to rounding.

Source: BNSF Reply electronic workpaper "III F 7 Facilities.xls," worksheet "Summary"; OTP Errata electronic workpaper "OTRR Construction.xls," worksheet "Summary."

a. Otter Tail Methodology

This section presents BNSF's response to Otter Tail's opening evidence with respect to the cost of construction of the following buildings:

- Headquarters Building
- Yard Office Building
- Crew Change Building
- MOW Building
- Locomotive Maintenance Shop
- Locomotive Fueling Facilities
- Railcar Maintenance Shop
- Wastewater Treatment Facilities.

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[243] BNSF Reply electronic workpaper "III F 7 Facilities.xls."

[244] *Id.*

In its opening evidence (OTP Nar. at III-F-42 through III-F-44), Otter Tail presents a summary of the general purpose, interior functional arrangement, and locations of buildings and facilities necessary for its operation. Otter Tail does not provide specific information with respect to the methods and materials to be used in the construction of these buildings and facilities.

Otter Tail relies heavily on the work of others with respect to developing construction costs for its buildings and facilities. All costs, except those documented in workpapers for site improvements, drainage, lighting, and fencing come either from tables of square foot construction costs as presented in RS Means, "Square Foot Costs – 2002 Edition,"[245] or construction costs accepted by the STB in its decision in *TMPA.*

Although Otter Tail heavily relies on building construction costs from *TMPA,* it has provided no backup to those costs, nor any analysis of how those costs would be applicable to the construction required for the OTRR. Thus, there is no basis for determining whether Otter Tail is justified in relying on those costs in this proceeding.

Costs for the Operations Headquarters and Operations Building, Yard Office Buildings, Crew Change Buildings, and MOW Buildings are contained in Otter Tail's Opening Workpaper Volume III pages 4696 to 4734 and electronic spreadsheet titled "OTRR_bldgs.xls" and "OTRR_building unit costs.xls." The costs of these buildings are developed from tables of square foot construction costs from RS Means.

The RS Means square foot costs table does not provide specific examples of the cost of construction of small general purpose buildings such as the crew change, yard office and MOW buildings on the OTRR. Therefore, OTRR developed a price averaging methodology using

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[245] BNSF.RP.WP.III.F-0860-0915.

construction costs from examples of other types of commercial construction (garages and warehouses) to calculate square foot construction costs and applied the resultant average construction costs to construction of its crew change, yard office and MOW buildings.

The square foot construction costs taken from RS Means are for buildings of a size and type not accounted for in Otter Tail's opening evidence and workpapers. As a result, Otter Tail's cost averaging methodology uses these costs in a manner that leads to the calculation of a fictitious average cost per square foot for construction of the buildings. A detailed description of Otter Tail's cost averaging methodology is presented below in the discussion of each type of building.

The construction costs presented in the tables of square foot construction costs in RS Means represent only the summation of the costs of the specific individual construction assumptions and techniques used in the preparation of the costs. Any change in the individual construction methods and techniques used to calculate the construction costs will directly change the square foot construction costs of the building. Therefore, each construction cost presented in the RS Mean tables should be viewed as a representative sample of *one* possible construction cost based on the *specific* assumptions for that sample. Each table in RS Means represents a particular exterior wall and frame construction and building size. The square foot construction costs are only comparable within the particular table in which they are found. You cannot mix square foot construction costs from different tables, as Otter Tail has done.

Otter Tail's opening evidence and cost calculations also omit several important facilities necessary for OTRR's operation. These facilities include railcar maintenance facilities, wastewater treatment plants, sanitary waste treatment and disposal facilities, and storm water retention and treatment facilities.

There also are inconsistencies between the descriptions of the locomotive maintenance shop in Otter Tail's opening Narrative and in its supporting documents.

In order to present a comprehensive accounting of the facilities needed to operate the OTRR, BNSF Engineering Consultants performed the following analyses:

- **Locomotive Maintenance Shop.** BNSF operating witness Mueller instructed RWA to design a locomotive maintenance shop at Donkey Creek sufficient to handle a dozen engines a day. Based on this specification, a conceptual shop design was created based on service track lengths provided by OTRR (OTP Opening Exh. III-B-1, Page 4) and the general arrangement of similar locomotive maintenance facilities designed for BNSF at North Kansas City, MO, Chicago, IL, Topeka, KS, Barstow, CA and for the Union Pacific Railroad at Hermiston, OR. Construction costs for the locomotive maintenance shop were developed using a combination of unit prices from the cost estimates prepared at the time each facility was designed,[246] current budget quotations from equipment manufacturers, and where applicable, RS Means unit prices. These costs were then multiplied by estimates of quantities of construction materials and equipment needed to build the facility. The quantities were taken from design drawings of the facilities to develop a detailed construction cost estimate for the OTRR locomotive shop. This detailed construction cost estimate includes all support facilities necessary for a fully functional shop. Where necessary, construction prices were indexed to 2002 using the RS Means construction price indices for Cheyenne, WY.[247]

- **Locomotive Fueling Facilities at Donkey Creek, Glendive, and Mandan.** A conceptual design was created based on the general arrangement of a locomotive fueling facility constructed by BNSF at Hauser, ID during 2002. To develop the cost of the OTRR facilities, unit prices for similar facilities were multiplied by the quantities of construction materials and equipment needed for each OTRR facility. Where applicable, lump sum construction prices for the Hauser fueling facility also were used. Based on specifications from Mr. Mueller, RWA designed an additional fueling platform for Donkey Creek. The design for Glendive parallels the facility at Donkey Creek. Mr. Mueller also specified

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[246] The validity of the unit costs used in these estimates was confirmed by the final cost for the projects which were 95 to 100 percent of the estimated costs.

[247] BNSF.RP.WP.III.F-0922.

that fueling facilities should be added for traffic passing through Mandan, as noted in § III.B-3a(6).

- **Locomotive Fueling Facilities at Converse and Dutch.** BNSF Operating Witness Mueller provided specifications to RWA that fueling capability at Converse was needed for empty trains. He also directed that capacity was needed at Dutch for helper locomotives. Mr. Mueller directed that fueling at both locations would be by truck. A conceptual design was created by RWA based on fueling locomotives from a tank truck. A containment structure, and pump were provided at these locations to contain fluid spills. Unit prices of similar facilities were multiplied by the quantities of construction materials and equipment to develop the cost of these fueling facilities.[248]

- **Railcar maintenance facilities at Donkey Creek and Glendive.** Mr. Mueller directed RWA to design railcar facilities at Donkey Creek that could process 16 bad order cars a day. He directed that Glendive should be a facility of equivalent size, as noted in §§ III-B.3a(1) and (2). Based on these specifications, a conceptual design was created based on design criteria published by the American Railway Engineering and Maintenance-of-Way Association (AREMA) in its "Design Criteria for Spot Car Repair Shops – 1994,"[249] and the general arrangement of the Railcar Service Center at Springville, Utah.

- **Wastewater Treatment Plants at Donkey Creek, Glendive and Mandan.** Construction costs were developed using cost estimates prepared at the time the model facility was designed (indexed to 2002 unit prices using RS Means indices) multiplied by detailed quantity estimates of the quantities of construction materials and equipment. The model for the wastewater treatment plant is the wastewater treatment plant built with the Hinkle Locomotive repair facility.

- **Headquarters Building, Yard Office Building, Crew Change Buildings, and MOW Buildings.** Unit construction costs from RS Means for construction techniques meeting the requirements of building, fire, and life safety codes were used to recalculate the construction costs for these buildings.[250]

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[248] BNSF Reply electronic workpaper "III F 7 Facilities.xls."

[249] BNSF.RP.WP.III.F-0928-0943.

[250] BNSF.RP.WP.III.F-0860-0915.

The following subsections present a detailed evaluation of OTRR's opening evidence with respect to building construction costs.

b. Operations Headquarters and Operations Buildings

Otter Tail states that its headquarters facility at Donkey Creek will accommodate its operating, supervisory, clerical and dispatching staff; the CTC control center; and the general and administrative staff in a facility of approximately 24,000 square feet in size. OTP Nar. at III-F-42. BNSF witness Primm accepts OTRR's area allocations for each individual office and assumes a 24,000 square foot building based on BNSF witnesses' determination of the appropriate staffing levels.

BNSF Engineering Consultants do not agree with the methodology used by Otter Tail to calculate the cost of its headquarters building. Otter Tail uses square foot construction costs from RS Means as shown on workpaper page 4700 of its opening evidence. Otter Tail takes the costs for two different exterior wall and frame construction methods (glass and metal curtain wall with reinforced concrete frame [$110.80 /square foot] and wood siding with wood frame [$90.40 /square foot]) and transfers them to its Errata electronic spreadsheet "OTRR_Bldngs.xls," worksheet "Unit Costs."

In the spreadsheet, the unit costs for both types of construction are first reduced by removing engineering and architectural design costs (by multiplying by 93%). Then the unit cost for each type of wall and frame construction is multiplied by the total square foot area of the headquarters building to compute the total cost of the building ($3,742,320). Otter Tail then computes the average cost per square foot for the headquarters building by taking the total cost of the headquarters building, dividing it by the total area of the building and then dividing it again by two (2) to calculate the average cost per square foot of the building ($93.56). This cost is then multiplied by a weighting factor (0.78) from RS Means to arrive at a final cost per square

foot for the building construction ($72.98). An additive for smoke detectors is added to bring the square foot construction cost to $73.05.

Although BNSF accepts the use of RS Means construction cost pricing in this instance, removal of engineering and architectural design fees, and the use of the 0.78 weighting factor, it does not accept the use of the costs of two different exterior wall and frame construction techniques to compute an average cost per square foot for the headquarters building.

This methodology for calculating the square foot building costs is inappropriate for the following reasons:

- An office building is typically constructed with one type of exterior wall treatment and frame unless there are two or more separate occupancies or uses. Otter Tail provides no explanation for why it calculates the cost of the headquarters building using two different types of exterior wall and frame construction. The headquarters building, as described by OTRR, will be exclusively a Class "B" occupancy.

- The building cost is calculated by multiplying the unit cost for each type of exterior wall construction by the total area of the building. This implies the building has two complete exterior wall and framing systems, which is impossible.

- The cost calculation is based on a building with an area of 20,000 square feet (electronic spreadsheet: "Building Unit Costs.xls," worksheet: "Unit Costs") not a building with an area of 24,000 square feet as described in Otter Tail's opening evidence (OTP Nar. at III-F-42).

- The Uniform Building Code – 1997 Edition (UBC)[251] does not allow the use of wood frames or siding in a multi-story building exceeding 18,000 square feet in area. The use of wood for structural framing or siding in a multi-story building of 24,000 square feet is therefore prohibited by the UBC.

- The methodology used by Otter Tail artificially lowers the unit cost of construction by averaging the higher unit costs of

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[251] BNSF.RP.WP.III.F-0944-0960.

permissible construction methods with the lower unit costs of impermissible construction methods.

- Otter Tail omits the following costs from its calculations of costs for the headquarters building:

    1. Emergency generator with fuel storage tank for support of critical functions (computers, dispatch center)
    2. Utility connections (natural gas, water, electricity, sewer)

The Uniform Building Code (UBC) is the most widely adopted model building code in the United States and provides performance-based regulations for design standards and construction practices. The requirements contained in the UBC are adopted by governmental agencies charged with enforcement of building regulations. The UBC defines the permissible sizes of buildings based on the degree of fire resistance of the structure. The greater the fire resistance of the materials used in a building's structure, the larger the building can be. The UBC also defines the allowable area of a building based on its occupancy class.

Otter Tail states that its headquarters building will be a multi-story building with an enclosed area of approximately 24,000 square feet. The 1997 Edition of the UBC (the most current edition) states in Table 5-B (Page 1-59) that the maximum allowable area of a multi-story building with a "B" occupancy classification using Type I (fire resistive) construction is unlimited. Type II-N.R. construction is limited to 39,900 square feet. The UBC defines "B" occupancy as occupancies for the storage of records and accounts and business occupancies including, but not limited to civic administration and professional services. Office buildings used for general administrative purposes would fall into this occupancy.

Type I and II-N.R. construction requires the structural elements of the building to be of steel, iron, concrete, or masonry. Wood framing is <u>not</u> allowed.

The UBC does allow wood to be used for structural elements of a building under its Type III construction. However the maximum area of a multi-story building of Type III (one-hour fire resistance) and Type III-N (no fire resistance) is 18,000 and 12,000 square feet, respectively.

Therefore, Otter Tail would not meet the requirements of the UBC if wood were used to construct the frame of its 24,000 square-foot multi-story headquarters building. Thus, relying on square-foot construction costs that are based even in part on the use of wood is incorrect and the cost associated with that impermissible construction technique must be removed from the calculations for the unit cost.

Since Otter Tail chose as part of its construction cost averaging methodology for its headquarters building the square foot costs for a building based on the use of a reinforced concrete frame and glass and metal curtain exterior wall, Mr. Primm has re-priced the headquarters building using the costs of the glass and metal curtain wall but with a reinforced steel frame. Steel framing is used instead of concrete because it is more representative of the construction techniques used by BNSF and other railroads for general purpose buildings and more consistent with the construction techniques used for other structures at Donkey Creek.

Mr. Primm's restatement of OTRR construction costs is based on a 24,000 square foot building that meets BNSF witnesses' determinations of the appropriate staffing. The costs of a paging system, smoke detectors, and security system -- all of which are essential in a railroad headquarters building for both operational and safety reasons -- have been added to the building's costs. BNSF's estimated construction cost of the headquarters building is presented in its BNSF Reply electronic workpaper titled "III F 7 Facilities.xls," worksheet "Headquarters."

BNSF witness Primm accepts Otter Tail's methodology and pricing for site grading, drainage, and parking lots and used those unit costs in his calculations for these items. He

disagrees with Otter Tail's costs for lighting. He has added costs for light pole foundation, cross arm (for mounting two lighting fixtures to one pole).[252] He also disagrees with using a mercury vapor mixture and minimal lighting levels because that does not provide an adequate level of illumination to promote safety. BNSF has replaced Otter Tail's lighting fixture with a "roadway" type low-pressure sodium fixture designed to adequately illuminate parking areas and roadways.

Mr. Primm also disagrees with Otter Tail's use of a five-foot chain link fence without barbed wire for security. A five-foot chain link fence can be easily climbed by an intruder or vandal. To provide security for materials stored at buildings along the right-of-way and in the headquarters building, a six-foot fence with barbed wire topper is necessary. Finally, Otter Tail's fencing costs omit the costs of corner posts and a gate. These costs have been included in BNSF's restatement of buildings costs.[253]

c. Operating Crew Change Buildings

BNSF witness Primm accepts Otter Tail's area allocations for individual cubicles for operating crew buildings, but actually costs crew change building based on BNSF determinations of the appropriate number of crew members. He does not agree with the methodology used by Otter Tail to calculate the cost of its operating crew change buildings.

OTRR has taken RS Means unit prices for three different types of buildings (a 10,000 square foot warehouse, a 6,000 square foot garage, and a 2,000 square foot garage) and averaged them together to develop a composite unit price of $62.35 for the yard office, crew change, and MOW buildings. This methodology is incorrect for the following reasons:

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[252] BNSF.RP.WP.III.F-0961-0962.

[253] BNSF.RP.WP.III.F-0962.

- Otter Tail does not account for construction of a warehouse in its opening evidence or other workpapers.
- Otter Tail's crew change, yard office, and MOW buildings range in size from 3,026 square feet to 4,548 square feet. (OTRR Errata electronic workpaper "OTRR_Bldgs.xls, worksheet "Buildings.") Using costs for larger buildings with inherently lower average construction costs per square foot is therefore inappropriate because they artificially lower the average unit construction costs.
- Otter Tail uses costs from RS Means that represent light-duty commercial construction practices that are not representative of the construction methods typically used in the construction of railroad facilities.

Otter Tail uses costs per square foot from RS Means as shown on Otter Tail's opening workpaper page 4698 to price construction of garages. Otter Tail has taken the construction costs for two different exterior wall and frame construction methods (poured concrete wall with steel joists [$94.90 /square foot for the 6,000 square foot garage and $118.75 /square foot for the 2,000 square foot garage] and insulated metal panel wall with steel frame [$87.40 /square foot for the 6,000 square foot garage and $105.30 /square foot for the 2,000 square foot garage] and used them in its Errata electronic workpaper titled "OTRR_Bldgs.xls," worksheet "Unit Costs."

Otter Tail uses costs per square foot from RS Means as shown on Otter Tail workpaper page 4702 of its opening evidence to price a warehouse. It has taken the costs for two different exterior wall and frame construction methods (brick with concrete block backup wall and steel frame [$87.30 /square foot] and concrete block wall with bearing walls [$69.60 /square foot]) for a 10,000 square foot warehouse and used them in OTP's Errata electronic workpaper titled "OTRR_Bldgs.xls," worksheet "Unit Costs."

In the electronic spreadsheet, the unit costs for both types of construction are first reduced by removing engineering and architectural design costs (by multiplying by 93% for the warehouse and 92% for the garage). Then the unit cost for each type of construction is

multiplied by the total square foot area of the building to compute the total cost of each building and then totaled for all three building types ($2,877,718). An average cost per square foot for the building is then computed by taking the total cost of the building and dividing it by the total area of the building and then dividing it again by two (2) to calculate the average cost per square foot of the building ($79.94). This cost is then multiplied by a weighting factor (0.78) from RS Means to arrive at a final average cost per square foot for the building construction ($62.35).

This methodology for calculating the building costs is inappropriate for the following reasons:

- A building is typically constructed with one type of exterior wall and frame treatment, unless there are two separate occupancies or uses. Otter Tail provides no explanation for why it calculates the cost of each of the buildings using two different types of exterior wall and frame construction. The crew change, yard office, and MOW buildings will all be Class "B" occupancies.
- The building cost is calculated by multiplying the unit cost for each type of exterior wall and construction by the total area of the building. This implies that the building has two complete exterior wall and framing systems, which is impossible.
- The methodology used by Otter Tail acts to artificially lower the unit cost of construction by averaging a higher and lower unit construction cost.
- The methodology used by Otter Tail improperly groups buildings of different functional types into one category. The unit costs for the warehouse and garages are separately listed in RS Means because the construction techniques and methods for erecting each type of building are different, and therefore, so are the construction costs.
- Otter Tail omits any mention of a warehouse from its opening evidence and the warehouse's construction costs are only shown on Otter Tail's electronic spreadsheet titled "Buildings Unit Costs.xls."

- Otter Tail omits the following costs from its calculations of costs for the crew change and MOW buildings:

    1. Utility connections (natural gas, water, electricity, sewer)

The building costs presented by Otter Tail are therefore not representative of the costs of constructing crew change, yard office, and MOW buildings of the size described in Otter Tail's opening evidence.

The costs of the crew change and MOW buildings have been re-calculated using only one type of exterior wall and frame construction and taking into account the staffing requirements as restated by BNSF operating and maintenance-of-way witnesses. For the crew change and yard office buildings and MOW buildings, insulated metal panel walls with a steel frame were used because this construction technique is the standard used by BNSF for buildings of comparable size.

The RS Means square foot pricing was adjusted to include replacing the costs of light-duty commercial construction with durable industrial construction as follows:

- Replace built-up tar and gravel roof covering with standing seam metal roof
- Replace oil-fired hot water heater with gas-fired hot water heater.

As with the headquarters building, BNSF witness Primm accepts the unit prices for grading, drainage and parking lots applied to BNSF quantities, but disagrees with the specifications and costs for lighting and fencing. To provide adequate illumination to promote safety, BNSF uses a roadway type low-pressure sodium fixture. To provide security for materials and to deter an intruder or vandal, BNSF has used a six-foot fence with barbed wire topper instead of the five-foot fence proposed by Otter Tail.

d. Maintenance of Way Buildings

All comments with respect to crew change and yard office buildings apply to Otter Tail's cost calculations for the MOW buildings. The cost for these buildings has been recalculated using insulated metal panel walls with steel frame.

OTRR has listed three sizes of MOW buildings, differing only in size of the offices provided. Mr. Primm generally accepts Otter Tail's individual room area allocations for each size building, except for the minor section crew headquarters building. Individual room area allocations for each size building were adjusted slightly to conform with BNSF witness Albin's determination of the appropriate staffing levels. The costs for these buildings are included in BNSF Reply electronic workpaper "III F 7 Facilities.xls."

Storage area would be gravel paved to provide a stable service for track materials.

e. Fueling Stations and Locomotive Facility

(1) Fueling Facilities

In its opening evidence, Otter Tail proposes two fueling facilities, one at Donkey Creek and one at Glendive. Otter Tail states on page III-F-43 of its opening Narrative that there are five (5) locomotive service tracks at Donkey Creek served by two (2) fueling platforms. On page III-F-44, Otter Tail states that at Glendive five (5) locomotive service tracks would be served by three (3) fueling platforms. The locomotive service track arrangement at Donkey Creek is the same as at Glendive. Thus, an additional fueling platform is required at Donkey Creek because two fueling platforms cannot physically serve five tracks. For example, if service platforms are designated A, B, and C, and tracks are designated 1 through 5, the only arrangement that will allow three platforms to serve five tracks is the following 1, A, 2, 3, B, 4, 5, C. Locomotives on Track 5 cannot be serviced without Platform C. The cost of an additional fueling platform at Donkey Creek has therefore been added to the project costs.

BNSF operating witness Mueller determined that additional fueling facilities would be necessary at Mandan to fuel coal trains moving in both directions, at Dutch to fuel helper locomotives used in that area, and at Converse. The Mandan facility is based on the same design as the Donkey Creek and Glendive, while the facilities at Dutch and Converse will fuel locomotives from a tank truck. Mr. Primm included the costs for these additional smaller fueling facilities in his restatement. The facility at Mandan was constructed with two platforms, one on the east and one on the west end of the yard, serving two tracks each. The facility at the west end is situated between the north main and siding to the north and south of the double mainlines there. The facility at the east end is located between the two main lines.

Otter Tail reuses costs for fueling facilities that were accepted by the STB in its *TMPA* decision. Otter Tail provides no details of the fueling facilities making it impossible to determine if their arrangement is appropriate for the OTRR. In order to resolve any ambiguities with respect to the equipment and materials included in the *TMPA* cost, Mr. Primm developed 2002 costs based on the construction costs for the BNSF fueling facility at Hauser, ID (constructed in 2002). This facility complies with all of the current (2002) federal, state, and local stormwater discharge and treatment regulations. The costs for the facility include fuel spill containment at locomotive fueling tracks, fuel delivery tracks, tank truck delivery areas, storage tanks, sanding equipment, fuel dispensing equipment, lubricant and engine combustion additive dispensing systems, and storm and wastewater collection and treatment facilities. These costs are shown on BNSF Reply electronic workpaper "III F 7 Facilities.xls."

Otter Tail omits costs for wastewater treatment plants at the fueling platforms. BNSF however has included wastewater treatment plants in its costs for the fueling facilities at Donkey Creek, Glendive and Mandan as a necessary and practical expense.

(2) Locomotive Repair Facilities

Otter Tail has provided conflicting statements with respect to the size and use of its locomotive shop at Donkey Creek. OTP Opening Exh. III-B-1, Page 4 shows a schematic representation of a shop with two 400' and three 200' stub-ended tracks. In its opening Narrative, Otter Tail describes the track arrangement differently. "The two shorter tracks in the shop will be used for heavy repairs, with the three longer tracks will be used for periodic inspections and light repairs."[254]

Assuming an average 30-foot distance between service track centers, a distance of 25 feet from the outside service tracks to the building walls, and a 400-foot length, the shop would enclose an area of 68,000 square feet. This is substantially larger than the 47,000 square foot shop proposed by Otter Tail in its Errata electronic workpaper "LocoFuel_Facility.xls," worksheet "Loco_facility."

The shop arrangement proposed by Otter Tail is an old and inefficient design and does not conform to standard design practice as presented in AREMA "Design Criteria for Diesel Repair Facilities," dated 1988.[255]

In order to comply with current locomotive maintenance practice and to provide space sufficient to meet the maintenance needs for a fleet size of approximately 300 locomotives, the shop has been re-designed to provide sufficient through tracks for running repairs and periodic inspections and track for heavy repairs, as determined by BNSF operating witness Mueller. The shop includes a maintenance area, a warehouse, and office area. The maintenance area will be

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[254] OTP Nar. at III-F-43-44.

[255] BNSF.RP.WP.III.F-0964-0985.

an "H-4" occupancy, the warehouse will be a "S-2" occupancy, and the office a "B" occupancy.[256]

Shop capacity is based on the length of an SD-70MAC of 80'-2" between pulling face of couplers. Dash 9 locomotives are 79'-8" long between pulling faces of couplers. The shop will accommodate twelve locomotives at any one time.

Neither the shop arrangement shown on OTP Opening Exh. III-B-1, Page 4 nor Otter Tail's opening Narrative describes a wash house for cleaning locomotives prior to the locomotive's entering the shop for maintenance or inspection. A wash house is an important and necessary part of the locomotive maintenance process because providing a clean working environment promotes efficiency and safety of the maintenance staff. A railroad can be fined by the Federal Railway Administration (FRA) if a locomotive is so dirty that proper maintenance and inspection procedures cannot be performed.[257] Since 1991, wash houses have been added to BNSF locomotive shops at North Kansas City, MO; Topeka, KS; and Corwith, IL. A wash house was built as an integral part of the UP's locomotive shop at Hinkle, OR (built 1997). In order to provide a clean and safe working environment for locomotive maintenance personnel, a wash house enclosing an area of 6,000 square feet has been added to the locomotive shop at

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[256] The UBC occupancy classifications are as follows:

"B" - a building or structure, or a portion thereof, for office, professional, or service-type transactions, including the storage of records and accounts; eating and drinking establishments with an occupant load of less than 50.

"H-4" - Repair garages not classified as Group S Division 3 Occupancies (where work is limited to exchange of parts and maintenance not requiring open flame or welding).

"S-2" - Low hazard storage occupancies including buildings or portions of buildings use for storage of non-combustible materials.

[257] 49 CFR 229.45; BNSF.RP.WP.III.F-0986.

Donkey Creek. The wash house was sized to enclose an area spanning two tracks (60 feet) with each track being 100 feet long.

In addition to the wash house, the following support buildings and structures have been added to the locomotive shop costs to provide a fully functioning maintenance system:

- Pump House. This building houses pumps for distribution of fuel, locomotive lubricating oil, journal oil, air compressor oil, waste oil, radiator water, soap, and toilet chemical throughout the shop, wash house, and fueling facility.
- Pipe Racks. Support structures for the maintenance fluid distribution system.
- Storage Tank Containment Structure. Concrete structure enclosing storage tanks holding locomotive lubricating oil, journal oil, air compressor oil, waste oil, soap, and toilet chemical.
- Wastewater Pretreatment Building. Holds wastewater pretreatment (Dissolved Air Flotation) apparatus and discharge metering equipment.
- Pressure combined sanitary and industrial wastewater sewer line to Gillette, Wyoming Publicly-Owned Treatment Works (POTW).

The Otter Tail locomotive shop track arrangement does not show any tracks outside the shop on which to stage locomotives waiting to enter the shop for maintenance or on which to perform locomotive load tests. A track on the west end of the shop has been added to provide a protected location on which to load test locomotives. Concrete walkways are provided along the track so maintenance personnel can access the locomotive. Lead tracks to the shop will be a minimum of 100 feet long to accommodate one locomotive. Concrete walkways will be provided along all lead tracks to provide maintenance personnel safe access to the locomotive. Inbound and outbound lead tracks to the shop will be a minimum of 200 feet long to accommodate two locomotives, with concrete walkways for maintenance personnel.

Otter Tail also failed to provide any detailed descriptions of the arrangement or contents within the locomotive maintenance facility, relying entirely on unsupported costs taken from *TMPA*. Because BNSF Engineering Consultants could not determine what specific costs are included in Otter Tail's locomotive facility costs, BNSF witness Primm prepared an independent construction cost estimate for a locomotive shop arrangement that includes the following:

- Drip pans and storm water containment at entrance and exit to the locomotive maintenance shop and at locations where locomotives are stored running; an additional drip pan would be required where locomotives are stored while running
- A minimum 10' wide drive way and apron at each end of the shop for materials management vehicles to enter and exit the shop
- Locomotive wash house with industrial wash equipment, wash water containment and drip pans
- Wastewater collection piping from track pans, wash house, and locomotive maintenance shop
- Maintenance fluid storage tanks and containment structure. Tanks would include storage of locomotive lubricating oil, waste oil, air compressor lubricating oil, journal oil, toilet chemical and soap
- Maintenance fluid delivery area assuming fluids are delivered by tanker truck
- Locomotive radiator water preparation equipment
- Single-axle drop table with release track top
- Locomotive maintenance fluid distribution stations
- Multi-level floor, pit, and platform arrangement for access to locomotives
- 3-ton bridge cranes over each through maintenance track
- 10-ton bridge crane over stub-end tracks
- Blue flag, blue light, and derail protection on all lead tracks
- Concrete pad with security fencing for outside material storage

- Connections to utilities

    1. Sanitary sewer
    2. Wastewater sewer
    3. Water
    4. Natural gas
    5. Electricity

- Electrical substation for shop

- Sanitary sewer line to Gillette POTW

- Security fencing around the shop buildings, wastewater treatment plant, and locomotive fueling facility is not provided because these facilities would be inside the yard perimeter security fencing.

A construction cost estimate for the locomotive shop is included in BNSF's electronic spreadsheet "III F 7 Facilities.xls." As noted in the above discussions, these estimates were based on quotations from equipment suppliers and from actual construction costs based on the detailed design of locomotive facilities of similar purpose and construction.[258]

f. Railcar Maintenance Shop

In its opening evidence, Otter Tail states that it would lease all of its railcars under a full-service lease and therefore it has made no provision for railcar maintenance facilities. OTP Nar. at III-D-8. Otter Tail also states that maintenance of its customer's railcars would be the responsibility of the customer. Otter Tail is silent with respect to maintenance of railcars accepted in interchange.

Under Association of American Railroads (AAR) interchange rules, OTRR is responsible for repairs to any railcars accepted in interchange. This includes all railroad and privately owned railcars arriving in unit, merchandise or intermodal trains.

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[258] BNSF.RP.WP.III.F-0987-0992.

Because most contemporary unit train coal car designs extensively use aluminum for car body construction, provisions must be made for repair of these car types. Welding requirements contained in the AAR interchange rules refer to the standards and procedures in the American Welding Society's, Railroad Welding Specification D15.1. AWS D15.1 states that all welding of aluminum must be done at temperatures above 50° Fahrenheit. In consideration of the extreme cold winter temperatures in OTRR's service area, an enclosed maintenance facility for railcars is required if repairs to railcars (especially aluminum-bodied railcars) are to be performed. Also, automated bottom-discharge hopper cars require periodic maintenance of their door operating mechanisms. An enclosed shop provides a safe working environment and facility for making the necessary adjustments to door operating linkages.

BNSF witness Primm prepared a conceptual design for the railcar maintenance facilities at Donkey Creek and Glendive using the 1994 AREMA Design Criteria for Spot Car Repair Shops[259] and based on a railcar maintenance facility at Harvey, IL.[260] This design also includes maintenance features contained in a railcar maintenance shop at Springville, UT expressly designed for a fleet of aluminum-bodied automated discharge hopper cars. Based on Mr. Mueller's specifications, Mr. Primm's design includes two tracks for general maintenance and repair of railcars. A pit for the inspection and maintenance of the operating mechanisms of automated bottom discharge hoppers is included on one track. This model facility is appropriately sized to maintain the volumes of interchange traffic proposed for OTRR.

The shops are constructed from a pre-engineered metal building with insulated metal side panels and a steel frame approximately 250 feet long by 80 feet wide. They contain office and

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[259] BNSF.RP.WP.III.F-0928-0943.

[260] BNSF.RP.WP.III.F-0941.

warehouse space for the railcar maintenance staff. A concrete-surfaced outside storage for larger railcar components is also provided.

Maintenance equipment includes the following:

- Inbound and outbound car puller on two maintenance tracks
- Blue lights, blue flags, and derails on all lead tracks
- Two (2) jib cranes with mare posts on each general maintenance track. Each jib crane would be equipped with three (3) one-ton hoists
- Hose reels for water, compressed air, oxygen-acetylene, work light, and electric arc welding (ferrous and aluminum)
- One hydraulically-operated jacking arrangement consisting of two outboard and one center jack at each general maintenance track
- Hydraulic power unit, swaging, and cutting tools for installing and removing mechanical fasteners
- Pit for inspection of hopper door mechanisms. Reinforced concrete jacking pads would be provided along each side of the track

Facility costs also include site preparation and connection to utility lines.

Based on information from BNSF operating witness Mueller, the OTRR would need two car repair facilities, one located at Donkey Creek and the other at Glendive. The costs for the car progression system, jacks, jib cranes, and hose reels were based on quotations from supplier PORTEC, Incorporated.[261]

F.8. Public Improvements

a. Fences

Otter Tail states that its estimates of the right-of-way and snow fencing requirements for the OTRR were determined from "the Orin Line construction documents, the Eagle Butte Branch

[261] BNSF.RP.WP.III.F-0993-0994.

construction documents and the ICC Engineering Reports." OTP Nar. at III-F-44. It included 10,124,493 linear feet of right-of-way fencing at a unit cost of $1.20, and 459,757 feet of snow fence at a unit cost of $3.39. It also included gates, panels, brace panels and cattle guards.

BNSF Engineering Consultants accept Otter Tail's estimate of the percentage of each line segment that was fenced. They also accept Otter Tail's methodology for determining the quantities of the gates, panels, brace panels and cattle guards.

Otter Tail uses 2002 average Wyoming DOT bid prices for barbed wire fencing for its right-of-way fence unit cost as well as for unit costs for the gates, corners and panels and for the various sizes of cattle guards. Otter Tail uses an RS Means cost for Rough Carpentry of $830/MBM for brace panels. BNSF Engineering Consultants accept these unit costs.[262]

In determining its snow fence quantities, Otter Tail omitted the quantities shown in valuation § CMSP-5 South Dakota. BNSF therefore added in those quantities.[263] For its unit cost, Otter Tail does not use the $10.45/LF unit cost shown on the Wyoming bid tabs that it used for right-of-way fencing. Instead it uses a much lower cost that it purports comes from RS Mean. It did not, however, provide a workpaper supporting that cost or showing the fencing materials to which that cost applies. Therefore, BNSF used the Wyoming bid tabs cost of $10.45/LF. Snow fences require much more substantial material than ROW fences and generally are constructed of wood to keep the drifts from accumulating on the adjacent track or roadway. AREMA § 6.8.2.6.3[264] provides a standard for the "Wyoming Type" snow fence that is consistent with the type costed in the Wyoming DOT bid tabs. Therefore, BNSF Engineering

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[262] Details of his calculations are included in BNSF Reply electronic workpaper "III F 8 Total Fencing.xls."

[263] BNSF Reply electronic workpaper "III F 2 Additional ICC Quantities.xls."

[264] AREMA § 6.8.2.6.3; BNSF.RP.WP.III.F-1051.

Consultants use the 2002 WYDOT average bid price for 10' Wood Snow Fence, which is $10.45/LF. The AREMA standards and specifications for snow fencing are included in BNSF's workpapers. Total investment for snow fencing is $4.8 million.

b. Roadway Signs

(1) Types and Quantities

Otter Tail includes 5,033 roadway signs, including the following types of signs: milepost, whistle posts, stations, yard limits, advance warning, reduce or resume speed, and flanger signs. BNSF agrees with the use of these types of signs. Milepost, station and yard signs inform the engineer where he is on the line at all times. The engineer also needs to know the speed at which he is allowed to operate.

Advance warning, speed restriction and resume speed signs put locomotive engineers on notice that they are about to enter or leave a restricted speed zone so that they can maintain a safe and efficient train speed. Without these signs, the engineer cannot know precisely where he is and adjust his speed appropriately to pull into sidings, yards or mines. Similarly, signs giving advance warning of upcoming crossings and yard limits provide essential information to the train crew. The General Code of Operating Rules that has been adopted by all Class 1 and 83 short line railroads, require advance warning signs, speed signs and resume speed signs even if the information is already included in the timetables.[265] Whistle posts are required at public crossings for advance warning for the public.

Flanger signs are used in heavy snowfall areas, such as the Great Plains states through which the OTRR will move. These signs warn snowplow operators to raise the plow to avoid

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[265] Copies of the pertinent pages of the Code are included in BNSF.RP.WP.III.F-1053-1055.

damaging the rails at turnouts, inner guard rails on bridges, crossing planks, and failed equipment detectors, and rail lubricators. Otter Tail placed flanger signs at rail lubricators and DEDs. BNSF placed them at those locations, but in addition placed them at grade crossings and on bridges with inner guard rails.

BNSF Engineering Consultants adjusted the quantities of the other signs only if they found discrepancies between Otter Tail's count and the actual numbers required on the OTRR.

In addition to the above, BNSF Engineering Consultants recommended other signs that are used on railroads for safety and regulatory reasons. These include the following:

Danger – Keep off Bridge: At each bridge location four warning signs should be used to keep trespassers and others away from the structure. Even with walkways there is limited clearance for walking when there is a moving train.

FRA required 1-800 signs at crossings: The FRA requires that each grade crossing have a posted identification number and contact telephone number to call in case of an emergency. Each crossing would have a minimum of two signs that could be mounted either on active protection equipment or on a separate post.

Stop signs required for Minnesota roadways: The state of Minnesota requires stop signs at all railroad crossings of roadways in the state.[266] Minn. Stat. § 219.06 (1999). A minimum of two signs will be placed at each crossing with non-active warning crossings.

Derail signs at derail locations: There would need to be one sign at each derail to warn the train crew of the derail, particularly in winter when snow obliterates the derail.

Stop signs at all yard exits: At least one stop sign should be placed at the exit of each yard or terminal.

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[266] BNSF.RP.WP.III.F-1052.

Directional signs for emergency crews at facilities: In the event of an emergency at any OTRR facility, there should be a minimum of two signs at each OTRR facility indicating the access locations for emergency vehicles and directing them to a central meeting point or points.

(2) Unit Costs

Otter Tail used a unit cost of $82.40 for each sign, which it claims was provided by BNSF in discovery. However, it did not provide any cite or details. A BNSF materials price list included in Otter Tail's workpapers at page 4476 shows a 2002 cost of $85.00. BNSF therefore used the $85.00 cost and applied it to its estimate of the quantities of signs needed on the OTRR. Table III.F.8-1 demonstrates the difference in the parties' quantities of roadway signs. The total cost for roadway signs on OTRR is $720,375.

Table III.F.8-1
Comparison of BNSF and Otter Tail
Quantities of Roadway Signs

Sign Type	BNSF	Otter Tail	Difference
Milepost	1,654	1,679	(25)
Whistle Post	2,648	2,648	0
Station	222	222	0
Yard Limits	18	18	0
Advanced Warning	216	216	0
Flangers	3,583	250	3,333
Derail	62	0	62
Highway Direction Signs at Yards	72	0	72
Total	**8,475**	**5,033**	**3,442**

Source: Otter Tail "OTRR.Construction.xls," BNSF "III F OTRR Construction.xls" worksheet "Segment Data."

c. Crossings

Otter Tail excludes costs for at-grade or overhead crossings on any portion of the route other than between Eagle Butte and Bridger Jct. (including Reno Jct. to Jacobs Ranch), claiming

that since BNSF predecessor lines were in place before automobile highways were constructed, inclusion of these costs constitutes an entry barrier.

(1) At-Grade Crossings

Although Otter Tail contends that it should not have to construct at-grade road crossings because there were no roads "back then," the ICC Engineering Reports provide evidence to the contrary. The ICC Engineering Reports for several of the valuation sections specifically noted the number of crossings in existence at the time. These sections included all of North Dakota, Montana (except for 1AB-MT) and Minnesota (except Val §§ 4, 9, 22 and 23). While the other valuation sections did not specifically identify the number of crossings, they did provide quantities of materials under Account #15 for crossings. BNSF consultant Phillips summarized the information in the ICC Reports and determined that there was sufficient material for the equivalent of 2,519 crossings. BNSF then determined the percent of route miles in each valuation section that are on the OTRR and applied that percentage of the crossing quantity to the crossings on the OTRR line that Otter Tail did not build. BNSF accepted Otter Tail's unit costs for the type of crossing materials.

The decisions in *WPL* and *PPL,* upon which Otter Tail relies, eliminated road crossings and the associated road crossing warning devices only because there was *no evidence* provided to demonstrate that the railroads actually incurred costs for road crossings. Here, however, the Engineering Reports show that there were more at-grade road crossings in place then than exist today and that the railroad did in fact incur costs associated with those roads.[267] Therefore,

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[267] It is not really surprising that there are fewer at-grade crossings today given BNSF's aggressive participation with state and local governmental agencies in programs to eliminate such crossings. The railroad is fully responsible for maintaining and replacing at-grade crossings and incurs substantial amount each year in costs for crossings and crossing warning devices, as shown in BNSF AFEs produced in discovery. BNSF.RP.WP.III-F-1056-1067.

BNSF inclusion of the grade crossing materials identified in the Engineering Reports in its restatement of crossing costs[268] is consistent with the Board's ruling in *TMPA* accepting the Engineering Report quantities as evidence that "BNSF's predecessor railroads incurred investment for a substantial amount of at-grade crossing materials." *TMPA,* slip op. at 154.

Otter Tail constructs signs and active warning devices only on the newly constructed segments, using unit costs produced by BNSF in discovery. BNSF Engineering Consultants agree with the unit costs for these segments, but also include five (5%) percent of the cost of all flashers and gates outside of the Orin Line along the OTRR route. This amount is consistent with BNSF's average level of initial assessment for crossing warning devices, although in many instances, the railroad must incur a much larger percentage. Inclusion of these costs is consistent with the Board's recent ruling in *TMPA.*[269]

BNSF also disagrees with the exclusion of costs for signs and warning devices on the remaining segments. Based on the crossings identified from the Engineering Reports, BNSF includes the cost of crossbucks and signs for 100 percent of those crossings.

(2) Highway Overpasses

Otter Tail excludes all highway overpasses other than those on the Orin Line, claiming that such overpasses are entry barriers. Otter Tail included 17 overpasses and used a unit cost derived from *FMC* to develop its costs for these bridges. BNSF accepts the costs for those overpasses.

BNSF engineers identified additional highway overpasses on the remaining line segments of the OTRR either through their field trip or from BNSF inventories. These are overpasses that

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[268] BNSF Reply electronic workpaper "III F 8 Crossings.xls."

[269] *TMPA*, slip op. at 155.

are owned and/or maintained by BNSF. BNSF applied Otter Tail's unit cost to these additional overpasses.

Table III.F.8-2
Comparison Of BNSF's Estimate Of Cost Of Crossing To Otter Tail's Estimate In Opening Evidence (Millions)

Crossings Materials At Grade Crossing	BNSF	Otter Tail	Difference
Crossings	**$9,376050**	**$1,544,220**	**7,831,830**
Timber	3,526,110	167,910	3,358,200
Asphalt	296,100	4,230	291,870
Concrete	396,900	8,820	388,080
Rubber	339,660	19,980	319,680
Other	4,817,280	1,343,280	3,474,000
Warning Devices	**3,541,126**	**2,093,029**	**1,448,097**
Signs & Crossbucks	266,420	177,554	88,866
Gates/Flashers-	3,274,706	1,915,475	1,359,231
Overpasses	**14,608,800**	**9,551,908**	**5,056,892**
TOTAL	**27,525,976**	**13,189,157**	**14,336,819**

F.9. Mobilization

Mobilization plays a significant role in a project that extends nearly thirteen hundred miles and includes the construction of both roadbed and structures. It takes a tremendous effort to coordinate and transport personnel, equipment, materials and supplies to the project sites and to establish temporary offices and other support facilities needed at the various construction sites both before and during the project. A similar effort is also required to dismantle the temporary facilities and return heavy construction equipment to the contractors' storage areas.

The STB has recognized the legitimacy of this cost in the past, approving factors up to 5.5 percent[270] and most recently approving a 3.5 percent additive to total construction cost for mobilization in *PPL.* Based on *PPL,* Otter Tail includes a mobilization factor of 3.5 percent.

After reviewing the mobilization requirements for OTRR, BNSF Engineering Consultants determined that Otter Tail's 3.5% additive is reasonable. BNSF applied the 3.5 percent to total construction costs, less land and track materials.

Applying the 3.5% to the estimated construction cost of the OTRR of $3.4 billion results in a cost of $89.9 million for mobilization/demobilization costs.

F.10. Engineering

a. Analysis of Otter Tail's Approach

Otter Tail's engineering costs are taken directly from the *PPL* case and consist of:

- 8.5% of total construction cost (excluding land). This is purported to include "overall design, land surveying, procurement and contract and construction management." OTP Nar. at III-F-46.
- $9,036 per route mile for "mapping and subsurface investigation." This amount is presented as the $8,464 per route mile adopted by the STB in the *PPL* case indexed for inflation from 3Q00 to 1Q02.

There are several problems with Otter Tail's approach. First, Otter Tail has offered no substantiation that the engineering costs from the STB decision in *PPL* are applicable to the OTRR. The Board has not established an accepted engineering percentage. In other cases, it has accepted higher percentages. In *FMC,* for example, the Board accepted an engineering

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[270] Mobilization costs have been regarded by state transportation departments as a standard expense, separate from other aspects of the project, and have been accepted by the Board in stand-alone cases, such as *WTU* (where it accepted a 5.5% mobilization factor) and *FMC* (where it accepted costs for mobilization that totaled nearly 2.4% of total construction costs).

percentage of 11.65%. If precedent alone were the basis for the engineering percentage, use of a larger project like *FMC* would be more appropriate

Second, the nature of the supporting documentation in the *PPL* case is difficult to ascertain. However, it appears from the Board's decision that at least part of the engineering costs accepted by the Board were based upon generalized cost percentages as opposed to an in-depth assessment of the work required. Therefore, the detailed approach undertaken by BNSF that follows offers a better indication of the costs involved.

Third, while Otter Tail recognizes costs associated with mapping and geotechnical subsurface investigations, the amount of $9,036 per mile comes from an escalation of a cost from the Board's decision in *PPL,* but without taking into consideration the differences between the SARR proposed in *PPL* and the SARR proposed by Otter Tail As described above, vast portions of the OTRR route east of the SARR proposed in *PPL* experience poor soil quality or stabilization problems, as in the flat poor drainage areas across the Great Plains states, where additional subsurface testing must be done. Again, BNSF has developed a detailed analysis of these costs, rather than relying on a questionable extrapolation from a previous case. BNSF's analysis clearly demonstrates that the costs used by Otter Tail are inadequate.

Fourth, Otter Tail has omitted costs for planning and feasibility studies. The need for planning and feasibility studies is widely recognized within the industry and is well documented within the AREMA guidelines.[271]

While Otter Tail's lack of detail makes it difficult to ascertain what is included in its proposed engineering cost, the Construction Phase appears to be one area where Otter Tail has underestimated the effort and cost required.

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[271] BNSF.RP.WP.III.F-1069-1071.

The subsections below discuss the various aspects of engineering that would be required to plan, design and oversee the construction of the OTRR.

b. Engineering Services

Adequate engineering services are essential to the success of a project of the magnitude, complexity and fast-track construction schedule as the OTRR. All of the appropriate steps in the engineering process must be addressed, especially if the least cost construction option is going to be realized.

The American Society of Civil Engineers (ASCE) publishes a widely accepted Manual 45 – Consulting Engineering: A Guide for the Engagement of Engineering Services. Although Manual 45 is periodically updated, the 1981 edition was the last one to include "cost curves" for engineering services. (As explained in subsequent editions of Manual 45, ASCE has since abandoned the practice of publishing cost curves).

ASCE's 1981 Manual 45 classifies engineering services by phase of the project and as basic vs. special services[272] as follows:

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[272] BNSF.RP.WP.III.F-1072-1079.

Phase	Basic Services	Special Services
Planning Studies	• <none>	• Feasibility Investigations • Cost Studies • Planning Studies
Design Phase	• Preliminary Design • Final Design • Specifications • Contract Documents	• Surveying • Geotechnical Investigations
Bid Phase	• Assistance to the Owner	
Construction Phase	• Office Consultation • Shop Drawings • Periodic Site Visits	• Construction Stakeout • Construction Management • Material Testing

(1) Planning Studies – Special Services

In more recent times, much greater emphasis and work effort has been placed upon Planning Studies for transportation projects. A good deal of this is in response to the myriad of environmental regulations that have emerged over the past several decades. Under the SAC barriers to entry principle, it is inappropriate to include these environmental-related costs for portions of the line that run along existing routes that did not face similar requirements when they were designed and constructed.

However, the location of the existing routes did not occur by happenstance. Today's railroad network is the result of a tremendous amount of planning, study and evaluation by BNSF and its predecessor railroads. The importance of adequate planning is widely recognized as a necessary and cost-effective expenditure within the transportation industry and the AREMA guidelines.[273]

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[273] BNSF.RP.WP.III.F-1069-1071.

The cost of performing Planning Studies can vary widely, depending upon the level of detail and number of options to be considered. The number of routes and analysis required to find the least cost option along the nearly 1,300 mile OTRR is substantial. Several factors suggest the OTRR costs for Planning Studies will be on the mid-to upper end of the range:

- The SARR is intended to be the least cost, most efficient option. To arrive at this option requires an extensive amount of study to consider the vast array of options available. Not only does the basic route itself have to be assessed, but also the resulting construction techniques and costs need to be assessed for each alternative route.
- The OTRR is following existing routes. These routes reflect not only the original planning that went into the route, but also refinements that are the results of years of operational experience and "tinkering" with the layout of the railroad.
- As discussed in § III.F.11, the level of contingencies included in the OTRR is low for a project of this magnitude and complexity. To justify such a low contingency allowance demands adequate upfront planning.

All of the information on the existing route came at a cost to BNSF in the form of alternative route studies, design and construction experience, operational adjustments, maintenance experience, analysis associated with acquisitions and just plain trial and error. This knowledge should not be a "free" starting point for the OTRR.

Fortunately, the OTRR will be able to employ more modern, cost effective techniques to evaluate these options than those available to BNSF or its predecessors. Aerial reconnaissance and computer modeling will be far cheaper than the field reconnaissance methods available to engineers when the lines were originally evaluated.

RS Means offers some guidance in the area of planning and feasibility studies. Means indicates a range of 0.5% to 2.5% of total project cost for educational planning consultant

services.[274] As demonstrated above, the OTRR case warrants consideration of costs in the mid to upper level of this range. Nonetheless, BNSF has taken a conservative approach and used the low end of this range, which is 0.5%. Applying this 0.5% to the estimated cost of the OTRR of $3.4 billion results in a cost of $17.0 million for the Planning Studies.

The use of Means for a percentage for this important area is appropriate because it is a fair representation of the real world cost of planning for a multi-billion dollar project that normally would stretch over years. While OTRR is allowed to assume that it can be done within a limited time, that does not mean that it does not incur the costs for planning. It simply means that they are assumed to be accelerated. The low end of the RS Means range is conservative and is used here only in recognition of the SAC principle that the SARR is not liable for the environmental and regulatory costs that would be reflected in a larger percentage.

c. Design Phase / Bid Phase / Construction Phase – Basic Services

ASCE's 1981 Manual 45 contains a cost curve for basic services of 5.7% for projects of above average complexity.[275] While ordinary railroad track construction is generally average complexity, the construction of an entire railroad system with nearly 1,300 route miles is above average complexity because of the magnitude of the project which involves construction of extensive facilities other than tracklaying, including fueling facilities, wastewater treatment plants, 400 bridges including several large bridges, office buildings, grade separations, pumping stations and sewer systems at rail yards, and a 1,300 mile communications and microwave system, and its fast track construction schedule.

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[274] BNSF.RP.WP.III.F-1080-1081.

[275] BNSF.RP.WP.III.F-1082-1083.

Applying this 5.7% to the estimated cost of the OTRR of $3.4 billion results in a cost of $193.9 million for the Basic Services for the Design, Bid and Construction Phases of the OTRR.

d. Design Phase – Special Services

Special services required for the OTRR during the Design Phase that are not included in the Basic Services described above include Surveying and Geotechnical Subsurface Investigations. Otter Tail attempted to account for these costs by adopting the per mile cost derived from *PPL*, but this approach does not reflect the costs required to adequately provide these important services on the OTRR route. BNSF employs a more thorough, detailed analysis to arrive at its costs for this particular project.

(1) Surveys

Location and design surveys are required to provide survey information on existing conditions upon which the design can be based.

Otter Tail will have the advantage of using modern, lower cost aerial mapping techniques to obtain this information. This contrasts with the technology available to the railroads, at the time of original construction of the lines, which consisted of an extensive number of field survey crews working on the ground through dense vegetation and rugged terrain.

The per acre unit cost for location and design surveys was developed using Means.[276] This unit cost was then applied to twice the total number of acres of right-of-way and easements to be acquired for the OTRR. Use of twice the acreage is required to account for the need for survey information beyond the proposed right-of-way line to:

- account for the fact that airplanes fly in straight lines to obtain this information

[276] BNSF.RP.WP.III.F-1084-1085.

- provide data for the design of access roads
- provide data to assess drainage features
- provide data so engineers can assess the implications of slight alignment shifts during the design process.

As detailed in BNSF's workpapers,[277] the total cost for location and design surveys for the OTRR is $6,242,594.

(2) Geotechnical Subsurface Investigations

Geotechnical Subsurface Investigations (*i.e.*, borings, sampling and testing) of existing conditions are required to provide adequate data upon which the design can be based. Sufficient up-front geotechnical investigations during the design phase are required to avoid subsequent construction schedule delays due to unknown foundation conditions being encountered and increased unit bid prices as contractors attempt to mitigate the risk of the unknown subsurface conditions.

Geotechnical Subsurface Investigations are especially important to establish design parameters for the roadbed through the low-lying, "swampy" terrain for the eastern portion of the OTRR (*i.e.*, east of Missouri River at Bismarck, ND).

Geotechnical Subsurface Investigations are required in four primary areas:

1. Evaluation of foundation conditions at bridges ("Bridges")
2. Evaluation of slope stability in cuts ("Cut Slopes")
3. Evaluation of the suitability of excavated and borrow site material for use as embankment ("Embankment Material")
4. Evaluation of foundation conditions at culverts ("Culverts")

The American Association of State Highway and Transportation Officials (AASHTO) is made up of representatives from state departments of transportation from across the country.

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[277] BNSF.RP.WP.III.F-1086-1087.

AASHTO's 1988 Manual on Subsurface Investigations[278] contains "Guidelines for Minimum Investigations" that state:

> Experienced geotechnical personnel in transportation agencies generally agree that about 0.7 to 1.0 percent of total construction costs should be allocated for an 'average-condition' project. For sites or alignments in areas which are underlain by poorer quality soil or rock units, or which may be impacted by geological constraints, an increased level of expenditure should be budgeted.

Given the terrain and geological conditions through which the OTRR passes, these guidelines clearly support a level of expenditure for geotechnical subsurface investigations toward the upper end of this range. Nonetheless, BNSF has taken a conservative approach and used the mid-point of this range, or 0.85%. Applying this 0.85% to the estimated cost of the OTRR of $3.4 billion results in a cost of $28.9 million for the Geotechnical Subsurface Investigations.

To verify this cost, a second approach was utilized. This approach uses the unit costs for borings and testing contained in Means.[279] These unit costs were then applied to the total linear feet of borings and the total number of tests required for the OTRR to develop a cost for the geotechnical subsurface investigation program.

As detailed in BNSF's workpapers,[280] the total cost for Geotechnical Subsurface Investigations, using this second approach is $24,069,029.

Since the cost using the AASHTO criteria and the cost using the Means data differ, the lower of these two numbers will be used and the total estimated cost of the Geotechnical Subsurface Investigations for the OTRR is $24,069,029.

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[278] BNSF.RP.WP.III.F-1088-1090.

[279] BNSF.RP.WP.III.F-1091-1093.

[280] BNSF.RP.WP.III.F-1094-1101.

e. Construction Phase – Special Services

Special services required for the OTRR during the Construction Phase that are not included in the Basic Services described above include Construction Stakeout, Construction Management and Material Testing. Otter Tail purported to include all Construction Phase services in the 3.5% additive that is part of its overall 8.5% additive for engineering. This approach significantly understates the costs required to adequately protect the Owner's interest during the construction of the OTRR. BNSF employs a more thorough, detailed analysis to arrive at its costs.

(1) Construction Stakeout

Construction Stakeout is the means by which the information in the design and plans is transferred to the field so the project can be built.

The major elements of construction stakeout that will be required for the OTRR are:

1. Staking construction access roads
2. Staking vegetation clearing limits
3. Staking the railway centerline
4. Slope staking in cut and fill areas
5. Staking the location of drainage structures
6. Staking the location of bridge foundations
7. Re-staking the railway centerline after rough grading is complete
8. Setting finish grade stakes
9. Layout for bridge superstructures
10. Rail yard facilities layout
11. Layout for buildings
12. Layout for signal and communication systems
13. Track layout, including yards
14. As-built surveys

Otter Tail will have the advantage of using modern, lower cost electronic survey equipment to perform this task. This contrasts with the technology available to the railroads, at the time of original construction of the lines, which consisted of an extensive number of field survey crews working on the ground.

The unit cost, per day, for a construction stakeout survey crew was developed using Means.[281] This unit cost was then applied to the total number of survey crew-days required for the OTRR to develop the cost for Construction Stakeout services.

As detailed in BNSF's workpapers[282] the total cost for Construction Stakeout surveys for the OTRR is $37,506,118.

(2) Construction Management

Construction of the OTRR is truly a monumental undertaking that will require a professional staff to manage. Construction of nearly 1,300 miles of railroad across five states with over 400 bridges, rail yards and rail facilities dwarfs any project in recent memory. Construction of such "mega projects" requires far greater oversight and management – a fact that is drawing increasing attention in the industry and Congress.[283] The staff and systems this requires are costly.

A vast array of suppliers, contractors, subcontractors and work crews must be choreographed to execute literally hundreds of smaller, individual projects in order to complete the OTRR within its 30-month schedule. Any unexpected problem in the process will cost the OTRR dearly in terms of both time and money. Thus, in order to construct a least cost railroad

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[281] BNSF.RP.WP.III.F-1102-1104.

[282] BNSF.RP.WP.III.F-1105-1106.

[283] BNSF.RP.WP.III.F-1107.

on an accelerated schedule, Otter Tail must account for adequate resources to manage the project during construction.

BNSF utilizes three sources to develop a cost estimate for Construction Management.

The first source is Means, which the Board looked to in some previous cases for data on construction management fees.[284] The Means data indicate that construction management fees for building projects range from 2.50% to 4.00%.[285] In *FMC*, the Board utilized the average of this range, which is 3.25%. However, there is evidence that using this midpoint understates the cost of construction management services because

- The Means data cited applies to building projects. Unfortunately, Means does not contain information for construction administration costs for transportation projects, such as the OTRR. However, by using BNSF's second source (see below) this data can be correlated to transportation projects.
- The Means data is for a $5 million project. As previously discussed, construction management complexities, and costs, increase for "mega projects" such as the OTRR.

Second, BNSF has considered a recent 2000 survey by the Construction Management Association of America (CMAA).[286] This survey indicates that construction management costs for transportation projects are higher than the 3.25% average cost indicated in the Means data for buildings. The CMAA survey supports the following construction management costs:

Overall average	4.6%
Private Sector average	4.8%
Transportation Projects average	6.6%
New Transportation Projects average	4.3%

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[284] *FMC,* Appendix C, Article K.2 at 146. In *PPL,* the Board used the low end of the Means range, which is inappropriate for the reasons stated in this section.

[285] BNSF.RP.WP.III.F-1109-1110..

[286] BNSF.RP.WP.III.F-1111-1114.

BNSF adopts a conservative approach and uses the 4.3% average cost for new transportation projects.

Fortunately, the CMAA survey cited above also provides data on building projects. This allows this CMAA data to be compared to the Means data to assess the legitimacy of using the CMAA data for transportation projects. The data in the CMAA study for a variety of building types indicates an average cost for construction administration for new building construction of 3.22%.[287] This compares favorably with the Means average of 3.25% for building projects. Since the CMAA data for buildings matches the Means data for buildings, it is reasonable to use the CMAA data (*i.e.*, 4.3%) for transportation projects. Applying this 4.3% to the estimated cost of the OTRR of $3.4 billion results in a cost of $146.3 million for Construction Management for the OTRR.

Finally, BNSF has undertaken a detailed estimate of the effort and costs required to adequately provide construction management services for the OTRR project. This analysis takes into account the field and office staff and expenses that will be required to schedule and manage a construction workforce that will include:

1. Management of the overall construction project and the individual construction segments. This includes
    a. Construction contract administration
    b. Materials Management
    c. Scheduling
    d. Coordination of construction stakeout and material testing
2. Management, oversight and resolution of problems of construction activities in each of the specialized areas of construction:
    a. Clearing, grading, drainage and culverts
    b. Bridges
    c. Trackwork

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[287] BNSF.RP.WP.III.F-1115-1122.

d. Yards and facilities
e. Signals and communications

The construction management staff required is a function of the volume of work being performed and the construction schedule. Otter Tail has provided little guidance on their intent for organizing the construction, other than general indications that "construction of the OTRR was broken into small segments, each of which are completed simultaneously" OTP Nar. at III-F-49, and "the OTRR is divided into construction segments or contract packages (*e.g.*, grading and drainage, bridge construction, trackwork, signal installation, and site finishing)." OTP Nar. at III-F-50.

BNSF Engineering Consultants used 50 miles (which results in approximately 26 construction segments) as a reasonable length for a construction segment for the following reasons:

- During the initial phases of construction, when access is via temporary roads or circuitous detour routes, twenty five miles (*i.e.*, half of the 50 miles) is a reasonable one-hour drive for construction management personnel to access any place along the segment from the field office.
- The construction cost of each segment will be approximately $130 million, which is a large, but manageable size.
- Approximately 400 bridges along approximately twenty six 50-mile segments results in approximately fifteen bridges per construction segment, which is a reasonable number for one senior engineer, with appropriate support staff, to handle over the 20-month construction period.

The unit costs for the staff and expenses were developed using the Means[288] and PSMJ[289] data. PSMJ was used because Means lacks data on hourly rates for the engineering staff required

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[288] BNSF.RP.WP.III.F-1123-1125.

[289] BNSF.RP.WP.III.F-1126-1128A.

for construction management. The Professional Service Management Journal provides management services and publication to the Architectural and Engineering (A/E) communities. The data used is from their 2002 (17th edition) A/E Fees & Pricing Survey. These unit costs were then applied to the effort required for the OTRR to develop the cost for Construction Management. As detailed in BNSF's workpapers,[290] the total cost for Construction Management for the OTRR is $176,834,840.

Since the cost using the CMAA data and the detailed estimate using the Means and PSMJ data are approximately the same, the validity of this costing methodology has been confirmed. The lower of these two numbers will be used and the total estimated cost for Construction Management for the OTRR is $146.3 million.

(3) Material Testing During Construction

As with all major construction projects, the quality of the material used in the OTRR must be verified and monitored. This is accomplished by a team of field technicians conducting a variety of tests on the material as construction progresses. These tests range from compaction tests of the earth fill and subgrade to concrete strength tests to inspection and verification of materials provided by fabrications shops.

These services may be provided by the Contractor as part of a Quality Control program or by an independent firm hired by the OTRR. Regardless, the testing costs are incurred.

BNSF's approach uses the unit costs for material testing technicians contained in Means.[291] Alternatively, Means provides data on the cost of each of the multitude of tests that will be required. Since these per-test costs would yield significantly higher costs, BNSF chose

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[290] BNSF.RP.WP.III.F-1128B-1128E.

[291] BNSF.RP.WP.III.F-1129-1132.

the more conservative approach of using the per-staff cost. While this understates the cost of material testing because it doesn't include the costs of testing equipment and supplies, it is more indicative of how the work would actually be carried out on a project the size of the OTRR.

This unit cost was then applied to the total number of days required for the OTRR to develop the cost for Material Testing services.

As detailed in BNSF's workpapers,[292] the total cost for material testing during construction for the OTRR is $47,793,291.

f. Summary

Table III.F.10-1 summarizes the engineering costs for the OTRR:

Table III.F.10-1
SUMMARY OF ENGINEERING COSTS

Item	Cost
Planning Studies	$17,000,000
Basic Services (Design, Bid, Construction)	$193,900,000
Surveys	$6,200,000
Geotechnical Subsurface Investigations	$24,100,000
Construction Stakeout	$37,500,000
Construction Management	$146,300,000
Material Testing	$47,800,000
TOTAL	**$472,800,000**

F.11. Contingencies

Consistent with the Board's decisions in past SAC cases, Otter Tail has included a contingency factor of ten (10%) percent of total construction costs, excluding land.

In the experience of BNSF engineering witnesses from both Ralph Whitehead Associates and TranSystems, contingency factors in excess of 10 percent are not uncommon at the *final* design level of a project of this magnitude, and are substantially higher during the initial

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[292] BNSF.RP.WP.III.F-1133-1135.

planning stage. As planning and design work progress, the estimates become more site specific and precise, and contingencies are reduced accordingly. There is a body of resources that has long supported contingencies that decline from twenty (20%) percent during Planning to ten (10%) during Design to maybe five (5%) percent during Construction. For example, both the 1981 ASCE Manual[293] and the 1994 U.S. Army Corp of Engineers' policy for contingencies, recognize the need for large contingencies. The ASCE Manual says "Contingencies should be included in the preliminary estimates in the 10% to 20% range." Appendix D at page D-9 of the Army Corp of Engineers manual provides a "reasonable guide" for projects with an estimated total direct construction cost of more than $10,000,000 in which it recommends 20% at the reconnaissance/feasibility stage, 15% at the project/design stage, and 10% at the plans and specifications stage.[294]

BNSF Engineering Consultants firmly believe that this is the Planning Phase at best and that warrants a higher contingency than ten (10%) percent.[295] Based on industry practice, a more reasonable estimate for this stage of planning is twenty (20%) percent.

Despite the contradictory evidence of real-world practice, BNSF reluctantly accepts Otter Tail's ten (10%) percent contingency factor based solely on STB precedent to date. The Board

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[293] BNSF.RP.WP.III.F-1137-1139.

[294] ER1110-2-1302, Engineering and Design, Civil Works Cost Engineering, Contingencies, 31 March 1994.

[295] Otter Tail also appears to believe that this is in the rudimentary planning stages. In response to various BNSF requests for workpapers identifying (a) constructions sites that would need "access through grading contracts" as stated in Otter Tail's Narrative at III-F-49, (2) the breaking points of the "small segments" that would be constructed simultaneously as discussed at III-F-49, and (3) mobilization points as discussed in its Narrative at III-F-50, Otter Tail replied "The information requested would be determined and/or identified as part of the actual engineering work associated with the actual construction of the OTRR." Otter Tail Response to Defendant's First Request for Workpapers, questions III-F. 9, 10 and 11. BNSF.RP.WP.III-F-0577. Otter Tail's opening evidence thus assumes the OTRR project is at the pre-design stage.

has almost consistently approved a 10 percent contingency in SAC cases and appears disinclined to reexamine this issue. However, the Board must keep in mind that this project in the real world would be considered in the most preliminary stages of planning, where a contingency factor of ten percent would be viewed as *extremely out of line* with projects of this magnitude, and that any attempt by complainants in future SAC cases to reduce that factor to an even lower level would be unreasonable. Thus, BNSF's acquiescence in an overall contingency factor of ten (10%) percent for this case is *extremely* conservative. Such a low contingency factor, however, assumes a level of preplanning that can only be achieved through adequate engineering. Thus the use of a ten percent contingency is only justified if used in combination with realistic engineering costs.

Applying this 10% to the estimated construction cost of the OTRR of $4.0 billion results in a cost of $400 million for contingencies on the OTRR.

F.12. Construction Schedule (Staging)

In light of the SAC principle of unrestrained resources, BNSF Engineering Consultants do not take issue with the overall time allotted for construction of the OTRR in Otter Tail's proposed schedule. However, they do take issue with certain aspects of the schedule.

The construction of the OTRR system as designed by Otter Tail calls for the track to be constructed from the coal fields of the Powder River Basin to the Big Stone Plant in eastern South Dakota. The Otter Tail's opening evidence shows construction starting points or railheads at Converse Jct., Donkey Creek, Moran Jct., Fargo, and Benson.[296] Materials are purchased from various vendors with transportation added to move the various products from the

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[296] OTP.OP.WP.4541.

sources to these railheads for use in construction of the OTRR. Most items will then have to be delivered along the track for use in the construction.

The construction schedule posited by Otter Tail and the Narrative describing the construction period include estimates for the building of track at a rate of about 65 miles of track in a 3.5 month period, or an average of 0.7 miles per day. Even accepting Otter Tail's production rate, BNSF witness Zimmerman found that using this rate of construction combined with the construction of the Valley City Bridge in Valley City, ND, which is recognized as the longest construction project on the OTRR and thus the final project to be completed, the OTRR track cannot be completed in the time specified using the railheads proposed by OTRR.[297]

After experimenting with Otter Tail's proposed 65 miles in 3.5 months standard, Mr. Zimmerman concluded that even at the end of five 3.5-month periods the construction would not be completed. Starting at Moran Jct., the railroad could be built north to Snowden and south to Converse. From Moran, it would also be possible to turn off at Glendive and build toward the east. At the end of five periods the western part of the OTRR would be completed as well as track heading east to a point somewhere between Glendive and Dickinson. In that same period all line sections from Fargo to Benson to Big Stone and to the east side of the Valley City Bridge could also be completed. However, that would leave an uncompleted gap from the bridge at Valley City to west of Dickinson. After several attempts, BNSF witness Zimmerman concluded that there was no way to finish tracklaying across the middle segments of North Dakota without starting work on this interior section in the first 3.5-month period. Moreover, using only the railheads at Fargo and Benson, there is no economical way to move materials west without establishing a railhead west of the Valley City Bridge. There is also another complex, large

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[297] BNSF.RP.WP.III.F-1146-1148.

bridge near Snowden that will keep materials from being received at Snowden for construction southward until late in the schedule.

Given these obstacles, the only way to get rail access to the interior portion of the OTRR west of the large bridge at Valley City, ND was to create a new railhead at Sanborn, ND. Sanborn can be accessed from the existing BNSF lines. Materials would be shipped on BNSF to Minot, ND and then transferred to the Canadian Pacific Railroad for delivery to BNSF at Rogers, ND. From Rogers the traffic would move via BNSF to Sanborn. A map showing the proposed railheads, along with the construction sequencing from each railhead, is included in BNSF's workpapers.[298]

Using five 3.5-month periods will result in a slightly longer track construction period than proposed but is acceptable due to the fact that the bridge at Valley City will be the last structure completed which keeps the track out (not connected) for a full 14 months. These estimates are conservative as they make no allowance for a winter construction break to stop work on bridges along the OTRR during freezing weather.

However, the Otter Tail proposed construction schedule shows some flexibility to start construction earlier than shown. There is a three month advanced grading period shown in the schedule that can be used to start the track construction at Moran Jct., Fargo, and Sanborn.[299] Neither the final section held out due to the bridge at Valley City nor the remaining sections east and north of Glendive would take the full fifth period to complete according to the revised schedule proposed by BNSF Engineering Consultants.

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[298] BNSF.RP.WP.III.F-1141-1145.

[299] Construction could begin as soon as the first ¼ mile of roadbed is prepared. Thus, the tracklaying could begin sooner and follow right on the heels of the grading crews.

For the segments of track to be built east of the big bridge at Valley City, ND, the rail would be shipped from the proposed Moran Jct. welding facility to the Fargo railhead by way of BNSF.[300] The shortest route between Moran Jct.,WY and Fargo, ND appears to be by way of BNSF to Shelby, MT and then along BNSF's northern route. From Fargo, the rail and other materials can be shipped west toward the Valley City Bridge and south toward Benson. Material that was originally to be shipped from the east to Fargo will not be affected. This routing along the BNSF northern route will also allow OTRR to divert trains of rail and other materials along this northern route.

Otter Tail proposed ballasting the eastern portion of the OTRR from the Ortonville Quarry. However, as there will be no rail service to this quarry until **after** the construction of the OTRR, an alternate source was needed except for that portion of the OTRR built during the third 3.5-month segment, which could use ballast from the Ortonville Quarry. BNSF Engineering Consultants selected an existing quarry at St. Cloud, MN -- a ballast source identified by BNSF on the same discovery document Otter Tail used to select its ballast sources (OTP workpaper page 4488). Material from the St. Cloud Quarry can be shipped to Fargo for use in building west toward Valley City, ND and south toward Benson, MN.

Ballast material on the western portion of the OTRR was to be supplied from the Granite Canyon Quarry. To access the OTRR and begin construction Otter Tail would either have to ship rail from Moran Jct., WY to Converse Jct., WY by way of other BNSF lines or use additional ballast from the Pipestone Quarry, which is currently being used by OTRR for the construction of the line south out of Moran Jct. As the former would add additional costs with

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[300] References to transportation over BNSF mean the residual BNSF and not BNSF lines that are being replicated. Otter Tail cannot assume that it is replacing BNSF and then rely on the lines being replaced for transportation during construction.

no offsetting acceleration of the project, BNSF Engineering Consultants selected the latter. The other track materials would follow the rail construction phasing, which proceeds from the Moran Jct. rail welding facility. The final construction segment of this track is ballasted from Granite Canyon to take advantage of material that is closer to the construction and thus will incur lower transportation charges. The ballast material for the Eagle Butte line also uses the Converse Jct., WY railhead.

Materials to be used for construction of the line from Moran Jct. toward Glendive and Snowden will move through the railhead at Moran Jct. Because the construction of the OTRR Missouri River Bridge at Snowden will preclude delivery beyond that point, BNSF Engineering Consultants determined that there is no advantage to beginning construction at Snowden, MT.

In all cases, additional forces would be brought in to build the yards, sidings, and branch lines to mines after the mainline construction force moved past the yard or junction points.

Revised transportation distances are shown in the BNSF Reply workpaper electronic spreadsheet "III F 3 Transportation.xls." The spreadsheet also includes material transportation distance computations from the various supplier locations to the revised railheads.

Based on their comprehensive review of Otter Tail's assumptions, costs and supporting workpapers, BNSF Engineering Consultants conclude that Otter Tail has substantially underestimated the costs of constructing the OTRR, as demonstrated by comparison of BNSF's restatement of the OTRR road property investment cost of $4.4 billion to Otter Tail's estimate of $2.4 billion.

G. DISCOUNTED CASH FLOW ANALYSIS

1. Cost of Capital

As described in Section III.D.3.c.(4).(b), BNSF has included in the OTRR investment significant fees that the OTRR would be charged for floating equity. In past cases, plaintiffs have argued that inclusion of such fees is inappropriate. The Board rejected inclusion of such fees in *TMPA*, slip op. at 162, because it found the asserted costs were unsupported. In this case, BNSF has offered additional support for the financing costs it posits. In addition, it is clear that such costs must be added because the current cost of capital for Class I railroads does not include them. No Class I railroad has raised new capital in the last three years by issuing new equity.

2. Inflation Indices

The prices of goods and services used by the OTRR will change in future years, and it is necessary to reflect various rates of inflation for capital assets and operating expenses, over the useful life of the OTRR, in order to recover properly those capital costs and operating expenses. Accordingly, forecasts of (1) operating expenses, (2) capital costs, and (3) land values are needed to run the 20-year DCF model and to compute overall stand-alone costs for the OTRR.

a. Operating Expenses

For operating expenses, Otter Tail employed a forecast of the RCAF-A from DRI-WEFA's RCAF forecast dated June 2001. Otter Tail provides no explanation of why the RCAF-A is the appropriate index to adjust stand-alone operating expenses nor does it offer any explanation for using the now stale June 2001 forecast. The Board has historically relied upon RCAF-U data to estimate rates of change in future operating expenses.

In its DCF analysis, BNSF has relied upon the Board's traditional approach of applying the DRI-WEFA forecast of the RCAF-U to estimate operating expenses in future years, but used

a June 2003 forecast in place of the two year old June 2001 forecast relied upon by Otter Tail.[1] Use of the RCAF-U is clearly the appropriate approach for at least two related reasons.

First, because the OTRR is designed to be the most efficient, least-cost railroad, it would be inappropriate to impute to the OTRR improvements in productivity that the nation's Class I railroads are still in the process of achieving. These efficiencies are already built into the base year operating expenses that have been developed for the OTRR. Thus, it is much more likely that future operating expenses on the OTRR will inflate at the rate of the RCAF-U, not at the rate of the RCAF-A.

Second, most railroad productivity improvements come from technological improvements that occur over time as assets are replaced – a point the Board recognized in its *WPL* decision.[2] In the real world, railroad assets of all types are being replaced continuously, so improvements in productivity occur across asset types year by year. In the stand-alone analysis, however, the OTRR is assumed to be built in its entirety over a three-year time period, and most of the investment is in assets with lives longer than the 20-year DCF period. Under these circumstances, it makes no sense to impute to the OTRR the productivity anticipated for the nation's railroad industry as a whole.

In its *TMPA* decision, slip op. at 161, the Board agreed and held that RCAF-U is the appropriate index to apply to operating expenses because the RCAF-A incorporates productivity adjustments that there is no reason to believe a stand-alone railroad transporting only coal in unit trains could achieve. The Board held: "We have no evidence, and we find it unrealistic to

[1] DRI WEFA changed its name to Global Insight. A copy of the June 2003 Global Insight Forecast is included as BNSF.RP.WP.III-G-0001 to 0004.

[2] *See WPL* at 106, n. 197: "For example, the parties assume that the [stand-alone railroad] would replace its information technology and communications systems every 5 years. The [stand-alone railroad] could be expected to purchase equipment that would allow for productivity improvements."

assume, that projected industry-wide productivity adjustments would result primarily from the transportation of coal. In the absence of any evidence showing specific productivity improvements for unit coal train operations . . . we use the RCAF-U to index the operating expenses . . . ." *Id.* Otter Tail has submitted no evidence that it would be able to achieve specific productivity gains in its unit train or merchandise train operations. Nor could it submit evidence that it would be able to do so given its assumption that the OTRR would be a least-cost, most-efficient railroad.

b. Road Property Assets Other than Land

The annual inflation forecast used by Otter Tail to calculate the value of the OTRR's road property assets is based on a DRI-WEFA June 2001 forecast for rail labor and rail materials and supplies. As Otter Tail points out, this is the same procedure utilized by the Board in *FMC*. However, as the Board itself recognized, the standard Board/ICC procedure has "relied on historical rates of railroad inflation to project future inflation." *FMC* at 179.

More significantly, in three decisions rendered *subsequent* to *FMC*, *i.e.*, *WPL*, *PPL*, and *TMPA*, the Board has returned to its practice of using a five-year average of the historical AAR indexes to forecast future changes in road asset values, and BNSF has adopted that more current procedure in this proceeding.

c. Land

Otter Tail's filing used a composite index for all land owned by the OTRR. In its reply, BNSF adopts Otter Tail's land inflation value.

3. Tax Liability

As did Otter Tail, BNSF has calculated Federal taxes payable by the OTRR in a manner consistent with the approaches approved by the Board in prior maximum rate cases. *See, e.g.*, *FMC* at 178-81; *WTU* at 714. The OTRR is assumed to pay federal taxes at the corporate rate of 35%, with payments for debt interest, depreciation expense, and state income taxes treated as deductibles. The OTRR also will be subject to income taxes in Wyoming, Nebraska and Colorado. Consistent with the method adopted by the Board in *FMC* and *APS*, the taxes applicable to railroads in each of the states were weighted together based on the number of OTRR route-miles in each state.

4. Other

a. Capital Cost Recovery

The Board's DCF methodology uses economic depreciation to calculate the capital recovery cost of the stand-alone entity's property. The value of an asset at any point in time thus equals the discounted present value of the earnings that it will produce over its remaining useful life. Consistent with long-standing Board/ICC precedent, Otter Tail employed a 20-year DCF period to develop annual costs of assets, and BNSF has adopted the same approach, including the calculation of a residual value to reflect the continued operation of the railroad after the end of the 20-year DCF period (*i.e.*, after 2020) using the methodology endorsed by the Board in *FMC*, *WPL*, and *TMPA*. As did Otter Tail, BNSF employed the "time-based" method of capital recovery adopted by the Board in *FMC*, *WPL*, *PPL*, and *TMPA*.

b. Reparations

BNSF's stand-alone cost evidence demonstrates that, when properly developed, the stand-alone costs of the OTRR substantially exceed the revenues that would be generated by the

OTRR traffic group. Under such circumstances, the issue traffic rates are reasonable and no rate prescription is warranted.

H. RESULTS OF SAC ANALYSIS

As discussed in Section III.G, BNSF has calculated the OTRR's cost of moving coal to Otter Tail's Big Stone facility. The results of those calculations are summarized in the table at the end of this Section and set out in detail in Exhibit III.H-1. The following paragraphs describe the contents of Exhibit III.H-1.

1. Road Property Investment Values

The calculation of road property investment costs is based on construction cost as of 1Q01. This calculation is summarized in Table C. The investment cost incorporates the amount of investment the residual OTRR would be required to incur for the procurement of equity financing.

2. Interest During Construction

Interest During Construction ("IDC") accrues on the assets of the OTRR. Table D contains both the total IDC amount and the IDC amount that is debt-related. IDC is calculated based on the investment values in Table C, the composite cost of capital from Table A, and the length of finance period for each account. The construction schedule described in Section III.F determines the length of the finance period for each asset account. The amount of IDC that is debt-related is calculated by multiplying the investment by the length of the finance period, the OTRR's percentage of debt, and the cost of debt. For tax purposes, the debt-related IDC is shown as an interest deduction during the construction period.

3. Amortization Schedule of Assets Purchased With Debt Capital

Table E is the amortization schedule for the debt-related portion of the OTRR's investment. The debt principal is developed by multiplying the debt percentage from Table A – for the appropriate investment period – by the sum of the total investment and the interest during construction. The quarterly annuity payment is then calculated based on the principal, the debt

rate from Table A, and the DCF model life of 20 years. The amount of interest included in the quarterly payment is calculated by multiplying the beginning balance (*i.e.*, the principal in the first period) by the interest rate.

4. Present Value of Replacement Cost

Table F calculates the additional investment (on a present value basis) the OTRR would have to make if the hypothetical railroad replaced each asset indefinitely at the end of each asset's life. This additional investment is added to the initial investment in Table I prior to determining the quarterly cash flows.

5. Tax Depreciation Schedules

Table G displays the tax depreciation required under the Federal Tax Code currently in effect.[1] Investment in communications (Account 26), signals and interlockers (Account 27), and the track accounts (Accounts 8-12) was depreciated over seven (7) years employing a 200 percent declining balance methodology switching to straight-line depreciation when the straight line percentage exceeds the declining balance percentage. Investment in bridges and culverts (Account 6), public improvements (Account 39), fences and roadway signs (Account 13), roadway buildings (Account 17), fuel stations (Account 19), shops and enginehouses (Account 20) and public improvements (Account 39) was depreciated over 15 years using a 150 percent declining balance method switching to straight-line depreciation. Investment in grading (Account 3) was amortized over 50 years using straight-line amortization.

[1] The mandatory method for depreciating most tangible property placed in service after December 31, 1986 is the Modified Accelerated Cost Recovery System ("MACRS").

6. Average Annual Inflation In Asset Prices

Table H calculates the average annual inflation rate that is applied to the capital recovery charge in Table I. The weighted average inflation rate was used because Table H calculates the required capital recovery necessary to return the investment. All road property accounts are indexed at the quarterly rates shown in Table B. The weighted average inflation rates are based on the inflation indexes discussed above in Section III.G.

7. Discounted Cash Flow

Table I displays the calculation of the capital carrying charge and associated flow of funds required to recover the total road property investment. Inputs to this spreadsheet were taken from the tables described above. The quarterly capital recovery stream reflects the tax benefits associated with interest on the investment financed with debt from Table E and the road property tax depreciation from Table G. The cash flow shown in Column (8) of Table I is the amount remaining each quarter after the payment of federal and state tax liabilities. This cash flow is used for payment of return on and return of total investment in the OTRR. This quarterly figure is then discounted by the fourth root of the composite annual cost of capital from Table A, adjusted to reflect the asset being placed in service on January 1, 2002. The present value cash flow is then summed for each quarter along with the future cash flow and the total equals the total cost that must be recovered. The future cash flow is the residual value of the unconsumed assets of the OTRR and serves to reflect the cash flow required to account for the value of the assets not consumed during the 20-year life of the DCF model.

The development of the quarterly levelized capital carrying charge requirement is a relatively simple calculation, *i.e.*, starting capital carrying charge requirement multiplied by the quarterly index factor from Table H that will recover total investment during the 20 year DCF model period. The starting capital carrying charge requirement that recovers the total investment

is developed through an iterative process in which an arbitrary starting cost per ton is adjusted upward or downward as necessary until the starting quarterly charge yields a cumulative present value cash flow that just equals the required investment.

8. Computation Of Tax Liability -- Taxable Income

Table J - Part 1 displays the calculation of the OTRR federal tax liability. The procedures followed to develop the federal tax liability are those discussed in Section III.G.3. Table J - Part 2 displays the calculation of the OTRR state income tax liability, as discussed in Section III.G.

9. Operating Expenses

Table K displays the operating expenses incurred in each year of the OTRR's operation based on the traffic levels described earlier and includes a modification of Otter Tail's calculations to adjust Materials and Supply Operating to reflect changes in traffic levels consistent with the Board's DCF procedures. Also, as discussed in Section III.D.4, Otter Tail deviated from the Board's prior practices for its treatment of stand-alone maintenance of way expenses by no longer calculating normalized maintenance over the 20-year DCF period. Instead, Otter Tail purports to develop staffing levels required for 2021 traffic volumes and indexes those staffing levels back to produce a supposed base-year requirement. In doing so, Otter Tail changed the formulas in the Board's DCF model to permit indexing of normalized maintenance of way expenses by forecasted annual changes in tonnage volumes. BNSF corrected the formulas in Otter Tail's DCF to treat maintenance of way expenses consistent with prior Board precedent.

Table K uses the annual operating costs, states them on a quarterly basis, and indexes them to reflect inflation over the life of the OTRR based on the RCAF-U inflation rates shown in Table B.

10. Summary of SAC

The total SAC for the OTRR based on investment and operating costs is summarized in Table L of Exhibit III.H-1. The capital requirement from Table I and the annual operating expenses from Table K are presented and summed in Table L for each year the OTRR operates. The following tables summarize these results.

Table III.H-1
Summary of Stand-Alone Cost Results - OTRR
(All Figures in Millions of Dollars)

Year	Annual Revenue	Stand-Alone Cost	Difference
2002	$499.4	$916.3	($416.9)
2003	498.2	908.3	(410.1)
2004	500.3	929.9	(429.6)
2005	500.8	954.0	(453.1)
2006	515.6	985.1	(469.6)
2007	511.8	1,007.6	(495.8)
2008	526.7	1,027.0	(500.3)
2009	539.8	1,045.0	(505.2)
2010	556.3	1,065.9	(509.5)
2011	567.5	1,084.3	(516.8)
2012	572.6	1,101.9	(529.3)
2013	581.1	1,119.7	(538.6)
2014	585.3	1,138.1	(552.8)
2015	594.2	1,156.9	(562.7)
2016	603.4	1,176.3	(572.9)
2017	612.7	1,196.3	(583.6)
2018	621.9	1,216.4	(594.5)
2019	631.4	1,237.1	(605.7)
2020	641.2	1,258.5	(617.3)
2021	649.9	1,279.8	(629.8)

As noted above, the full results of the SAC analysis are contained in Exhibit III.H-1.

Public Version

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ABBREVIATIONS

Terms:

AAR	Association of American Railroads
AEI	Automatic Equipment Identification
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARN	Administration Radio Network
ATSF	The Atchison Topeka & Santa Fe Railway Company
BN	Burlington Northern Railroad Company
BNSF	The Burlington Northern and Santa Fe Railway Company
CARDS	Computer Aided Railway Design System
CMP	Constrained Market Pricing
CP	Signal Control Point
CTC	Centralized Traffic Control System
DARA	Density Adjusted Revenue Allocation
DCF	Discounted Cash Flow
DED	Defective Equipment Detector
DEM	Digital Elevation Model
EOTD	End-of-Train Device
FTI	FTI Consulting, Inc.
G&A	General and Administrative
HBD	Hot Bearing Detector
HOTB	Head-of-Train Device
ICC	Interstate Commerce Commission

MMP	Modified Mileage Prorate
MOW	Maintenance of Way
OTM	Other Track Materials
OTP Errata	Complainant's Errata Evidence (filed on July 14, 2003)
OTP Opening	Complainant's Opening Evidence (filed on June 13, 2003)
PRB	Powder River Basin
RCAF-A	Rail Cost Adjustment Factor - Adjusted
RCAF-U	Rail Cost Adjustment Factor - Unadjusted
RFP	Request for Production
RTC Model	Rail Traffic Controller Model
RRVW	Red River Valley Western Railroad
RWA	Ralph Whitehead Associates
SAC	Stand-Alone Cost
SARR	Stand-Alone Railroad
SSAC	Simplified Stand-Alone Cost Model
STB	Surface Transportation Board
UBC	Uniform Building Code
USGS	United States Geological Survey
WP	Workpaper
WRPI	Western Rail Properties, Inc.

ICC or STB Proceedings:

APS	*Arizona Public Serv. Co. v. The Atchison, Topeka & Santa Fe Ry.*, 2 S.T.B. 367 (1997).
Coal Rate Guidelines or Guidelines	*Coal Rate Guidelines, Nationwide*, 1 I.C.C.2d 520 (1985).
Conrail	*Potomac Electric Power Co. v. Consolidated Rail Corp.*, 367 I.C.C. 532 (1983).
Conrail II	*National Railroad Passenger Corp. and Consolidated Rail Corp.--Application under Section 402(a) of the Rail Passenger Service Act For an Order Fixing Just Compensation 10 I.C.C. 2nd 863 (1996)*
FMC	*FMC Wyoming Corp. v. Union Pacific R.R.*, STB Docket No. 42022 (STB served May 12, 2000).
General Procedures	*General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*, STB Ex Parte No. 347 (Sub-No. 3) (STB served Mar. 12, 2001).
Georgia Power	*Georgia Power Co., Southern Co. Servs., Inc., Oglethorpe Power Corp., Municipal Auth. of Georgia, & City of Dalton v. Southern Ry. Co. & Norfolk Southern Corp.*, ICC Docket No. 40581 (ICC served Nov. 8, 1993).
McCarty	*McCarty Farms, Inc. v. Burlington Northern Inc.*, 2 S.T.B. 460 (1997).
Nevada Power I	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 6 I.C.C.2d 1 (1989).
Nevada Power II	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 10 I.C.C.2d 259 (1994).
Non-Coal Guidelines	*Rate Guidelines - Non-Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2) (STB served May 8, 2002).
OPPD	*Omaha Public Power Dist. v. Burlington Northern R.R.*, 3 I.C.C.2d 853 (1987).
PPL	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served Aug. 19, 2002).
PPL II	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served March 24, 2003)

IV. WITNESS VERIFICATIONS

1. Gary D. Agnew

Gary D. Agnew is General Director of Resource Planning for The Burlington Northern and Santa Fe Railway Company ("BNSF"). He is responsible for analysis of BNSF's line capacity in support of capital expansion projects and train scheduling efforts on BNSF rail lines. He has held his current position since 1999. He has been responsible for line capacity modeling for five years, although he had different titles during this period. He began his career with BNSF in 1982 in the marketing department. Since 1984, he has held a number of planning, budget and analysis positions. Mr. Agnew moved from marketing to operations in 1989.

Mr. Agnew is sponsoring evidence relating to BNSF's use of the RTC Model. His evidence is contained in Section III.B.2.a.(4)(a) of the Narrative. Mr. Agnew has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 3, 2003

Gary D. Agnew

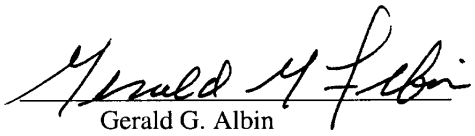
2. Gerald G. Albin

Gerald G. Albin is a Principal and Vice President of TranSystems Corporation, a civil engineering company located in Denver, Colorado. His business address is 4949 S. Syracuse, Suite 620, Denver, CO 80237. Mr. Albin is a registered professional civil engineer in five states including Wyoming, Montana and Minnesota. He has been involved in railroad engineering since 1962. He has had more than thirty years experience working for BNSF and its predecessors. Between 1970 and 1980, he held the positions of Assistant Maintenance Engineer, Regional Engineer, and Maintenance Engineer for The Burlington Northern Railroad Company ("BN") (predecessor to BNSF). From 1980 to 1988, he held various staff positions (Director & Assistant Director of Maintenance planning) in St. Paul and Kansas City, as well as working for four years as Chief Engineer of the BN Springfield Region. From 1988 to 1995, he held the positions of Director of Engineering, Chief Engineer of Field Operations, Superintendent of Roadway Engineering, and Assistant Chief Engineer of Design/Construction for the Southern Region of BN, including much of the route of the proposed stand-alone railroad in this case – *i.e.*, Wyoming, Montana and Minnesota. His responsibilities included project management, design and construction of rail lines, including numerous projects on the lines involved in this proceeding. In addition, he has had responsibility for the supervision of construction, design and maintenance activities in various departments, including track, bridge, signal and telecommunications.

Mr. Albin is sponsoring evidence relating to random failures in railroad operations in Section III.C.2, maintenance-of-way costs set forth in Section III.D.4, and earthworks set forth in Section III.F.2. Mr. Albin has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October ____, 2003



Gerald G. Albin

3. Michael R. Baranowski

Michael R. Baranowski is a Senior Managing Director at FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. Since 1980, Mr. Baranowski has been involved in many aspects of transportation consulting including operational analyses, terminal switching studies, facility and equipment valuation, liquidation studies, merger studies as well as a variety of cost studies including the development of both short and long run marginal cost, variable cost and stand-alone costs. He has been responsible for developing costs and working with the Board's discounted cash flow model in stand-alone cost proceedings since 1987 and has sponsored testimony in a number of those proceedings including the *APS, Potomac Elec. Power Co. v. CSX Transp., Inc, WPL, Duke Energy Co. v. CSX Transp. Co., Duke Energy Co. v. Norfolk Southern Ry. Co.*, and *Carolina Power & Light v. Norfolk Southern Ry. Co.* cases.

Mr. Baranowski received his Bachelor of Science in Accounting degree from Fairfield University in 1980. In 1988, he joined Klick, Kent & Allen, Inc. ("KK&A"), which was acquired by FTI Consulting in 1998. While with KK&A and FTI, Mr. Baranowski has conducted a wide range of studies in both the transportation and telecommunications industries and testified in proceedings before the Interstate Commerce Commission, Surface Transportation Board, Federal Communications Commission, and various State Utility Commissions.

Mr. Baranowski is sponsoring evidence relating to Section III.F.2 Roadbed Preparation and the Board's DCF model and SAC calculations contained in Sections III.G and III.H. Mr. Baranowski has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 7th, 2003

Michael R. Baranowski

4. Robert H. Baughman, P.E.

Robert H. Baughman is a Vice President and Project Manager in the Rail Division at Ralph Whitehead Associates, an engineering consulting firm. His business address is 1000 West Morehead St., Charlotte, NC 28208. Mr. Baughman oversees and directs all of Ralph Whitehead Associates' services to the railway industry. As Project Manager, Mr. Baughman has coordinated and/or supervised the preparation of computations, plans, and specifications on many large projects. These have included: the planning and design services for a two-mile trolley line along an abandoned railway corridor, the bridge structure for a 42-inch water line with cast-in-place retaining walls in a $24 million project, fifteen highway bridges in North Carolina, South Carolina and Georgia, four railway bridges in North Carolina, South Carolina, and Georgia, and retaining walls for the widening of I-75, among many others.

Mr. Baughman is a 23 year veteran of the railroad industry. Mr. Baughman received his Bachelor of Science degree in Civil Engineering from Ohio Northern University in 1979. He then graduated with a Masters in Business Administration from the University of North Carolina at Charlotte in 1984. He holds licenses as a Registered Professional Engineer in Alabama, North Carolina, Ohio, and Kansas. He is also a member of the North Carolina Consulting Engineers Council, the American Society of Civil Engineers, and the National Society of Professional Engineers.

Mr. Baughman is sponsoring evidence relating to Sections III.F.9 Mobilization, III.F.10 Engineering/Construction Management and III.F.11 Contingencies. Mr. Baughman has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Robert H. Baughman

Robert H. Baughman, P.E.

5. Andrew J. Cebula

Andrew J. Cebula is a licensed professional engineer and Director, Planning & Engineering Services at CANAC, Inc. His business address is 3950 Hickmore Street, St. Laurent, Quebec, Canada H4T 1K2. He has more than two decades of experience providing technical expertise for railway operations and transportation planning needs throughout the industry. Railroad clients for whom Mr. Cebula has worked recently include Union Pacific Railroad Company ("UP"), BNSF, CSX, Canadian National Railway, Wisconsin Central, Amtrak, Metra, government commuter and passenger agencies in the United States and Canada, and railways in Colombia, Malaysia and Australia.

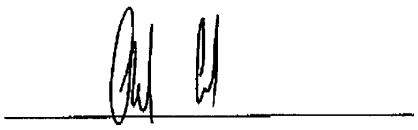
CANAC is a 500-employee transportation, engineering and consulting company based in Montreal, Houston and Pittsburgh that provides a full spectrum of rail planning, engineering and operations services, ranging from the design of rail operations and infrastructure to actual implementation and operation. CANAC has over a decade of experience assisting both rail carriers and mine site operators in the evaluation of capacity and operations for the movement of Powder River Basin ("PRB") coal. CANAC has been actively involved in four studies of the PRB Joint Line, which is currently owned by UP and BNSF. One of these studies also involved a capacity analysis of the Western Rail Properties, Inc. ("WRPI") Line, which runs from South Morrill Yard to Shawnee Junction, where it connects with the Joint Line. Mr. Cebula served as project manager/director for all four of these studies. For various mine site operators, CANAC has recently developed or is currently developing operational and infrastructure needs for current and proposed tonnage levels at Eagle Butte, Caballo, the North Antelope/Rochelle Complex, and Antelope mines. Mr. Cebula participated in each of these projects.

Mr. Cebula has also participated in projects for major rail carriers developing operations and infrastructure plans over specific geographic areas. In 1998, for example, UP retained CANAC as the project manager for the development of an operating and capital investment plan to address congestion problems in UP's Texas operations. In connection with that project, CANAC successfully developed infrastructure and operations design for the entire Gulf Coast Gateway, including route structure, overall operations planning, Storage In Transit ("SIT") strategy, terminal and industrial operations, infrastructure investment, and integration of proposed capital improvements with maintenance programs. CANAC was also retained by BNSF in 1996-1997 to develop an operations and infrastructure plan relating to rail operations serving nine individual export grain terminals in Portland, Oregon, and Seattle, Tacoma, Kalama, and Vancouver, Washington.

Mr. Cebula is sponsoring evidence demonstrating the need for helper service to assist Big Stone trains. His evidence is contained in Section II.A.1.c.(11) of the Narrative. Mr Cebula is also sponsoring evidence contained in Section III.C.2.a of the Narrative relating to Otter Tail's string program. Mr. Cebula has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 6th, 2003



Andrew J. Cebula

6. Benton V. Fisher

Benton V. Fisher is a Director at FTI Consulting, Inc., an economic and financial consulting firm with offices located at 1201 Eye Street, N.W., Suite 400, Washington, DC, 20005. Since 1991, Mr. Fisher has been involved in various aspects of transportation consulting including economic studies involving costs and revenues, traffic and operating analyses, and work with performance measurement and financial reporting systems.

Mr. Fisher holds a Bachelor of Science in Engineering degree from Princeton University. In 1990, he served as the Deputy Controller for the Bill Bradley for U.S. Senate Campaign. In 1991, he joined Klick, Kent & Allen, Inc., which was acquired by FTI Consulting, Inc. in 1998. While with the firm Mr. Fisher has performed numerous analyses for and assisted in the preparation of expert testimony related to merger applications, rate reasonableness proceedings, contract disputes, and other regulatory costing issues before the Interstate Commerce Commission, Surface Transportation Board, Federal Energy Regulatory Commission, Postal Rate Commission, Federal Court, and State Utility Commissions.

Mr. Fisher is sponsoring evidence relating to BNSF's variable costs for the issue movement as well as evidence relating to excluded non-coal traffic and T&E salaries for the OTRR. His evidence is incorporated in Sections II.A, III.A.1 and III.D.3.a of the Narrative. Mr. Fisher has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 7, 2003

Benton V. Fisher

7. Christopher D. Kent

Christopher D. Kent is Senior Managing Director of FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. He holds a Bachelor of Arts degree from the University of Virginia. In 1970, he joined Western Electric, Inc. as a Management Trainee in its "High Risk-High Reward" program. During the next six years, he was promoted through various levels in the production, production scheduling, and costs and forecasting departments.

Since 1977, Mr. Kent has been involved in various aspects of transportation including traffic analyses, economic studies including costs and revenue analyses, railroad valuations, and the development of railroad operating plans, railroad facility plans and rolling stock requirements.

In 1977, Mr. Kent joined Conrail as Project Manager and worked primarily in assisting the Operating Department in optimizing fleet availability.

In 1978, Mr. Kent was employed by the United States Railway Association as Manager of Equipment and Facilities. He was subsequently appointed Chief, Equipment and Facilities, Rail Asset Valuation, in the Office of General Counsel. In this capacity, he supervised a staff of in-house professionals and outside consultants in developing the equipment, maintenance of way, and operating evidence submitted by the U.S. government in the valuation proceedings before the Special Court created under Sections 303(c) and 306 of the Regional Rail Reorganization Act.

In 1980, Mr. Kent formed Kent Associates, a consulting firm dealing with operating, transportation and marketing issues for various clients. Kent Associates was affiliated with the Washington Management Group, and Mr. Kent served as Vice President of that firm.

In 1984, Mr. Kent joined the economic consulting firm of Snavely, King & Associates, Inc. as a Senior Consultant. While with that firm, he participated in numerous studies related to Section 229 proceedings and anti-trust litigation.

In 1987, Mr. Kent founded Klick, Kent & Allen, Inc. ("KK&A"), an economic and financial consulting firm. He served as a Principal of KK&A until its acquisition by FTI Consulting, Inc. in June 1998.

Mr. Kent has presented testimony in the valuation proceedings before the Special Court, the House of Courts of Justice Committee of the Virginia General Assembly, various state courts and federal courts and the Interstate Commerce Commission and Surface Transportation Board.

Mr. Kent is sponsoring evidence relating to the calculation of operating costs contained in Section III.D. Mr. Kent has signed a verification of the truth of the statements contained therein. A copy of Mr. Kent's verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Christopher D. Kent

8. Wilbert Kissner

Wilbert Kissner is the BNSF Division Trainmaster at Aberdeen, South Dakota, a position he has held since 1991. His business address is 1 North Main Street, Aberdeen, South Dakota 57401. Mr. Kissner has worked for a railroad since 1971 and has been employed by BNSF or its predecessors since 1979. Among other positions, he has served as the Trainmaster/Roadforeman at the Alliance, Nebraska Yard and as Terminal Trainmaster at Northtown, Minnesota. In his current position, Mr. Kissner oversees all operations in a territory that includes 405 miles of main line and 140 miles of branch line, and includes Otter Tail Power Company's Big Stone Generating Station.

Mr. Kissner is sponsoring evidence relating to the operation of Otter Tail trains between Hettinger, North Dakota and Otter Tail's Big Stone Generating Station. His evidence is contained in Section II.A.1.(c)(10)(b) of the Narrative. Mr. Kissner has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 3, 2003

Wilbert Kissner

9. John C. Klick

John C. Klick is the Executive Vice President of the economic and financial consulting firm of FTI Consulting, Inc. The firm's offices are located at 1201 Eye Street, N.W., Suite 400, Washington, DC 20005.

Mr. Klick graduated in 1970 from Bates College with a Bachelor of Science degree in Mathematics. He also has taken graduate courses in finance, accounting, and operations research. Since 1970, he has been involved continuously in cost-based economic and financial studies for a variety of industries.

Throughout Mr. Klick's career, he has organized and directed cost and economic studies for service providers, state governments, and other public bodies dealing with railroads, pipelines and other network industries. Examples of past studies that he has participated in include (1) organizing and directing traffic, operational, and cost analyses in connection with the valuation of northeastern rail property transferred to the Consolidated Rail Corporation, (2) calculation of stand-alone and long-run incremental costs for major segments of the nation's railroad industry, (3) estimation of the long-run incremental costs of providing various aspects of local telecommunications services, and (4) calculation of marginal, incremental and stand-alone costs for services performed by a major petroleum products pipeline company. Virtually all of these studies have involved the development and/or use of complex, computerized cost models that make extensive use of detailed engineering and operating input and incorporate sophisticated discounted cash flow techniques.

In addition, Mr. Klick has undertaken studies related to economic issues and analysis such as the effects of productivity and inflation on the costs of operations, forecasts of traffic volumes and corresponding resource requirements, and valuations of services and facilities.

The results of these studies frequently have been presented in both oral and written testimony before the Surface Transportation Board (and its predecessor, the Interstate Commerce Commission), the Federal Energy Regulatory Commission, state public utility commissions, arbitration panels, and the federal and state courts. This testimony has related to subjects such as the development of variable cost of service, marginal costs, incremental costs, stand-alone costs, economic principles related to the maximum and minimum level of rates, and procedures for implementing these maximum and minimum rate principles.

Mr. Klick is sponsoring evidence regarding flaws in Otter Tail's volume and revenue assumptions, Otter Tail's cross-over revenue divisions methodologies and revenue forecasts. He also sponsors evidence regarding BNSF's modified volume and revenue assumptions, including testimony regarding the development and implementation of BNSF's proposed density adjusted revenue allocation ("DARA") procedure and interprets the results of his DARA calculations. That evidence is incorporated in Section III.A of the Narrative. Mr. Klick has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 4, 2003

John C. Klick

10. Thomas G. Kraemer

Thomas G. Kraemer is currently Group Vice President - Coal Marketing for BNSF, a position he has held since June 1999. His business address is 2650 Lou Menk Drive, Fort Worth, Texas 76131. In his position, Mr. Kraemer is responsible for all marketing activities associated with BNSF's sale of rail transportation services to shippers of coal, including Otter Tail Power Company, and for developing forecasts of coal shipments and revenues and for tracking and evaluating competition. He began his career in the railroad industry in 1981 as a marketing manager with BNSF's predecessor, Burlington Northern ("BN"). He held a variety of positions at BN and BNSF in the marketing, operations, and strategic planning organizations before he assumed his current position in Fort Worth, Texas. He holds a Bachelor of Science degree from the University of Minnesota and an MBA degree from Mankato State University in Mankato, Minnesota.

Mr. Kraemer is sponsoring evidence relating to a study of recent BNSF coal contracts. His evidence is incorporated in Section III.A.3 of the Narrative. Mr. Kraemer has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 3, 2003

Thomas G. Kraemer

11. Karl M. Leopold

Karl M. Leopold is a Senior Consultant at FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. Mr. Leopold holds a Bachelor's Degree in Government and Politics. In 1997, he joined Klick, Kent & Allen, Inc., which was acquired by FTI Consulting, Inc. in 1998. Since that time he has been involved continuously in analyzing accounting, cost, financial and engineering issues associated with railroad operations and pricing. He has conducted numerous stand-alone cost studies, conducted and evaluated railroad contract provisions, and developed computer models to evaluate railroad engineering and operating requirements.

Mr. Leopold is sponsoring evidence relating to Otter Tail's string program, the number of crew personnel required by the OTRR, and the number of locomotives and railcars required by the OTRR. His evidence is contained in Sections III.B.2.a, III.C.2 and III.D.3.a of the Narrative. Mr. Leopold has signed a verification of the truth of the statements contained therein. A copy of Mr. Leopold's verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 2nd, 2003

Karl M. Leopold

12. J. Reilly McCarren

J. Reilly McCarren is a railroad executive and engineer. His business address is 330 Abbotsford Road Kenilworth, Illinois 60043-1105. Mr. McCarren holds Bachelors and Masters Degrees in Civil Engineering from the Massachusetts Institute of Technology. Mr. McCarren is currently the Chairman of the Arkansas & Missouri Railroad Company ("A&M"), a transportation company that provides local railroad, trucking and logistics services in Northwest Arkansas and Southwest Missouri. Prior to his chairmanship at A&M, Mr. McCarren served as an executive at several railroads, including a term as President and Chief Executive Officer of the Wisconsin Central System, the largest integrated regional rail carrier in North America, with a 2,800 mile network in both the United States and Canada, and as President of the Gateway Western Railway and the Wheeling and Lake Erie Railway.

Mr. McCarren is sponsoring evidence relating to factors affecting crew compensation. His evidence is contained in Section III.D.3.c. of the Narrative. Mr. McCarren has signed a verification of the truth of the statements contained therein. A copy of Mr. McCarren's verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 2, 2003

J. Reilly McCarren

13. Rick A. Meredith

Rick A. Meredith is a Design Engineer with Ralph Whitehead Associates, an engineering consulting firm. His corporate business address is 1000 West Morehead St., Charlotte, NC 28208. As a Design Engineer at RWA, Mr. Meredith is responsible for the design and plan preparation of a variety of highway and railway projects, including span bridge replacements. He is also a qualified On-Track Worker Training instructor conducting courses for CSXT and Norfolk Southern contractors. His major project experience for RWA includes work on over a dozen bridge projects such as: the final engineering design of a dual track two simple deck plate girder spans with a composite concrete ballast deck bridge, the replacement of a single track 163'-0" 7-span open deck bridge on timber piles with a 4-span timber ballast deck steel beam bridge on steel pile and drilled shaft bents, the replacement of a single track 137'-4" 4-span open deck bridge on timber and steel pile bents with a 3-span timber ballast deck steel beam bridge on steel pile bents, among others.

Mr. Meredith received his Bachelor of Science in Civil Engineering in 1995 from the Virginia Polytechnic Institute and State University. He is a member of the American Railway Engineering and Maintenance of Way Association (AREMA), and the American Society of Civil Engineers (ASCE). Mr. Meredith previously worked for Norfolk Southern Corporation as Track Supervisor, managing all aspects of track maintenance and operations for several large metropolitan areas.

Mr. Meredith is sponsoring evidence relating to Section III.F.5 Bridges. Mr. Meredith has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Rick A. Meredith

14. Paul B. Michiels, P.E.

Paul B. Michiels is a Project Manager and Senior Engineer with Ralph Whitehead Associates. His corporate business address is 1000 West Morehead St., Charlotte, NC 28208. At RWA, Mr. Michiels manages the railway design group, and he also administers contracts. He has extensive experience in the design and review of railway structures, including serving as Senior Engineer or Engineer on more than a dozen complex bridge projects. His major project experience at RWA includes serving as Senior Engineer on large bridge replacements in the southeastern region. Mr. Michiels has also worked on widening existing structures.

Mr. Michiels has worked for 16 years in the bridge industry. His previous work experience includes working for three years at the Virginia Department of Transportation. He also has worked for the engineering firms URS Greiner Woodward Clyde, Inc. and HDR Engineering, Inc. Mr. Michiels received his Bachelor of Science in Civil Engineering in 1986 from Old Dominion University. He holds a license as a Professional Engineer in Virginia, North Carolina, and South Carolina. He is a member of the American Railway Engineering & Maintenance-of-Way Association (AREMA), where he sits on two committees, and is also a member of the American Institute of Steel Construction.

Mr. Michiels is sponsoring evidence relating to Section III.F.5 Bridges. Mr. Michiels has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Paul B. Michiels, P.E.

15. Terence J. Monks

Terence J. Monks is a computer programmer and software consultant. His business address is 2450 Freetown Drive, Reston, Virginia 20191.

Mr. Monks holds a Bachelor of Arts degree in French and German from the University of Exeter, United Kingdom. He also spent two years in a doctoral program in Computational Linguistics at Birkbeck College, University of London, United Kingdom.

Since 1968, Mr. Monks has been employed as a programmer, systems analyst and Director of Computer Services and Systems Development for various organizations. He has specialized in computer modeling and simulation, providing studies and software to the National Aeronautics and Space Administration (NASA), the Raytheon Corporation, and the Federal Aviation Administration (FAA). Mr. Monks was a lead designer/programmer for a project sponsored by the FAA to simulate day-to-day air traffic between the West Coast and Hawaii.

Mr. Monks held the titles of Chief, Operational Support and Director, Computer Services, for the United States Railway Association. During this time, he oversaw the development and deployment of the Operations Cost Model (OCM), a large-scale simulation of day-to-day operations on the entire Conrail rail network. Following deployment of the OCM, Mr. Monks spent considerable time refining the model and increasing the throughput and accuracy.

Throughout his professional career, Mr. Monks has had the opportunity to study and use many computer languages and operating systems, including all those in common use today. His work also includes program verification, debugging techniques and error checking in software development.

Mr. Monks is sponsoring evidence relating to Otter Tail's string program. His evidence is contained in Section III.B.2.a.3 and III.C.2.a of the Narrative. Mr. Monks has signed a

verification of the truth of the statements contained therein. A copy of Mr. Monks' verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 3, 2003

Terence J. Monks

16. Loren E. Mueller

Loren E. Mueller is a railroad transportation consultant. His business address is 614 Regency Crossing, Southlake, TX 76092.

Mr. Mueller was employed by BNSF and its predecessors for 32 years. His management positions with the Burlington Northern Railroad began in 1975 as yardmaster at Lincoln, Nebraska. He held a number of positions with the railroad. From 1992 to 1994, Mr. Mueller was General Manager - Coal Operations, responsible for operations of the BN system coal business unit. During this time, he directed major construction and expansion of the BN's operations in the Powder River Basin ("PRB") of Wyoming to include coordination of the joint line with Chicago and North Western Railway Company ("CNW")/Union Pacific ("UP"). From 1995 through 1996, he was Vice President of Burlington Lines, responsible for the total transportation function for one-third of the BNSF Railroad, including major terminals, mechanical, engineering and operations. Mr. Mueller retired from BNSF in 1996. From May, 2000, through April 30, 2001, he held a one-year assignment as Vice President and Chief Operating Officer of the Alaska Railroad. He was responsible for all aspects of operation for the Alaska Railroad, including operations, engineering, mechanical, marketing and safety.

Mr. Mueller is sponsoring evidence relating to operations of the stand-alone railroad. His evidence is incorporated in Sections III.B.3, III.C and III.D.3 of the Narrative. Mr. Mueller has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 8, 2003

Loren E. Mueller

17. Julie A. Murphy

Julie A. Murphy is a Manager at FTI Consulting, Inc., an economic and financial consulting firm. Her business address is 1201 Eye Street, N.W., Suite 400, Washington, D.C. 20005. Ms. Murphy holds a Bachelor of Arts and a Master of Arts in Economics from Allegheny College and Pennsylvania State University. Since 1994, Ms. Murphy has been involved in various aspects of consulting for network industries including electric utilities, trransportation and telecommunications firms. Her work has encompassed damages analysis, competition and antitrust analyses, asset valuations, pricing and costing analyses.

Ms. Murphy joined FTI Consulting in 2000. While with FTI, Ms. Murphy has provided technical support and filed testimony in several proceedings before the Surface Transportation Board, Federal Communications Commission, and the California State Utility Commission. She has been involved in developing traffic and revenue forecast in stand-alone cost proceedings since 2000 including the *WPL, TMPA, Duke Energy Co. v. CSX Transp. Co., Duke Energy Co. v. Norfolk Southern Ry, Co., and Carolina Power & Light v. Norfolk Southern Ry. Co.* cases.

Ms. Murphy is sponsoring evidence in Section III.A regarding flaws in Otter Tail's volume and revenue assumptions, Otter Tail's cross-over revenue divisions methodologies and revenue forecasts. She also sponsors evidence regarding BNSF's modified volume and revenue assumptions. Ms. Murphy has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 7, 2003

Julie A. Murphy

18. Janusz Aleksander Ordover

Janusz Aleksander Ordover is a Professor of Economics at New York University. His business address is 269 Mercer Street, New York, New York 10003. Following undergraduate work at Warsaw University in Poland, Dr. Ordover received an M.A. degree in economics from McGill University in 1968. He received his Ph.D. in economics from Columbia University in 1973.

Dr. Ordover has been a tenured professor of Economics at New York University since 1982. During the course of his academic career he has taught at other institutions as well, including New York University Law School, Columbia University Law School, Yale Law School, and the Yale University School of Management and Organization. Dr. Ordover's numerous publications, covering a range of economic issues, are listed in his curriculum vitae, a copy of which is attached hereto as Attachment A.

Dr. Ordover served as Deputy Assistant Attorney General for Economics in the U.S. Department of Justice's Antitrust Division from 1991 to 1992. In addition, Dr. Ordover has been an economic advisor or consultant to numerous organizations including the Organization for Economic Cooperation and Development, the Polish Ministry of Finance and Anti-Monopoly Office, and the World Bank. Dr. Ordover has also been an active participant in numerous activities of the American Bar Association relating to antitrust and economic issues. He has also presented testimony before the Federal Trade Commission and the Senate Judiciary Committee.

Dr. Ordover is sponsoring evidence contained in Sections III.A.1.a and III.A.3.c of the Narrative. His Declaration underlying the evidence in these Narrative sections is Exhibit III.A-2. Dr. Ordover has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Janusz A. Ordover

Curriculum Vitae

JANUSZ ALEKSANDER ORDOVER

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New York University
269 Mercer Street
New York, New York 10003

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Email: janusz.ordover@nyu.edu

EDUCATION

1968-1973	Columbia University, New York, New York.
	Graduate Department of Economics and European Institute of the School of International Affairs
	Doctoral Dissertation: Three Essays on Economic Theory, May 1973
1967-1968	McGill University, Montreal, Canada.
	Departments of Economics and Political Science
1963-1966	Warsaw University, Warsaw, Poland.
	Department of Political Economy

HONORS

1973	Columbia University: Highest distinction for the doctoral dissertation
1971-1972	Columbia University: Honorary President's Fellow
1969-1971	Columbia University: President's Fellow
1967-1968	McGill University: Honors Student
1964, 1965	Warsaw University: Award for Academic Achievement, Department of Political Economy
	Who's Who in the World Who's Who in America Who's Who in the East

PROFESSIONAL EXPERIENCE

June 1982 - present	Professor of Economics Department of Economics, New York University, New York, New York
Sept. 1996 - present	Director of Masters in Economics Program Department of Economics, New York University

Summer 1996	Lecturer International Program on Privatization and Reform Institute for International Development, Harvard University, Cambridge, Massachusetts
Aug. 1991 - Oct. 1992	Deputy Assistant Attorney General for Economics Antitrust Division United States Department of Justice, Washington, D.C.
Sept. 1989 - July 1990	Visiting Professor of Economics School of Management and Organization, Yale University, New Haven, Connecticut
	Lecturer in Law Yale Law School
Mar. 1984 - June 1988	Visiting Professor of Economics Universita Commerciale "Luigi Bocconi", Milan, Italy.
June 1982 - Feb. 1985	Director of Graduate Studies Department of Economics, New York University
Sept. 1982 - June 1986	Adjunct Professor of Law (part-time) Columbia University Law School, New York, New York
Feb. 1982 - June 1982	Acting Director of Graduate Studies Department of Economics, New York University
June 1978 - June 1982	Associate Professor of Economics Department of Economics, New York University
Sept. 1979 - May 1990	Lecturer in Economics and Antitrust New York University Law School
Sept. 1977 - June 1978	Member, Technical Staff Bell Laboratories, Holmdel, New Jersey
	Associate Professor of Economics Columbia University
	Visiting Research Scholar Center for Law and Economics, University of Miami, Miami, Florida
Sept. 1973 - Aug. 1977	Assistant Professor of Economics New York University
Summer 1976	Fellow Legal Institute for Economists, Center for Law and Economics, University of Miami
Summer 1976	Visiting Researcher Bell Laboratories, Holmdel, New Jersey

OTHER PROFESSIONAL ACTIVITIES

1997-present	Board of Editors Antitrust Report
1995 - present	Consultant, The World Bank

	Testimony, Hearings of the Federal Trade Commission
Fall 1995	"Anticipating the 21st Century: Competition Policy in the New High-Tech, Global Marketplace," Washington, D.C.
1994 - 1996	Senior Affiliate Law and Economics Consulting Group, Emoryville, California
1994 - present	Senior Affiliate Consultants in Industry Economics, LLC, Princeton, New Jersey
1993 - 1994	Director Consultants in Industry Economics, Inc., Princeton, New Jersey
1992 - 1993	Vice-Chair (*pro tempore*) Economics Committee, American Bar Association, Chicago, Illinois
1992 - 1995	Senior Consultant Organization for Economic Cooperation and Development, Paris, France
1990 - 1991	Senior Consultant Organization for Economic Cooperation and Development
1991	Member, Ad-hoc Working Group on Bulgaria's Draft Antitrust Law The Central and East European Law Initiative American Bar Association
1990 - 1991	Advisor to Polish Ministry of Finance and Anti-Monopoly Office Warsaw, Poland
1990 - 1991	Member, Special Committee on Antitrust Section of Antitrust Law, American Bar Association
1990 - 1991	Director and Senior Advisor Putnam, Hayes & Bartlett, Inc., Washington, D.C.
1990 - 1996	Member, Predatory Pricing Monograph Task Force Section of Antitrust Law, American Bar Association
Apr. 12, 1989	Witness, Hearings on Competitive Issues in the Cable TV Industry Subcommittee on Monopolies and Business Rights of the Senate Judiciary Committee Washington, D.C.
1989	Member EEC Merger Control Task Force, American Bar Association
1988 - present	Associate Member American Bar Association
1987 - 1989	Adjunct Member Antitrust and Trade Regulation Committee The Association of the Bar of the City of New York
1984	Speaker, "Industrial and Intellectual Property: The Antitrust Interface" National Institutes, American Bar Association, Philadelphia, Pennsylvania
1983 - 1990	Director Consultants in Industry Economics, Inc.
1982	Member, Organizing Committee Tenth Annual Telecommunications Policy Research Conference, Annapolis, Maryland

	Member
1981	Section 7 Clayton Act Committee, Project on Revising Merger Guidelines American Bar Association
1980	Organizer, Invited Session on Law and Economics American Economic Association Meetings, Denver, Colorado
1978 - 1979	Member, Department of Commerce Technical Advisory Board Scientific and Technical Information Economics and Pricing Subgroup

Referee for numerous scholarly journals, publishers, and the National Science Foundation.

MEMBERSHIPS IN PROFESSIONAL SOCIETIES

American Economic Association
American Bar Association

PUBLICATIONS

A. Journal Articles

"Parity Pricing and its Critics: Necessary Condition for Efficiency in Provision of Bottleneck Services to Competitors," with W. J. Baumol and R.D.Willig, Yale Journal on Regulation, vol. 14, Winter 1997, 146-63.

"Competition and Trade Law and the Case for a Modest Linkage," with E. Fox, World Competition, Law and Economics Review, vol. 19, December 1995, 5-34.

"On the Perils of Vertical Control by a Partial Owner of Downstream Enterprise," with W.J. Baumol, Revue D'Economie Industrielle, No. 69, 3^{e} Trimestre 1994, 7-20.

"Competition Policy for Natural Monopolies in Developing Market Economy," with R.W. Pittman and P. Clyde, Economics of Transition, vol. 2, no. 3, September 1994, 317-343; reprinted in B. Clay (ed), De-monopolization and Competition Policy in Post-Communist Economies, Westview Press 1996, 159-193.

"The 1992 Agency Horizontal Merger Guidelines and the Department of Justice's Approach to Bank Merger Analysis," with M. Guerin-Calvert, Antitrust Bulletin, vol. 37, no. 3, 667-688; reprinted in Proceedings of the 1992 Conference on Bank Structure and Competition: Credit Markets in Transition, Federal Reserve Bank of Chicago, 1992, 541-560.

"Entry Analysis Under the 1992 Horizontal Merger Guidelines," with Jonathan B. Baker, Antitrust Law Journal, vol. 61, no. 1, Summer 1992, 139-146.

"Economics and the 1992 Merger Guidelines: A Brief Survey," with Robert D. Willig, Review of Industrial Organization, vol. 8, 139-150, 1993. Reprinted in E. Fox and J. Halverson (eds.), Collaborations Among Competitors: Antitrust Policy and Economics, American Bar Association, 1992, 639-652.

"Equilibrium Vertical Foreclosure: A Reply," with G. Saloner and S.A. Salop, American Economic Review, vol. 82, no. 3, 1992, 698-703.

"A Patent System for Both Diffusion and Exclusion," Journal of Economic Perspectives, vol. 5, Winter 1991, 43-60.

"R&D Cooperation and Competition," with M. Katz, Brookings Papers on Economic Activity: Microeconomics, 1991, 137-203.

"Equilibrium Vertical Foreclosure," with G. Saloner and S. Salop, American Economic Review, vol. 80, March 1990, 127-142.

"Antitrust Policy for High-Technology Industries," with W.J. Baumol, Oxford Review of Economic Policy, vol. 4, Winter 1988, 13-34. Reprinted in E. Fox and J. Halverson (eds.), Collaborations Among Competitors: Antitrust Policy and Economics, American Bar Association, 1991, 949-984.

"Conflicts of Jurisdiction: Antitrust and Industrial Policy," Law and Contemporary Problems, vol. 50, Summer 1987, 165-178.

"Market Structure and Optimal Management Organization," with C. Bull, Rand Journal of Economics, vol. 18, no. 4, Winter 1987, 480-491.

"A Sequential Concession Game with Asymmetric Information," with A. Rubinstein, Quarterly Journal of Economics vol. 101, no.4, November 1986, 879-888.

"The G.M.-Toyota Joint Venture: An Economic Assessment," with C. Shapiro, Wayne Law Journal, vol. 31, no. 4, 1985, 1167-1194.

"Economic Foundations and Considerations in Protecting Industrial and Intellectual Property: An Introduction," ABA Antitrust Law Journal, vol. 53, no. 3, 1985. 503-518, Comments, 523-532.

"Antitrust for High-Technology Industries: Assessing Research Joint Ventures and Mergers," with R.D. Willig, Journal of Law and Economics, vol. 28, May 1985, 311-334.

"Use of Antitrust to Subvert Competition," with W.J. Baumol, Journal of Law and Economics, vol. 28, May 1985, 247-266. Reprinted in Journal of Reprints for Antitrust Law and Economics, vol. 16, no. 2.

"Advances in Supervision Technology and Economic Welfare: A General Equilibrium Analysis," with C. Shapiro, Journal of Public Economics, vol. 25/3, 1985, 371-390.

"Predatory Systems Rivalry: A Reply," with A.O. Sykes and R.D. Willig, 83 Columbia Law Review, June 1983, 1150-1166. Reprinted in Corporate Counsel's Annual-1984 edition, Matthew Bender & Company, 1984, 433-450.

"The 1982 Department of Justice Merger Guidelines: An Economic Assessment," with R.D. Willig, 71 California Law Review, March 1983,535-574. Reprinted in Antitrust Policy in Transition: The Convergence of Law and Economics, E. Fox and J. Halverson (eds.), American Bar Association Press, 1984, 267-304.

"Unfair International Trade Practices," with A. Sykes and R.D. Willig, 15 Journal of International Law and Politics, Winter 1983, 323-338.

"On Non-linear Pricing of Inputs," with J. Panzar, International Economic Review, October 1982,

659-675.

"Herfindahl Concentration, Rivalry and Mergers," with A. Sykes and R.D. Willig, Harvard Law Review, vol. 95, June 1982, 1857-1875.

"A Reply to 'Journals as Shared Goods: Comment,'" with R.D. Willig, American Economic Review, June 1982, 603-607.

"Proposed Revisions to the Justice Department's Merger Guidelines," with S. Edwards, et al., Columbia Law Review, vol. 81, December 1981, 1543-1591.

"An Economic Definition of Predation: Pricing and Product Innovation," with R.D. Willig, Yale Law Journal, vol. 91, November 1981, 8-53.

"On the Consequences of Costly Litigation in the Model of Single Activity Accidents: Some New Results," Journal of Legal Studies, June 1981, 269-291.

"On the Political Sustainability of Taxes," with A. Schotter, American Economic Review Papers and Proceedings, May 1981, 278-282.

"Information and the Law: Evaluating Legal Restrictions on Competitive Contracts," with A. Weiss, American Economic Review Papers and Proceedings, May 1981, 399-404.

"Redistributing Incomes: Ex Ante or Ex Post," Economic Inquiry, April 1981, 333-349.

"On the Nonexistence of Pareto Superior Outlay Schedules," with J. Panzar, The Bell Journal of Economics, Spring 1980, 351-354.

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19. Robert C. Phillips, P.E.

Robert C. Phillips is a Project and Branch Manager with Ralph Whitehead Associates. His business address is 1000 West Morehead St., Charlotte, NC 28208. As Project and Branch Manager for RWA, he is responsible for branch office management, construction management for fiber optic construction, and the general administration of construction inspection for railway projects. He has extensive experience in fiber optic construction management, railroad track and bridge construction, track maintenance and railroad operations. His special expertise is roadbed preparation, and his major project experience with RWA includes construction management at approximately ten sites.

Mr. Phillips is a 27 year veteran of the railroad industry. Mr. Phillips received his Bachelor of Science in Civil Engineering at Virginia Polytechnic Institute in 1975. He received his Masters in Business Administration from Averett College in 1992. Upon graduation he worked for Norfolk Southern Railroad as a Track Supervisor, where he inspected and maintained tracks, scheduled track maintenance, supervised track gangs, and maintained a successful safety program. He then worked for APAC-Virginia, Inc. as a project manager, which included cost estimating and analysis, as well as site engineering and development. He holds a license as a Registered Professional Engineer in Virginia.

Mr. Phillips is sponsoring evidence relating to Section III.F.2 Roadbed Preparation. Mr. Phillips has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Robert C. Phillips, P.E.

20. Robert J. Plum, III

Robert J. Plum, III, is a Director of FTI Consulting, Inc. ("FTI"), with offices at 1201 Eye Street, N.W., Suite 400, Washington, DC 20005.

Mr. Plum holds a Bachelor's Degree in Accounting and an MBA degree with a concentration in finance. He began his career in 1979 with Wyer Dick & Company, a consulting firm that specialized in railroad costing issues. Since that time he has been involved continuously in analyzing accounting, cost, financial and engineering issues associated with railroad operations and pricing. He has conducted numerous variable and stand-alone cost studies, conducted and evaluated railroad contract provisions, field studies of railroad operations, and developed computer models to evaluate railroad engineering and operating requirements.

Mr. Plum is sponsoring evidence relating to BNSF's variable costs for the issue movement, OTRR route miles, and the number of locomotives and railcars required by OTRR. His evidence is incorporated in Sections II.A, III.B.1, and III.C.2 of the Narrative. Mr. Plum has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 7, 2003

Robert J. Plum, III

21. Dennis K. Prewitt

Dennis K. Prewitt is a Construction Inspector with Ralph Whitehead Associates, an engineering consulting firm. His business address is 1000 West Morehead St., Charlotte, NC 28208. As Construction Inspector for RWA, Mr. Prewitt is responsible for the general administration and construction inspection of railway projects. He has extensive experience in bridge inspections, bridge replacements, structural steel protective coatings, siding and mainline track construction upgrades and earthwork. His major project experience at RWA includes such duties as the daily on-site observation at work locations and the verification of construction compliance to approved plans and specifications for multiple projects. He has evaluated hundreds of bridges, and has provided detailed inspection reports, including photographs and videos.

Mr. Prewitt studied Physics at both Washington & Jefferson College and Wright State University. He holds multiple Inspector Certificates, including Bituminous Concrete Inspector, Portland Cement Concrete Inspector, DOT Corrugated Metal Culverts over 10' Span, DOT Structural Steel Protective Coatings with Lead Abatement, and Bridge Inspector, Concrete and Structural Steel. Mr. Prewitt has previously worked at Balke Engineers of Cincinnati, OH as a Resident Project Representative, responsible for the general administration and inspection of private and public works projects, including highways, bridges, railroad grade separations, water mains, sanitary installations and bridge painting.

Mr. Prewitt is sponsoring evidence relating to Sections III.C.1 Route Miles and III.F.2 Culverts and Compilations. Mr. Prewitt has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Dennis Prewitt

Dennis K. Prewitt

22. Charles W. (Pat) Price

Charles W. Price is a Project Inspector at Ralph Whitehead Associates, an engineering consulting firm. His business address is 1000 West Morehead St., Charlotte, NC 28208. As Project Inspector for RWA, Mr. Price is responsible for the general administration of construction inspection for railway projects, as well as for providing safety awareness training on fiber optic construction. His special expertise is in the area of signals, and his major project experience for RWA involving signals has included the oversight for all construction engineering and inspection services for fiber optic installation on the Norfolk Southern right of way. His daily responsibilities included providing on-site reports for all work locations and enforcing compliance with safety rules. He has performed a similar oversight role on other major right of ways. He has also served as Project Inspector for the construction of a large mixing facility, including the creation of a large excavation, the laying of track, paving of a storage yard, and installation of 2 railroad and 1 highway bridges.

Mr. Price is a 35 year veteran of the railroad industry. He graduated from the Master Course in Industrial Electronics Technology at the National Radio Institute in Washington D.C. in 1983. Mr. Price previously worked for Norfolk Southern Corporation as a Senior Project Engineer in the Signal Department, overseeing all signal projects in the northeastern region. This included the scheduling of all signal projects, meeting with contractors to solicit bids for signal projects, coordinating with material management to ensure materials were provided in a timely fashion, and monitoring of material and labor budgets.

Mr. Price is sponsoring evidence relating to Section III.F.6 Signals. Mr. Price has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

C.W. Price

Charles W. (Pat) Price

23. James Primm

James Primm specializes in all aspects of railroad engineering, specifically in the design of maintenance facilities for and the procurement of railcars and locomotives. He is currently working on subcontract for Ralph Whitehead Associates, an engineering consulting firm. His business address while on subcontract is 1000 West Morehead St., Charlotte, NC 28208. Mr. Primm has supervised the design of locomotive maintenance facility renovation projects and has helped procure over 1,300 unit train coal cars.

Among Mr. Primm's many engineering achievements are the direction of design and management of construction at Barstow Locomotive Facility in Barstow, California, Hinkle Locomotive Facilities in Hermiston, Oregon, and Topeka System Maintenance Terminal Renovation in Topeka, Kansas. He has also prepared conceptual designs for high speed train maintenance facilities.

Mr. Primm has authored numerous transportation studies, as well as undertaken geotechnical and environmental investigations. He received his Bachelor of Science in 1973 in Electrical Engineering from the University of Oklahoma. He is a member of the American Railway Engineering Association, the American Welding Society, the Locomotive Maintenance Officers Association, and the International Association of Railway Operating Officers.

Mr. Primm is sponsoring evidence relating to Section III.F.7 Buildings. Mr. Primm has signed a verification of the truth of statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

James Primm

24. Bill H. Slaughter

Bill H. Slaughter was BNSF's Assistant Vice President, Intermodal/Automotive Operations, until his retirement on October 1, 2003. His business address is 27962 State Highway J, Atlanta, MO 63530.

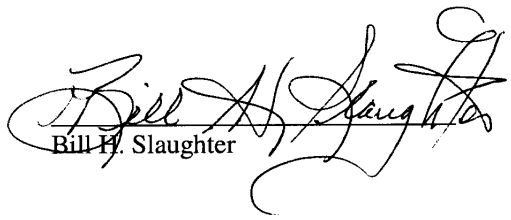
In his position as Assistant Vice President, Mr. Slaughter was responsible for the design and oversight of intermodal and automotive schedules, trains, service, and operations to provide intermodal and automotive service. In addition, Mr. Slaughter was responsible for managing capacity at BNSF, including determining how much traffic could travel over segments of BNSF's rail network and projecting how capacity should be increased when necessary. Mr. Slaughter had equivalent responsibilities since the merger between Burlington Northern and the Atchison, Topeka & Santa Fe ("ATSF") until his retirement.

Prior to the merger, Mr. Slaughter was employed by the ATSF. Between approximately 1990 and the merger, his management responsibilities fell within the intermodal area at ATSF. His prior work with the ATSF, which spanned more than 20 years, involved various positions in field operating capacities, including responsibility for special operating territories in several geographic regions.

Mr. Slaughter is sponsoring evidence relating to characteristics and requirements of high-priority intermodal Z train service. His evidence is contained in Section III.A.1 of the Narrative. Mr. Slaughter has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on September 24, 2003



Bill H. Slaughter

25. Arnold S. Tesh

Arnold S. Tesh is a real estate consultant and certified real property appraiser at FTI Consulting, Inc., an economic and financial consulting firm. His business address is 1201 Eye Street, N.W., Suite 400, Washington, DC 20005. He has been valuing real estate for more than thirty-seven years. He has spent twenty-five years performing property appraisals for use by railroads. He served as the Director of Real Estate in the Law Department of the United States Railway Association during the proceedings that resulted in the creation of Conrail. In that proceeding, he directed the valuation of nearly 24,000 miles of railroad in seventeen states, the District of Columbia, and two Canadian provinces, comprising the lines of Penn Central, Erie Lackawanna, Central of New Jersey, Ann Arbor, Lehigh Valley, Reading, and Delaware and Hudson railroads. The methodology that he developed in that case, and which formed the basis of his Special Court testimony under the Regional Rail Reorganization Act of 1973, employs the same valuation principles he uses here.

Mr. Tesh has also performed real property appraisals for railroad lines used by Amtrak, Union Pacific, Southern Pacific, Illinois Central Gulf, Santa Fe, Burlington Northern, CSX, and other railroads. His experience also includes appraising commercial, industrial, residential and agricultural properties located throughout the United States, as well in the Caribbean, Canada, Mexico, and Central America.

Mr. Tesh is a Counselor of Real Estate ("CRE") of the American Society of Real Estate Counselors and a General Accredited Appraiser of the National Association of Realtors. Only about 1,100 real estate experts in the world have earned the CRE designation. He has also served as an officer in various real estate associations and has his certification to appraise real estate in many states.

Mr. Tesh is sponsoring evidence relating to road property investment in land. His evidence is contained in Section III.F.1 of the Narrative. Mr. Tesh has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

Arnold S. Tesh, CRE

26. Dale W. Wagoner

Dale W. Wagoner is the Senior Manager Property Accounting-Systems and Control at The Burlington Northern and Santa Fe Railway Company ("BNSF"). Mr. Wagoner is responsible for maintaining the fixed asset system for BNSF, and has been in his current position for approximately 14 months. Prior to that, Mr. Wagoner worked in the areas of Engineering Operating Budgets and Engineering Field Maintenance and has more than 20 years of railroad work experience.

Mr. Wagoner is sponsoring evidence relating to BNSF's accounting procedures for maintenance-of-way costs. His evidence is contained in Section II.A.1.c.(7)(a)(ii) and (iv) of the Narrative. Mr. Wagoner has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 3, 2003

Dale W. Wagoner

Dale W. Wagoner

October 3, 2003

Sally C. Wagner

SALLY C. WAGNER
Notary Public, State of Texas
My Commission Expires
June 07, 2007

27. Joseph L. Walton III

Joseph L. Walton III is a consultant who has worked for 42 years in the railroad signals and communications field. He is currently on subcontract to Ralph Whitehead Associates, an engineering consulting firm. His business address while on subcontract is 1000 West Morehead St., Charlotte, NC 28208.

Mr. Walton has provided leadership, management and supervisory responsibility in the field of signals and communications since December, 1959. His experience includes the engineering, operating, construction and maintenance of railway signals and communications systems. His career has spanned the job of being an assistant signalman to being a top manager of complex signals and communications systems. Most of his career has been spent working in various positions involving signals and communications at Norfolk Southern Corporation.

Mr. Walton received an Associate Degree from Rowan Technical Institute in 1969 in Electronic Technology. He is a member of AREMA, the Association of American Railroads, and the American Short Line and Regional Railroad Association.

Mr. Walton is sponsoring evidence relating to Signals and Communications. His evidence is contained in Section III.F.6. of the Narrative. Mr. Walton has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 2, 2003

Joseph L. Walton III

28. David R. Wheeler

David R. Wheeler is the founder and President of Rail Network Analytics. His business address is 9222 Nottingham Way, Mason, OH 45040.

Mr. Wheeler received a Bachelor of Science degree in engineering and computer science from Merrimack College in 1985. He also received a Masters of Business Administration degree in finance and operations management from Miami University in 1992. He has training in Six Sigma methodology and holds a Six Sigma Blackbelt certification.

Throughout his career, Mr. Wheeler has focused on advanced analytical techniques for operational improvement and strategic planning. He has more than fifteen years experience in areas including rail operations analysis, capacity analysis, simulation, stand-alone rate case litigation, structured problem solving using the Six Sigma methodology, supply chain efficiency and mergers & acquisitions. Mr. Wheeler has experience not only in the simulation and analysis of railroads, but also in other high technology industries including cockpit simulation work on the F-16 and F-22 fighter aircraft.

Mr. Wheeler held a number of leadership positions within the Union Pacific Railroad Company (UP). During his tenure with UP, Mr. Wheeler led teams within Finance, Capacity Planning, Network & Capital Planning and Network Design & Integration. He has submitted testimony in previous stand-alone cost cases and presented research in a variety of forums. As General Director, Capacity Planning & Analysis, Mr. Wheeler was responsible for and led the capital planning function for UP's annual capital development and implementation. In this capacity, Mr. Wheeler analyzed and directed spending of more than $300 million for Powder River Basin coal traffic. Mr. Wheeler uses simulation tools on a regular basis and has conducted a number of simulation benchmarking studies to determine and lead vendors toward simulation improvements.

Mr. Wheeler has worked on a variety of projects in the railroad industry. Mr. Wheeler developed UP's Colorado/Utah coal capacity plan and guided the Intermodal growth capacity initiative from Chicago to Los Angeles across UP's Sunset and Tucumcari routes. He has worked on multiple projects for the BNSF, NS, CSX, CP and CN, as well as the many short lines that connect with the UP. Mr. Wheeler has also led teams working on proposals for new passenger service for Amtrak, various commuter agencies, and UP's Joint Facilities, Finance, Operations and Engineering groups.

Mr. Wheeler is sponsoring evidence relating to the OTRR's capacity requirements and cycle times. His evidence is contained in Sections III.B.2, III.B.3 and III.C.2 of the Narrative. Mr. Wheeler has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 4, 2003

David R. Wheeler

29. George T. Zimmerman, P.E.

George T. Zimmerman is a Branch Manager and Project Manager/Senior Engineer with Ralph Whitehead Associates. His business address is 1000 West Morehead St., Charlotte, NC 28208. As Project Manager/Senior Engineer for RWA, Mr. Zimmerman manages all aspects of Ralph Whitehead Associates' relationship with Norfolk Southern. He assists in the preparation of proposals and contracts, and provides structural design and plan reviews for railway and bridge projects. His major project experience, among others, includes serving on an on-call as-needed basis for Norfolk Southern, for plan review and periodic construction inspection throughout the system. Mr. Zimmerman also has served as Project Manager for several large projects for CSXT.

Mr. Zimmerman is a veteran of 23 years in the railroad industry. Mr. Zimmerman received his Bachelor of Science in Civil Engineering in 1979, from West Virginia University. He holds a license as a Registered Professional Engineer in South Carolina, Georgia, Ohio, and Kansas He is a member of the American Railway Engineering and Maintenance of Way Association (AREMA), and a member of the American Society of Civil Engineers.

Mr. Zimmerman is sponsoring evidence relating to Section III.F.3 Track Construction. Mr. Zimmerman has signed a verification of the truth of the statements contained therein. A copy of that verification is attached hereto.

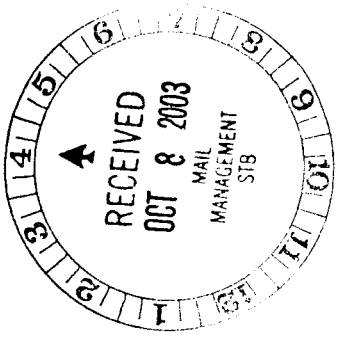
I declare under penalty of perjury that I have read the Reply Evidence that I have sponsored, as described in the foregoing Statement of Qualifications, and that the contents thereof are true and correct. Further, I certify that I am qualified and authorized to sponsor this testimony.

Executed on October 1, 2003

George T. Zimmerman

209077

PUBLIC VERSION



BEFORE THE
SURFACE TRANSPORTATION BOARD

STB Docket No. 42071

OTTER TAIL POWER COMPANY
v.
THE BURLINGTON NORTHERN AND SANTA FE RAILWAY COMPANY

Reply Evidence of
The Burlington Northern and Santa Fe Railway Company

Exhibits

Volume I of I

ENTERED
Office of Proceedings
OCT - 9 2003
Part of
Public Record

Richard E. Weicher
Michael E. Roper
David M. Pryor
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October 8, 2003

ATTORNEYS FOR
THE BURLINGTON NORTHERN AND
SANTA FE RAILWAY COMPANY

PUBLIC VERSION

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ABBREVIATIONS

Terms:

AAR	Association of American Railroads
AEI	Automatic Equipment Identification
AREMA	American Railway Engineering and Maintenance-of-Way Association
ARN	Administration Radio Network
ATSF	The Atchison Topeka & Santa Fe Railway Company
BN	Burlington Northern Railroad Company
BNSF	The Burlington Northern and Santa Fe Railway Company
CARDS	Computer Aided Railway Design System
CMP	Constrained Market Pricing
CP	Signal Control Point
CTC	Centralized Traffic Control System
DARA	Density Adjusted Revenue Allocation
DCF	Discounted Cash Flow
DED	Defective Equipment Detector
DEM	Digital Elevation Model
EOTD	End-of-Train Device
FTI	FTI Consulting, Inc.
G&A	General and Administrative
HBD	Hot Bearing Detector
HOTB	Head-of-Train Device
ICC	Interstate Commerce Commission

MMP	Modified Mileage Prorate
MOW	Maintenance of Way
OTM	Other Track Materials
OTP Errata	Complainant's Errata Evidence (filed on July 14, 2003)
OTP Opening	Complainant's Opening Evidence (filed on June 13, 2003)
PRB	Powder River Basin
RCAF-A	Rail Cost Adjustment Factor - Adjusted
RCAF-U	Rail Cost Adjustment Factor - Unadjusted
RFP	Request for Production
RTC Model	Rail Traffic Controller Model
RRVW	Red River Valley Western Railroad
RWA	Ralph Whitehead Associates
SAC	Stand-Alone Cost
SARR	Stand-Alone Railroad
SSAC	Simplified Stand-Alone Cost Model
STB	Surface Transportation Board
UBC	Uniform Building Code
USGS	United States Geological Survey
WP	Workpaper
WRPI	Western Rail Properties, Inc.

ICC or STB Proceedings:

APS	*Arizona Public Serv. Co. v. The Atchison, Topeka & Santa Fe Ry.*, 2 S.T.B. 367 (1997).
Coal Rate Guidelines or Guidelines	*Coal Rate Guidelines, Nationwide*, 1 I.C.C.2d 520 (1985).
Conrail	*Potomac Electric Power Co. v. Consolidated Rail Corp.*, 367 I.C.C. 532 (1983).
Conrail II	*National Railroad Passenger Corp. and Consolidated Rail Corp.--Application under Section 402(a) of the Rail Passenger Service Act For an Order Fixing Just Compensation 10 I.C.C. 2nd 863 (1996)*
FMC	*FMC Wyoming Corp. v. Union Pacific R.R.*, STB Docket No. 42022 (STB served May 12, 2000).
General Procedures	*General Procedures for Presenting Evidence in Stand-Alone Cost Rate Cases*, STB Ex Parte No. 347 (Sub-No. 3) (STB served Mar. 12, 2001).
Georgia Power	*Georgia Power Co., Southern Co. Servs., Inc., Oglethorpe Power Corp., Municipal Auth. of Georgia, & City of Dalton v. Southern Ry. Co. & Norfolk Southern Corp.*, ICC Docket No. 40581 (ICC served Nov. 8, 1993).
McCarty	*McCarty Farms, Inc. v. Burlington Northern Inc.*, 2 S.T.B. 460 (1997).
Nevada Power I	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 6 I.C.C.2d 1 (1989).
Nevada Power II	*Bituminous Coal—Hiawatha, Utah, to Moapa, Nevada*, 10 I.C.C.2d 259 (1994).
Non-Coal Guidelines	*Rate Guidelines - Non-Coal Proceedings*, STB Ex Parte No. 347 (Sub-No. 2) (STB served May 8, 2002).
OPPD	*Omaha Public Power Dist. v. Burlington Northern R.R.*, 3 I.C.C.2d 853 (1987).
PPL	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served Aug. 19, 2002).
PPL II	*PPL Montana, LLC v. The Burlington Northern and Santa Fe Ry. Co.*, STB Docket No. 42054 (STB served March 24, 2003)

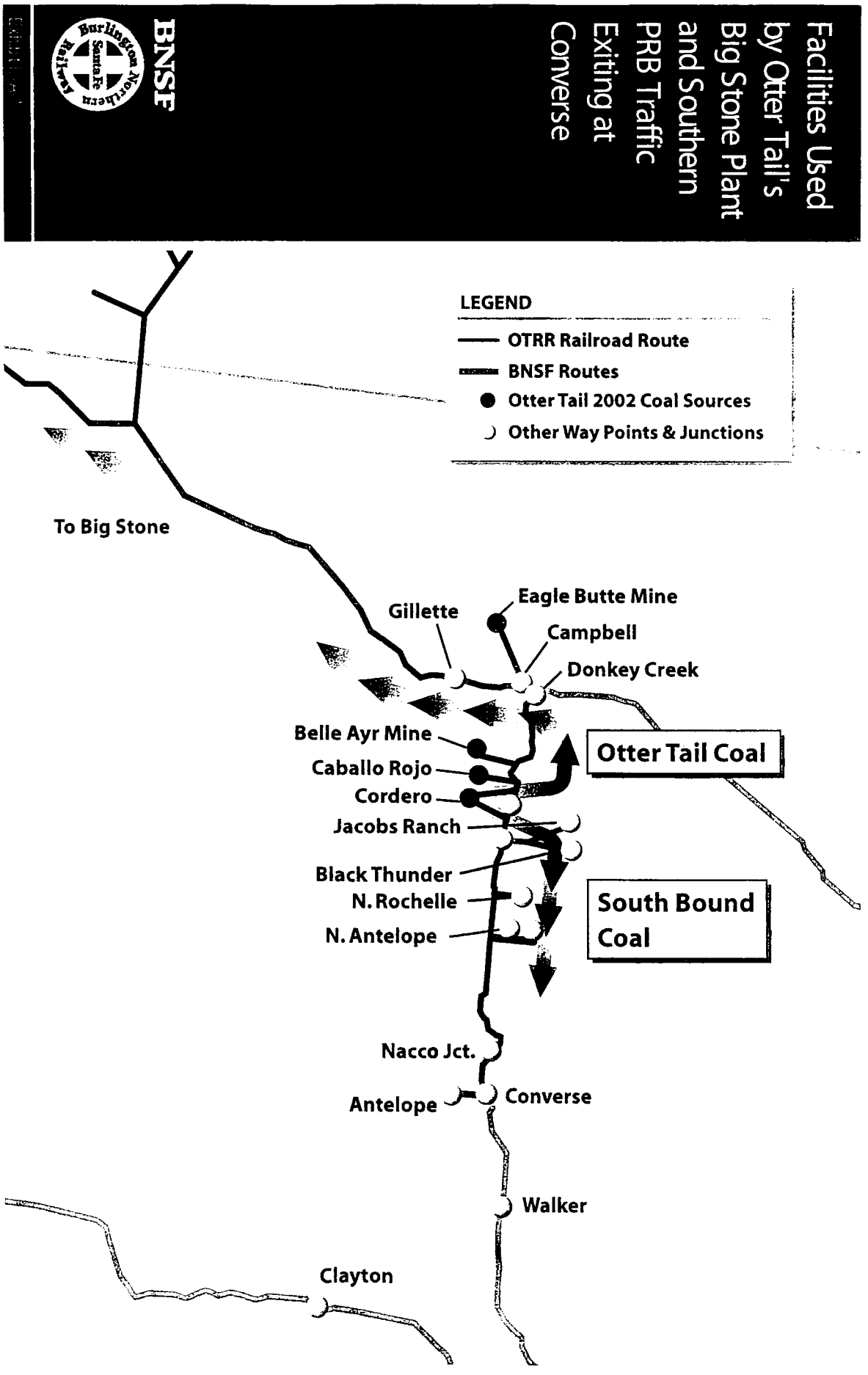
REDACTED

Summary of Variable Costs and Revenue to Variable Cost Ratios for Otter Tail Traffic Moving in Aluminum Cars

	Belle Ayr				
		BNSF Reply		OTP Opening*	
Period	Rate/Ton	Variable Cost/ Ton	Revenue to Variable Cost Ratio	Variable Cost/ Ton	Revenue to Variable Cost Ratio
1st Qtr 2002	$13.49	$5.89	2.29	$4.78	2.82
2nd Qtr 2002	$13.49	$5.94	2.27	$4.81	2.80
3rd Qtr 2002	$13.49	$5.93	2.27	$4.81	2.80
4th Qtr 2002	$13.49	$6.05	2.23	$4.90	2.75
1st Qtr 2003	$13.76	$6.39	2.15	$5.10	2.70

	Eagle Butte				
		BNSF Reply		OTP Opening*	
Period	Rate/Ton	Variable Cost/ Ton	Revenue to Variable Cost Ratio	Variable Cost/ Ton	Revenue to Variable Cost Ratio
1st Qtr 2002	$13.49	$5.83	2.32	$4.66	2.89
2nd Qtr 2002	$13.49	$5.91	2.28	$4.72	2.86
3rd Qtr 2002	$13.49	$5.93	2.27	$4.74	2.85
4th Qtr 2002	$13.49	$5.96	2.26	$4.75	2.84
1st Qtr 2003	$13.76	$6.46	2.13	$5.08	2.71

*Adjusted to reflect Ex Parte No. 638 agreements on various operating and traffic characteristics


Facilities Used by Otter Tail's Big Stone Plant and Southern PRB Traffic Exiting at Converse
BNSF
Burlington Northern Santa Fe Railway
LEGEND
OTRR Railroad Route
BNSF Routes
Otter Tail 2002 Coal Sources
Other Way Points & Junctions
To Big Stone
Gillette
Eagle Butte Mine
Campbell
Donkey Creek
Belle Ayr Mine
Caballo Rojo
Cordero
Jacobs Ranch
Otter Tail Coal
Black Thunder
N. Rochelle
N. Antelope
South Bound Coal
Nacco Jct.
Antelope
Converse
Walker
Clayton

REDACTED

REDACTED

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DECLARATION OF JANUSZ A. ORDOVER

I. INTRODUCTION AND THE PURPOSE OF THIS STATEMENT

My name is Janusz A. Ordover. I am a Professor of Economics at New York University and a former Deputy Assistant Attorney General for Economics in the Antitrust Division of the U.S. Department of Justice. For over 20 years I have been actively involved in numerous regulatory and deregulatory matters involving network industries, such as railroads, airlines, telecommunications, and electricity in the United States and other countries. My work on competition and regulatory standards for these industries has been relied upon by the Department of Transportation, the Federal Communications Commission, the Federal Energy Regulatory Commission, the World Bank, the OECD, and the Inter-American Development Bank. I am one of the economists who signed the verified statement of economists supporting the principles of Constrained Market Pricing in June, 1983 in the *Coal Rate Guidelines* proceeding.[1]

I have been asked by counsel for BNSF to examine the economic issues related to the inclusion of revenues from "cross-over traffic" in the stand-alone cost ("SAC") test for excessive rates. Whether use of cross-over traffic should be permitted at all – and, if so, what share of revenues should be allocated to the stand-alone railroad ("SARR") is perhaps the single most significant public policy issue faced by the Surface Transportation Board ("Board") in recent and pending stand-alone cost cases. In several proceedings currently before the Board, the claim that the complaining shipper's rate is above SAC turns largely on the amount of revenue that the complainant has attempted to allocate to the SARR from cross-over traffic. Of course, whether any particular rate is found to be excessive often depends on other factors, such as forecasts of SARR traffic volumes and revenues, and the appropriate level of operating expenses and

[1] A copy of that statement is attached to this declaration as Attachment 1.

construction costs, but the distorting impact of cross-over traffic revenues on the outcome of the SAC analysis requires that the Board gives it full and serious attention.

In this declaration, I shall conclude that the current treatment of cross-over traffic is contrary to the broad principles of Constrained Market Pricing that govern regulation of railroad rates in the post-Staggers Act era. Further, I conclude that as a practical matter, the inclusion of cross-over traffic as a component of SAC analysis opens the door to the manipulation by complainants of the stand-alone cost ceiling for railroad rates and, potentially, can be a vehicle for the very sort of "cross subsidy" that the Board seeks to prevent. Such manipulation can lead to unwarranted findings of unreasonable (excessive) rates to shippers whose demand is demonstrably inelastic and who, under CMP principles, should be required to pay rates significantly in excess of pertinent marginal costs. Put another way, economically unsound treatment of cross-over traffic that favors the proponent of a SARR can effectively vitiate the application of the principle of constrained (Ramsey) market pricing and can undermine achievement of the critical goal of revenue adequacy.

I will explain that, on the most fundamental level, inclusion of cross-over traffic revenues is at odds with the core principles of SAC because a hypothetical SARR that relies on revenues derived from interline traffic is not a genuine "stand-alone" railroad. The unavoidable conclusion is that a true SARR would not (and should not) benefit from the revenues generated by cross-over traffic as it would lack the necessary facilities to carry *all selected* traffic end-to-end. In principle, the complaining shipper should be required to build *all* the facilities needed to carry the traffic it selects. If it chooses not to build all the facilities, it should not be entitled to any net revenue contribution from traffic for which facilities have not been constructed.

Unless all relevant facilities are built, the comparison of stand-alone revenues and costs that is the core of SAC analysis is simply impossible. In the presence of cross-over traffic, the Board must rely on some arbitrary rule for allocating the (net) revenues from cross-over traffic between the SARR and the residual incumbent in order to calculate the total revenues of the proposed SARR. The inherent arbitrariness in constructing any rule for allocation of cross-over traffic revenues between the residual incumbent and the SARR stems from a simple and irreducible fact of railroad economics, which is that a substantial proportion of railroad costs is fixed as well as joint and common. An end-to-end rate that exceeds directly attributable costs of the movement makes a contribution to the recovery of any and all joint and common costs of the railroad. *Consequently, this contribution cannot be allocated to any particular subset of such joint and common costs or to any particular group of traffic.* This is not a problem when the railroad is integrated since an integrated railroad bears all of its costs and carries the responsibility for their recovery. When the SARR is permitted to include cross-over traffic, the "ownership" of these costs – and thus the responsibility for their recovery – is "split" between the two railroads, *viz.*, the SARR and the residual incumbent.

The split in ownership at a hypothetical interchange point creates the opportunity and incentive for the complaining shipper unilaterally to manipulate the allocation of revenues from cross-over traffic. I term this manipulation "strategic revenue shifting." In fact, the shipper may attempt to allocate to the SARR such share of the net revenues from the cross-over traffic as to potentially render the residual incumbent non-viable over the long run.[2] Such an allocation would be tantamount to an impermissible *strategic* "cross-subsidy" of the issue traffic in the

[2]At the minimum, such an allocation can render non-viable a portion of the residual incumbent's extant network.

shipper's SAC construct.[3] It is an inexorable conclusion that, since cross-over traffic does not impose any net costs on the SARR but generates net revenues by means of strategic revenue shifting, the Board may find the rate excessive *even if* such rate would not be found excessive either if cross-over revenues were excluded or if the SARR included all the required facilities for the claimed traffic.

Despite years of efforts by the nation's freight railroads to rationalize rates and routes, real-life incumbent railroads (such as BNSF) are revenue inadequate. Hence, in my view, any allocation rule that shifts contribution from cross-over traffic to the SARR from the incumbent is potentially not sustainable because it will further erode the financial viability of the incumbent. The revenue assumed to be transferred from the residual incumbent to the hypothetical SARR contributes to revenues in excess of SAC, thereby driving down the defendant's real world rate on the issue traffic. Thus, as a matter of public policy and sound economics, the Board should not accept any allocation rule that allows the shipper to construct a SARR that thrives only because it -- by fiat -- appropriates cross-over revenues from the residual incumbent. Indeed, if under such an allocation rule, the residual incumbent becomes even more revenue inadequate, the allocation rule effectuates a strategic "cross-subsidy" of the issue traffic.

The SAC methodology, as originally conceived, aimed to remove arbitrary allocations from rate calculations. It is thus a perversion of the letter and spirit of SAC methodology to implement regulatory policy that permits the finding of an excessive rate solely because of the shipper's reliance on arbitrary allocations of cross-over revenues. In brief, I urge the Board to insist on a true stand-alone methodology that disallows the use of cross-over traffic revenues in

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[3] In my terminology, strategic "cross subsidy" arises when the issue rate is not excessive when gauged using only stand-alone revenues but is found excessive when cross-over traffic is allowed and the residual incumbent is revenue inadequate.

the SAC test and thus eschews the arbitrary allocations necessitated by the inclusion of cross-over traffic.

I understand that the Board may not be willing to deny the SARR any contribution from cross-over traffic. Insofar as some allocations are permitted by the Board, the Board should accept the allocation procedure in an individual case that minimizes the distortions that result from reliance on cross over traffic. In this case, I conclude that the density adjusted revenue allocation rule ("DARA") proposed by BNSF is preferable to either of the mileage based allocation procedures used by Otter Tail. Otter Tail's mileage-based regression calculations and its modified mileage prorate ("MMP") both ignore the relationship between traffic densities and the ability of a railroad to defray its pertinent costs. DARA, on the other hand, recognizes the need for long-term cost recovery that is at the heart of the SAC test. Specifically, it recognizes that the residual incumbent must recover its "off-SARR" fixed costs if it is to remain a viable operation over the long run. Because DARA is responsive to differences in densities it is more likely to ensure the residual incumbent's long-term viability as compared to a density-insensitive rule. As such, DARA is consistent with the methodology underlying SAC, which relies on long-run costing principles. Indeed, the SAC test is predicated on the assumption that the SARR will carry the issue traffic and grouped traffic, including the cross-over traffic, over the long run. It is no defense against this argument that the residual incumbent can rely on other traffic from which to recoup the "off-SARR" costs. The fact of the matter is that if the residual incumbent is already revenue inadequate and if the application of the SAC test leads to a rate reduction, then the ability of the incumbent to recover the "off-SARR" costs is further undermined. It is also obvious that if the incumbent were in the position to earn higher revenues from the "off-SARR"

traffic it would have attempted to do so, which means that is has no ability to generate such newly-found (net) revenues.

Furthermore, BNSF's DARA proposal recognizes that in order to give both carriers an opportunity to recover the pertinent pools of fixed costs, a higher "mark up" per unit of traffic (e.g., a ton-mile) likely will be needed on low density routes, which are more likely to exist on the residual incumbent than on the SARR.[4] An allocation of the "quasi-rents" that *increases* with the length of haul on a railroad (as in MMP) and *decreases* with the density of traffic on the route is responsive both to the magnitude of the fixed costs and to the fact that the recovery of any given volume of fixed costs requires a higher average "mark-up" per ton-mile on lower density portions of each cross-over movement's route.

In the next section of this declaration, I briefly review the public policy rationale for the SAC test, including how it fits into an overarching goal of giving railroads a realistic opportunity to achieve revenue adequacy while protecting captive shippers from exercise of market power by the incumbent railroad. In Section III, I identify the key economic characteristics of cross-over traffic and show that they are inconsistent with the economic principles underlying Constrained Market Pricing ("CMP"). The final section of my declaration addresses Otter Tail's market-based rationale for its allocation procedures and lays out the rationale for DARA as a feasible allocation methodology that is consistent with the principles of railroad economics underlying CMP.

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[4] Since the complainant is granted considerable latitude in selecting its stand-alone traffic group and in designing its route network, it will be free to arrogate to itself those routes that experience high traffic density, leaving the residual incumbent with portions of the existing real world railroads with comparatively lower densities.

II. THE ECONOMIC AND PUBLIC POLICY RATIONALE FOR THE SAC TEST

It has long been recognized that for railroads to recover their efficiently incurred costs (both fixed and variable) some form of differential pricing must be permitted. *Coal Rate Guidelines* at 526-27. The logic behind this claim is now familiar and there is no need to rehash it at any great length. Because railroading is characterized by substantial fixed costs relative to variable (or marginal) costs, pricing rail services at marginal cost would generate insufficient revenues to defray the total forward-looking costs of the railroad.[5] Indeed, pricing at variable or marginal cost would condemn the railroad to revenue inadequacy and ultimately lead it to exit entirely from the market.

A second important feature of railroading as an economic activity is that it is characterized by joint and common costs. These are costs that are incurred on behalf of more than one shipper and, as such, can and should be recovered from more than one shipper.[6] The presence of these joint and common costs generates scope economies (defined as savings that are created by having one railroad serve more than one customer, as compared to a base case in which each customer is served by one railroad), which can potentially benefit all shippers. Because of these scope economies, it is generally efficient for a railroad to serve multiple shippers with its route structure. Furthermore, because of substantial fixed costs, railroads also

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[5] To illustrate, assume that the railroad needs to incur fixed costs of $10 million to construct the needed facilities and that the variable (marginal) cost per ton-mile is $1. Plainly, no matter how many ton-miles the railroad carries, it will not recover its full costs if the rate is capped at $1. Hence, a higher rate is required. Obviously, a railroad that has sunk the necessary $10 million can carry the traffic at the un-remunerative rate of $1 as long as it does not have to make another investment in the fixed facilities, but to be viable in the long run the rate must exceed $1 by enough to cover the full economic costs. The difference between the full costs of its operations and the total variable cost is the "quasi-rent."

[6] To continue with the example in footnote 5, assume that two shippers, A and B, use the pertinent facilities. In this case, the $10 MM can (and must) be recovered in some proportion from both.

can and often do exhibit economies of density whereby average costs per unit of traffic decrease as the number of units of traffic using particular facilities increases.[7]

At least since the Staggers Act, it has been widely recognized that cost recovery in the railroad industry cannot be achieved by requiring that each shipper pay the same mark-up per ton-mile or the same mark-up per dollar of variable cost. As has been demonstrated many times, such an approach to cost recovery is a prescription for inefficiency. It prevents socially profitable services from being offered, and it distorts shipping volumes by suppressing unduly the services utilized by those shippers whose demands are relatively more elastic, while "under-recovering" revenues from those shippers whose demands are relatively less elastic. The principle of Constrained Market Pricing recognizes that differential pricing conduces to economic efficiency.[8] CMP also recognizes that differential pricing can potentially lead to unduly elevated rates for some shippers. In order to protect against this eventuality, the current regulatory regime subjects market dominant railroad rates to the SAC test.[9]

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[7] Facilities congestion is the main reason why, once certain density is reached, per unit cost tends to increase.

[8] The familiar Ramsey pricing formula states that the price/cost margin earned on any given category of shipment should be inversely proportional to the elasticity of demand of that category with respect to rail rate. (A category of shipment can be defined narrowly as comprising shipments by or to a single customer over a period of time.) That is $L(i) = (p(i) - c(i))/(p(i) = k/E(i)$. In this formula, p(i) is the rail rate applicable to category "i", i=1, ….,N ; c(i) is the underlying marginal (variable) cost of the shipment; E(i) is the pertinent elasticity of demand; k is the so called "Ramsey" multiplier which takes on the value of k=0 when railroad is compelled to price at marginal cost; and k=1 when the railroad is allowed to act as a profit-maximizing monopolist. It is important to realize that the elasticity of demand facing a given railroad on a given shipment can reflect not only the usual reduction in "consumption" of railroad services from a price increase but also the presence of intermodal and intramodal competition, where such competition exists. (Modifications of the formula are needed in the presence of cross-elasticities of demand between different categories of shipments. I shall abstract from this complication here.)

[9] There is no general economic theorem showing that if the railroad is revenue inadequate, none of its rates can exceed SAC. However, it is plain that all of the rates taken

As originally intended, the SAC test was devised to ensure that no shipper was required to pay more than the full costs of the railroad facilities that it uses. A shipper who paid in excess of the full costs was said to be cross-subsidizing other shippers by paying for facilities from which it derived no benefit. Conceptually, this test is quite compelling and sound as a matter of economics and public policy. Indeed, if entry into railroading were unimpeded by entry barriers – *i.e.*, if the market for provision of railroad services were perfectly contestable, in the language of economics – a railroad seeking to collect from the shipper more than the long-run economic costs of the facilities used by the shipper would be replaced by an entrant that could attract that shipper by charging slightly lower rates, yet sufficient to cover its full economic costs. In this way, the SAC test mimics the operations of a perfectly contestable market *even though* railroading as an activity is hardly contestable because a huge share of the overall costs of each railroad is not only fixed but also sunk.[10]

As the name implies, and as initially conceived, the *stand-alone* cost test was designed to compare the costs incurred to build and operate a *stand-alone railroad* serving the needs of an individual shipper (or a group of shippers) with the revenues generated by that shipper (or a group of shippers) at the existing rate levels charged by the defendant railroad. The adoption of CMP, and in particular the application of the SAC test, obviated the need to examine whether the railroad's existing rates were consistent with the Ramsey pricing principles. The ICC considered this a significant regulatory advantage because calculating Ramsey prices requires information

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together cannot exceed SAC since the railroad *is* revenue inadequate. Hence, simple logic suggests that if the railroad is revenue inadequate, the likelihood that there are many rates in excess of properly developed SAC is low.

[10] Sunk costs are those costs that a firm cannot recover if it exits the relevant market (or industry). Thus, rail track may be sold for no more than its scrap value, which is much less than the cost of new rail track, and is thus substantially sunk. Sunk costs are generally regarded as a barrier to entry.

on demand elasticities that may not be readily available.[11] At the same time, recognition that differential pricing was desirable (when subjected to proper constraints) freed the railroads from inefficient pricing and increased the chances of revenue adequacy.

In light of the economies of scope and density discussed above, the ICC determined that complaining shippers should be permitted to design a SARR that could handle both the traffic of the complaining shipper (the "issue" traffic) and other "non-issue" traffic that shared facilities with the issue traffic. Furthermore, the ICC concluded that the complaining shipper would be permitted to define the traffic group and the railroad configuration in the first instance, because it had the incentive to design the most efficient operation that could feasibly handle the issue traffic and other non-issue traffic in the stand-alone traffic group. A complaining shipper has an incentive to group issue traffic with non-issue traffic in a way that, given the incumbent's current and forecasted rates, makes the largest possible contribution to the recovery of the total forward-looking costs of the SARR in order to demonstrate an excessive rate and obtain a rate reduction. In sum, the ICC's decision to allow a shipper to group issue and non-issue traffic that was to be carried end-to-end was fully consistent with the basic precepts of CMP and with the twin goals of ensuring railroad viability and extending protection to captive shippers.

However, the inclusion of cross-over traffic as a component of the stand-alone railroad has undermined the proper SAC construct – and its public policy rationale. As we shall see below, inclusion of cross-over traffic revenues in the base of revenues attributed to the SARR coupled with the concomitant burdening of the incumbent with the potentially excessive responsibility for the recovery of the costs of operating its residual network distorts the applicability of the SAC test as a test for cross-subsidy. To put it bluntly, by permitting cross-

[11] Actually, this calculation also requires the regulator to calculate or infer the value of the Ramsey multiplier, k (see fn. 8 above).

over traffic to be included in a SAC analysis, the Board has enabled the complaining shipper to use strategic revenue shifting and to game the regulatory process by constructing a hypothetical railroad that is neither stand-alone nor required to contribute to the recovery of the long-run costs of the residual incumbent who must defray all of its remaining costs, including the costs of facilities without which cross-over traffic would not be possible.

The inclusion of cross-over traffic in the SAC analysis necessitates arbitrary allocations of net revenues from such traffic. This, in turn, creates a real danger that the SAC test is rendered meaningless and that regulatory policy will be set back to the pre-Staggers Act era in which rates were evaluated using arbitrary cost allocation standards. Indeed, once the revenues from cross-over traffic are incorporated in the SAC test, the finding that the issue rate is excessive does not imply at all that the issue traffic is cross-subsidizing other traffic. As vividly demonstrated by Otter Tail's strategy in this proceeding, the inclusion of cross-over traffic in the SAC test can lead to unwarranted rate reductions on the issue traffic despite the fact that the properly constructed SARR would not generate revenues in excess of pertinent costs. This analysis is developed more fully below.

III. THE ECONOMIC DANGERS OF PERMITTING CROSS-OVER TRAFFIC IN A SAC TEST

There is no economically defensible way to "attribute" un-allocable joint and common costs to different traffic groups or different shippers. By definition, these costs are not caused by any particular shipment and thus cost-causality cannot be depended upon to guide cost recovery from any given shipment. Instead, economic efficiency requires that differential pricing (*i.e.*, Ramsey pricing principles) be used to recover these costs from the totality of the traffic that uses the pertinent facilities and, in the aggregate, causes these costs to be incurred. This is the basic principle of cost-causality which states that those who cause costs to be incurred should be

responsible for their recovery. In its standard formulation, SAC recognizes and builds on this principle of cost-causality because it tests whether revenues from a group of traffic exceed (or fall short of) all the costs *caused* by that group of traffic. In line with the cost-causality principle, the SAC test compares the total revenues generated by the traffic group with the full economic costs of *all* the facilities needed to serve the movements in the traffic group.

Introduction of cross-over traffic vitiates this approach. It splits what should be a stand-alone railroad into interline segments, strategically chosen by the complaining shipper, some of which are included in the SARR and some that are not built and thus remain with the residual incumbent.[12] As a result, while after this strategic split the quantum of costs remains unchanged (besides the putative reduction in costs because the SARR is allegedly designed to be more efficient), the responsibility for the recovery of the efficiently incurred costs is now divided between two entities – the SARR and the residual incumbent. This severing of the joint responsibility for cost recovery and the consequent arbitrary allocation of revenues is inconsistent with the economic rationale for the SAC test and creates the incentives for what I termed strategic revenue shifting, the objective of which is to ensure that the challenged rate is deemed to be excessive.[13]

The hypothetical SARR carries the cross-over traffic only for a portion of the end-to-end movement that currently occurs over the defendant railroad(s). That traffic is originated,

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[12] This artificial severing caused by the use of cross-over traffic must be distinguished from the real world interlining of traffic between railroads. Interlining is a result of arm's length transactions between willing railroads, neither of which in the ordinary situation could provide the through service on its own; whereas, as noted, the dismemberment of the incumbent is a strategic move designed to ensure that the shipper's rate is found to be excessive.

[13] As I noted earlier, a challenged rate is strategically "cross-subsidized" when it is found to be excessive only when cross-over revenues are included but is not excessive when such revenues are excluded. Strategic cross-subsidy does not necessarily imply actual cross-subsidy as this term is defined in the economics.

terminated (or both) on the off-SARR portions of the track owned and controlled by the defendant railroad (the residual incumbent) whose rates are being subjected to regulatory scrutiny. It is apparent from the definition of cross-over traffic that the hypothetical stand-alone railroad that incorporates cross-over traffic does not stand-alone after all; it is a SARR only in name but not as an economic entity. Traffic moves on the SARR for only a portion of its journey, not from end-to-end. The SARR remains "attached" to the residual incumbent by means of the cross-over traffic that they jointly carry, potentially siphoning revenue from the residual incumbent without removing any of the non-attributable costs of that traffic. But for the presence of the residual incumbent, the so-called "stand-alone" railroad would not, in fact, be able to carry the cross-over traffic, since it chooses not to build all the facilities needed to serve that traffic. The SARR is thus critically dependent on the residual incumbent to carry traffic from and to it, but since it does not build the lines that carry that traffic end-to-end, the SARR does not incur all the costs required to generate those revenues. Yet, through the allocation rule, it claims a portion of revenues that before the split helped to defray (a portion) of these costs.

The introduction of cross-over traffic into the SAC analysis is a recipe for economic distortions stemming from strategic revenue shifting that results in finding an excessive rate for the issue traffic, a circumstance that I also termed "strategic" cross-subsidy of the issue traffic. Let me elaborate on this point. The Board tests for cross-subsidy by determining whether revenues from the issue traffic and other traffic in the chosen shipper group exceed SAC. The introduction of cross-over traffic can make such a finding of cross-subsidy a mirage, because the revenues from cross-over movements are claimed without accounting for the costs incurred to generate those revenues. This magical generation of revenues by means of strategic revenue shifting comes at the expense of the residual incumbent which has no guarantee of receiving

sufficient contribution to cover the joint and common costs caused by the traffic it carries, including its portions of the cross-over movements. The revenue transfer to the SARR from the residual incumbent is a strategic cross-subsidy. In fact, because of the leeway in which the revenues from cross-over traffic are allocated, an issue rate may be deemed excessive or non-excessive depending solely on the share of cross-over revenues that is attributable to the SARR. Such an outcome is impossible if the shipper is required to build a SARR that carries all the claimed traffic end-to-end.

As noted, the inclusion of cross-over traffic puts the two railroads – the SARR and the residual incumbent – in a "vertical relationship" in which the profitability of the SARR is directly (*i.e.*, proportionately) linked to how *unprofitable* the complaining shipper can make the residual incumbent by means of strategic revenue shifting. When cross-over traffic is permitted, the complaining shipper no longer has the incentive to design the most efficient stand-alone railroad. Instead it has the incentive to siphon off as much revenue as possible from the residual incumbent while shedding responsibility for contributing adequately to the recovery of all the costs that must be incurred over a long run in order to generate the claimed cross-over traffic revenues.

The shipper must build out the facilities that are required to carry the issue traffic. Basic logic compels a conclusion that the shipper would build out other facilities if doing so generates less in incremental costs than it generates in additional revenues. When it comes to cross-over traffic, that traffic imposes no costs on the railroad but generates net revenues.[14] Revenue "freed" from responsibility for costs in this manner engenders the risk of strategic "cross subsidy" to the SARR. The true nature of this subsidy is disguised because, in a real setting, the net revenues

[14] By this I mean no costs besides directly attributable costs.

from cross-over traffic cannot be meaningfully associated with any particular portion of the track over which the cross-over traffic moves. All the fixed facilities used by cross-over traffic contribute to the viability of that traffic and must be paid for with the available sources of railroad revenues. When the SARR captures for itself the net revenues from cross-over traffic, it leaves with other shippers who use the residual incumbent's lines the burden of paying for those costs that, heretofore, were recovered in part from cross-over traffic revenues. This residual burden is smaller the smaller the portion of revenues that are strategically shifted to the SARR. However, the identified risks cannot be entirely obviated because any allocation is by its very nature arbitrary. It follows that the mileage based allocations advocated by Otter Tail are no solution to this endemic problem: no allocation methodology can handle the fact that prior to the artificial break up of the incumbent into a SARR and a residual incumbent, the net revenues from "cross-over" traffic contributed to the recovery of all fixed costs incurred by the incumbent. After the break up, the same pool of net revenues from cross-over traffic must be arbitrarily allocated among the two railroads whose total costs have been gerrymandered by the complaining shipper for its maximum advantage.

Reliance on cross-over traffic invites distortion into the SAC analysis because it precludes the comparison of total through revenues and end-to-end costs that are at the heart of the SAC test. The unattributable off-line costs that must be incurred in order to enable cross-over traffic, as well as other traffic that may move on these off-line portions of the residual incumbent, cannot be ascertained *unless* the off-line facilities are actually "built" as a part of the SARR. Thus, there is no way of identifying and eliminating the potential distortion created by

use of cross-over traffic short of requiring the proponent of a stand-alone system to conduct the test properly by building all the facilities needed to carry its non-issue traffic end-to-end.[15]

The Board should have no illusions regarding the incentives that complaining shippers have to exploit cross-over traffic in the manner described above. It should also be clear to the Board that the potentially distorting effect of cross-over traffic increases in magnitude as the proportion of cross-over traffic in the overall traffic group carried by the putative stand-alone railroad increases, as in Otter Tail's case. The Board could limit the incentives and ability of the complaining shipper to rely on cross-over traffic to lower its rate(s) by limiting the amount of cross-over traffic that it permitted to be included in a SAC model. Similarly, the Board may require that the complaining shipper who wishes to include some cross-over traffic in the SAC test actually build as part of the SARR those "off-line" facilities that are effectively dedicated to the claimed cross-over traffic. Plainly, if the non-included off-line facilities are totally dedicated to cross-over traffic, the cross-over traffic should have to pay for them. The Board can further constrain these incentives and the concomitant misallocations by insisting, as I suggested earlier, that the shipper justify why it prefers not to build out all the requisite facilities for the carriage of claimed traffic.

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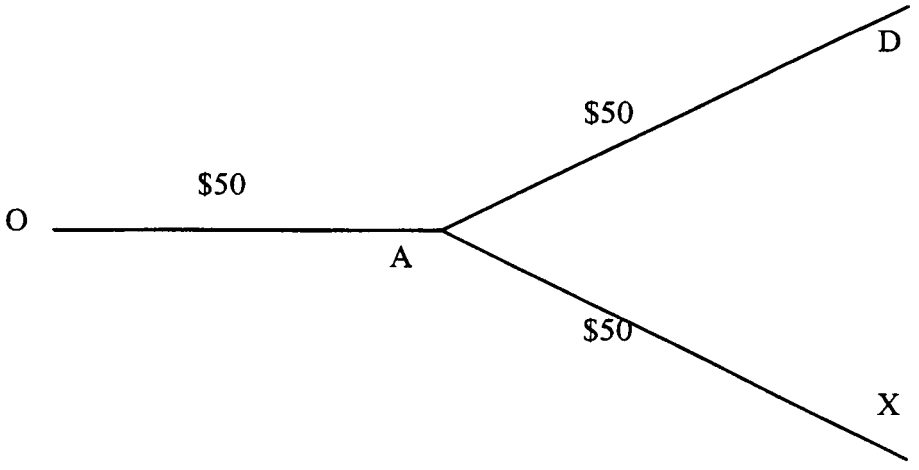
[15] Any time a facility is built out, it may have an additional "layer" of cross-over traffic associated with it. The first layer of cross-over traffic is the traffic that shares facilities with the issue traffic. The next level of cross-over traffic, layer 2 cross-over traffic, does not share such facilities. Hence, the complaining shipper may argue that it has no incentive to build out the initial layer of facilities to handle cross-over traffic unless it receives a share of layer 2 net revenues. I recognize the issue raised by the ever-expanding SARR network. The concern it raises must not be exaggerated, however. The problem that exists now is that recent SARRs do not even approach "stand-alone" status and therefore the results of SAC analyses do not even approach the results that would be realized under a true stand-alone analysis.

A. Distorting Effects Of Cross-Over Traffic Revenues On The Results Of The SAC Test: A Simple Example

To make the foregoing discussion more transparent, I develop a simplified example which illustrates how use of cross-over traffic can lead to a finding that the issue rate is excessive, where, in fact such a finding is economically irrational and would undermine the viability of the residual incumbent. Assume that the Board is assessing the reasonableness of a rate charged for traffic moving between origin O and destination D through point A. The fixed costs for that movement, standing alone, are $100 with $50 in costs for segment OA and $50 in costs for segment AD (operating costs are ignored for purposes of this example). Assume that the rates charged by the defendant for the issue traffic generate $90 of revenue. Therefore, when the issue traffic is analyzed on its own, without any grouping of other traffic, the costs of providing the issue traffic service ($100) exceed the issue traffic revenues ($90) by $10 ($100-$90).

Figure 1
Hypothetical Railroad System



Now assume that the defendant railroad also moves traffic for a different shipper between origin O and destination X through point A. Assume the line segment OA has sufficient capacity

to handle traffic for *both* shippers without additional investment. The additional cost of line segment AX is $50. Also assume that the second shipper has a more elastic demand for the rail service than the complainant. This limits the revenues the incumbent can charge for this movement to $60 rather than the $90 which the complainant pays on the issue traffic movement. The total cost for this traffic group is now $150 ($50 + $50 + $50) and the total revenues are $150 ($90 + $60). In other words, the revenues from the traffic group exactly match the costs of providing service. Recall that the issue traffic standing alone could not cover its full SAC. The grouped traffic can cover the SAC because of the economies of scope that exist in handling both the issue and the non-issue traffic over the line segment OA. This simple example illustrates how shippers presenting SAC evidence can potentially benefit from grouping end-to-end non-issue traffic with issue traffic and realize cost savings from economies of scope. In the example, there is no finding of excessive rate, however, since the pertinent revenues exactly match pertinent costs.

To this point, the example does not include cross-over traffic. In fact, it illustrates a circumstance in which the shipper can readily present evidence on the stand-alone costs of the entire system, as the complaining shippers in fact successfully did in the *West Texas Utilities*[16] and *APS*[17] cases. Presenting the stand-alone costs of the complete SARR system required to provide the stand-alone traffic with the same service as the incumbent does today is the only accurate way to ensure that the full economic costs of all of the lines are covered on a stand-

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[16] *West Texas Util. Co. v. Burlington Northern R.R.*, 1 S.T.B. 638 (1996), *aff'd. Burlington Northern R.R. Co. v. Surface Transp. Bd.*, 114 F.3d 206 (D.C. Cir. 1997) (*WTU*).

[17] *Arizona Public Service Co. and PacifiCorp. v. Atchison, Topeka and Santa Fe Ry. Co.*, 2 S.T.B. 367 (1997) (*APS*).

alone basis, and to ensure that there is no payment by the stand-alone traffic for facilities it does not use and from which it derives no benefit.

Now, assume that the complainant does not want to build the AX segment but, nevertheless, wants to claim some revenues for carrying traffic on the OA portion of the OAX movement. The complaining shipper thus chooses not present evidence on the costs of segment AX. It therefore posits a stand-alone railroad that runs only between OA and AD. The OX traffic becomes "cross-over" traffic, *i.e.*, it moves over segment OA but interchanges with the residual incumbent at the fictional interchange point A. The costs of this reduced railroad are only $100 ($50 + $50). The issue traffic contributes $90 of revenue, as noted above. What then is the revenue contribution from the non-issue traffic for the OA portion of its OAX end-to-end movement? The simple, and the only correct answer, is that this question cannot be answered at all![18] The $60 worth of net revenue from the OAX traffic, *i.e.*, revenue in excess of variable cost, cannot be attributed to either segment, be it OA or AX. As explained earlier, the movement requires that both segments be in place and thus the costs of both segments need to be covered from *all* sources of revenues in order to make the SARR and the residual incumbent sustainable over the long run where all costs are variable.

If the movement from O to A is the same distance as the movement from A to X, the MMP approach used by Otter Tail in this proceeding to allocate revenues on certain movements would generate equal division of revenue from the cross-over traffic to each carrier, or $30 contributed to the SARR and $30 to the residual incumbent. (Recall that in this example the incumbent receives $60 of revenue for the through OAX movement.) While having the air of objectivity and even-handedness, it is clear that this approach actually biases the SAC test in

[18] Another, equally unhelpful answer is that the number is either $0 or $60, or any number in-between.

favor of the complaining shipper. The theoretical rationale behind this conclusion is that if the complaining shipper believed that it could maximize the excess of total contribution (*i.e.*, maximize the difference between total revenues and total SARR costs) by building out the railroad to include the "off-line" segment, it would have done so! Hence, the mere fact that the complaining shipper prefers to include in its base of revenues the pro-rate *while incurring no additional costs* is evidence that this strategy is intended to yield a higher alleged overcharge on the issue traffic movement than the alternative of building out the full end-to-end railroad.[19]

As was demonstrated above, when the SAC analysis is done correctly and the full costs and revenues are considered, the revenues from the two movements ($90 + $60) just equal the full economic costs of providing service to the two shippers ($50 + $50 + $50). In other words, the incumbent's costs are fully covered and the rates charged for the issue traffic do not exceed a reasonable maximum. But in the cross-over example, if the modified mileage prorate is used to calculate the contribution from cross-over traffic to the SARR that does not include the AX segment (the "reduced" SARR) then the stand-alone "revenues" of $120 ($90 + $30) substantially exceed the costs of $100 ($50 + $50). This strategic revenue shift lowers the AX residual incumbent's share of revenues below its full economic costs of serving the cross-over traffic.

In the cross-over example, therefore, the rate charged for the issue traffic is determined to be unreasonably high, while in the full SAC analysis the rate would be deemed reasonable. Importantly, the former finding would result in a lower rate for the shipper whose demand has

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[19] I am not claiming that this conclusion rises to a level of a theorem. Considerations such as the potential presence of the second layer of "off-off-line" traffic complicate the general proof. However, if the off-line is preponderantly used for cross-over traffic, or if cross-over traffic is a substantial portion of all the traffic claimed by the SARR, then the force of the conclusion in the text is enhanced.

been deemed inelastic and a need to increase the rate for the shipper (the one moving on the OAX) whose demand has been deemed potentially more elastic. Such "rebalancing" of rates, assuming that the rate to the elastic shipper could even be raised, would harm economic efficiency and would be counter to the principles of Ramsey (differential) pricing. Of course, if the rate to the elastic shipper cannot be raised, because the shipper may not be willing to pay more than $60, the residual incumbent will become revenue inadequate and, over the long-haul, will have to withdraw service on the AX segment.

Note that the preferred allocation rule referred to earlier – *i.e.*, a rule that would make the proponent of the SARR indifferent between performing the SAC test properly by building out the AX segment, on the one hand, and using the cross-over traffic assumption, on the other – would allocate only $10 to the O-A-D SARR and $50 to the AX residual incumbent, thereby ensuring that revenues on each of these two entities are just sufficient to cover costs (the same result achieved by properly constructing the SARR to include both the OAD and AX segments).

However, as I have explained above, there is no formula or algorithm that, in the abstract, can calculate the ideal allocation in an individual cross-over traffic situation – the only way to determine the allocation that leads to the postulated indifference is to determine what it would cost to construct and operate the lines of the residual incumbent required to move the cross-over traffic to its end-points on the defendant railroad. No single allocation formula can determine that point unless the actual incremental costs of the off-line are calculated and presented. Because shippers have an incentive to use cross-over traffic only when the resulting net revenue contribution to the SARR is higher than it would be if the test were conducted properly, it is a reasonable presumption that any allocation "rule" advocated by shippers is likely to bias the SAC

results in favor of the shipper, no matter how vociferously the shippers claim it is "fair" or "even-handed."

Let me recapitulate by pointing out how the foregoing example illustrates the three propositions set forth at the beginning of this section.

***First**, when cross-over traffic is introduced, the stand-alone railroad is no longer "stand-alone."* In the example, segments OA, AD, and AX taken together comprise a stand-alone system. They constitute all the facilities needed to handle all the traffic that the shipper has selected. When cross-over traffic is introduced, the new, putative stand-alone comprises segments OA and AD; these are now severed from segment AX. Nevertheless, the new stand-alone is inextricably linked to the residual incumbent serving the AX movement, because the traffic that moves over from AX is the source of revenue that affects the outcome of the SAC analysis. If the AX segment ceased to exist, the OAX traffic would not move, and the only revenue available to cover the $100 of costs on the OAD segments would be the $90 in revenue generated by the OAD issue traffic. The complaining shipper cannot have it both ways; if it is entitled to assume that cross-over traffic revenues will be available to defray a portion of the costs of the OAD segment, it must also demonstrate that the AX segment will be viable over the long run. Otter Tail has made no such showing in this proceeding with respect to the lines of the residual BNSF upon which the movement of cross-over traffic relies.

***Second,** the use of cross-over traffic is a vehicle for strategic cross subsidy.* Of the $30 in revenues from the movement OAX that is allocated under the modified mileage prorate to the stand-alone, $20 is actually needed to cover the costs of segment AX. If cross-over traffic is permitted, this $20 becomes a strategic subsidy from the residual incumbent to the SARR.

Third, *the distorting effects of cross-over traffic increase as the share of cross- over traffic in the stand-alone traffic group increases.* In the example, the cross-over movement yields contribution to the SARR in excess of costs, and the more such cross-over movements are added to the SARR, the greater the potential magnitude of the alleged overcharge on the issue traffic movement.[20]

IV. PRINCIPLES TO GOVERN THE ALLOCATION OF REVENUES ON CROSS-OVER TRAFFIC

The Board to date has not indicated that it will exclude cross-over traffic from SAC analyses. In light of this, I discuss in the remainder of my statement the principles that should guide the development of a rule for allocating revenues on cross-over traffic that is likely to be more in line with the principles of constrained market pricing than the putative market-based division proffered by Otter Tail in this case.

The adoption of a least distorting revenue allocation method should be viewed as a matter or real urgency by the Board. In recent proceedings complainants have made increasing use of cross-over traffic, to the point that virtually *all* of the non-issue traffic included in the stand-alone traffic group has been cross-over traffic. With the exception of 500,000 tons of base year coal traffic that BNSF interlines with a real world shortline, this is the case in this proceeding. The

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[20] To illustrate, assume that the SAC of the issue traffic is $100 and that the current rate is $90. Hence, on the pure SARR basis there is no finding of excessive rate. Now assume that a huge volume of cross-over traffic moves over the portion of the SARR. Assume that this traffic generates $1000 in net contribution, which is just enough to cover the full costs of the total network (including the $10 shortfall on the SARR built to carry the original end-to-end traffic). Now assume that the shipper shifts $50 (or 5%) of that contribution from cross-over traffic to the SARR. With $50 so allocated, the revenues from the SARR are $150 which exceeds the SARR's SAC of $100 by $50, thus mandating a very substantial rate reduction under the Board's rate prescription methodology. Note that the distortion from the cross-over allocation is far greater in this example, even though only 5 percent of cross-over revenues are allocated to the SARR, than the initial outcome in which 50 percent of the revenues are allocated to the SARR.

higher the percentage of cross-over traffic in the stand-alone traffic group, the greater the likelihood of a significant departure from the results that would obtain from a properly-constructed stand-alone cost analysis.

If the Board chooses to permit inclusion of cross-over traffic in the SAC test, it must attempt to fashion an allocation rule that, on average, will keep the distorting impact on the outcome of SAC cases to the minimum. The objective should be to fashion a rule for dealing with cross-over traffic that can feasibly be implemented using standard railroad data, that reduces the incentives of the complaining shipper to manipulate the structure of the SARR, and that tries to ensure that the residual incumbent's long-run viability is not undermined by siphoning-off net revenues to the SARR.

The place to start in deriving the second-best principles for dealing with cross-over traffic is with the concept of cost recovery. The Board has recently indicated that both the SARR and the residual incumbent should receive a sufficient allocation of revenue from a cross-over movement to cover the directly attributable costs of that movement and that that both parties should receive some portion of the remaining contribution above attributable costs to defray unattributable joint and common costs.[21] Although the Board has not specified a preferred allocation rule, the rule adopted in a given case should not, in principle, undermine the residual incumbent's ability to recover the costs that it must defray to remain viable so that it is able to continue to interchange traffic with the SARR over the DCF period. The focus on long-run cost recovery is the proper one because the regulatory problem created by cross-over traffic is the inability to make a stand-alone comparison between revenues and forward looking costs if the requisite facilities have not been built. A cost based revenue allocation requires that one at least

[21] *TMPA* at 37 n.74.

consider the ability of available revenues to cover costs, rather than simply assuming that revenues are there for the taking.

In its treatment of revenue allocation on cross-over traffic, Otter Tail enunciates no principle or approach for allocating the contribution available to defray unattributable costs. Otter Tail instead espouses a market-based rationale for allocating revenue. Its scant rationale for this approach is as follows:

> The OTRR, as a replacement for BNSF, would achieve the same market place revenue division result for the cross over traffic that BNSF achieves in the real world for handling interline or overhead movements.

Otter Tail Op. Narr. At III-A-18-19. Of course there are no real world divisions on the cross-over movements on which the SARR replaces the real world BNSF. What Otter Tail presumably intends to say is that one can extrapolate from the real world experience of BNSF and its interline partners and posit that there is a sufficient similarity between that experience and the assumed relationship between the SARR and the residual incumbent to use real world divisions as a proxy for cross-over revenue allocations. In fact, the presumed similarity does not exist, either as a conceptual or practical matter.

On the conceptual level, there is no similarity between real world interline arrangements and the hypothetical arrangement between the SARR and the residual incumbent. The real world divisions negotiation occurs in the context of creating something – a new interline movement – that did not exist. In contrast, the hypothetical arrangement between the SARR and the residual incumbent represents the fragmentation of an existing through movement into two arbitrary components.[22]

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[22] Arbitrary in the sense that the fictional interchange point is determined at the whim of the proponent of the SARR.

Real world divisions negotiations occur in the context of creating (or enabling) a movement that would not otherwise be feasible. Real world negotiations of interline arrangements would not succeed unless both carriers were better off as a result of negotiating the arrangement than they would have been if they had not entered into it. (Hence, a real-life interline negotiation will typically lead to a Pareto superior outcome: that is, an outcome that benefits *both* parties relative to the *status quo*). This is not surprising given that market divisions in the real world reflect a voluntary transaction between two consenting railroads which leaves each in an improved financial position.

In the contrived world of hypothetical cross-over movements, nothing new is being created. Instead, there is an artificial fragmentation. Since the shipper is already being served by the incumbent, there is no affirmative rationale for this fragmentation of existing through movements into unnecessary pieces and no apparent social good that flows from such fragmentation. This fragmentation is an outgrowth of the Board's decision to allow the hypothetical entrant to take not only whatever traffic of the residual incumbent it chooses but also to provide whatever portions of through service that it elects.

The only way this contrived arrangement could produce a mutually beneficial (Pareto superior) outcome would be if the incumbent were able to retain its contribution on the through movement and the more efficient SARR were willing to accept a division equal to the incumbent's avoided costs of handling the cross-over movement over the SARR portions of the haul. (Because of the SARR's hypothesized greater efficiency, this division would include some contribution in excess of the SARR's attributable costs.) The Board, however, has determined that the incumbent is not entitled to retain its through movement contribution on cross-over

movements on the theory that claiming this amount would constitute an impermissible post-entry competitive response by the incumbent.[23]

Thus, at least under current ground rules, there appears to be no conceptual similarity between the motivations for and outcomes of real world divisions negotiations – which leave both parties in an improved financial position – and the motivations for and outcomes of assumed divisions negotiations between the SARR and the residual incumbent, which under the rationale of *Nevada Power II* preclude the incumbent from retaining its net contribution. Therefore, there is no logical basis for the extrapolation from real world divisions that Otter Tail purports to perform in this case.

Otter Tail's extrapolation is also not grounded in the logic of a putative negotiation between the hypothetical SARR and the residual incumbent. Consider the conditions imposed upon these hypothetical negotiations. First, the hypothetical entrant is free to enter the market without barriers and to take whatever traffic of the residual incumbent that it wishes, or in the cross-over context, whatever portions of existing through movements that it wishes. The hypothetical entrant has the option to "make" the through service by building facilities sufficient to handle traffic from end-to-end or to "make" only a portion of the through service and to "buy" the remaining portion from the residual incumbent by paying it a portion of the revenue on the through movement.

What are the hypothetical entrant's incentives to make or buy? If it costs less to buy the services from the residual incumbent than to build the facilities to handle the traffic end-to-end, the entrant will buy service from the residual incumbent. At what price? Potentially any price up to the cost of the alternative, i.e. building the facilities.

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[23] *Nevada Power II*, 10 I.C.C.2d at 266-67.

Now consider the conditions that govern the residual incumbent's behavior in the presumed negotiations. First, it cannot refuse to deal. It must yield all or a portion of the movement to the entrant, to the extent to which the entrant wishes to replace the incumbent. As to the terms on which it must deal, if the incumbent were free to price consistent with its self-interest, it would select a price less than the cost of the entrant's make alternative, a price that nevertheless allowed the entrant to handle the business profitably. This could be a price as high as the incumbent's current contribution on the through movement. But this is rational marketplace behavior that the Board has apparently forbidden. Again, the Board has said that the incumbent cannot seek to retain its net contribution on the through movement, because such action would represent an impermissible, post-entry competitive response.

The characterization of the incumbent's incentive as a predatory competitive response is incorrect. While the issue arose in *Nevada Power II* in the context of the actions of a presumed competitor, the incumbent's incentive and ability to retain its full contribution are equally applicable to a carrier that is being replaced for a portion of the movement by an entrant that has elected not to construct all the facilities needed to serve the traffic it has selected.[24] The behavior posited is not predatory. It is economically efficient. It permits an entrant that is more efficient than the incumbent for some portion of the haul to enter the market in its preferred manner – as an interline carrier rather than as a carrier that handles through movements – without inflicting economic harm on the incumbent. Permitting the SARR to earn more than the incumbent's

[24] In *Nevada Power II*, the ICC stated that the SARR is properly viewed as a replacement for and not as a competitor of the residual incumbent. In the cross-over context, however, the designation of the SARR as replacement is not entirely accurate. The SARR would be a replacement if it handled the traffic for the full end-to-end movement, but where it replaces the residual incumbent for only a portion of the movement, the SARR must should also be viewed as an interline partner of the residual incumbent. Approaches to revenue allocation on cross-over traffic that result in the SARR appropriating a disproportionate share of cross over revenue are inconsistent with the model of mutually beneficial partnership.

avoided costs for its portion of the haul could permit a SARR that is less efficient than the incumbent to enter the market. This would be inconsistent with the competitive market standard.

The fact is that prior rulings in SAC cases appear to preclude meaningful consideration of market-based divisions by imposing constraints on the incumbent that prevent it from pursuing rational and efficient market place objectives. This is a second reason why there is no logic in Otter Tail's claimed extrapolation from real world divisions.

Otter Tail does not approach revenue allocation from the perspective of cost recovery, but the procedures it advocates speak implicitly to that subject. The MMP, which Otter Tail uses for most of its non-coal traffic, implicitly treats each mile of the SARR, including the very dense portions adjacent to the PRB, as having the same total cost per ton as the less dense portions of the residual BNSF that must terminate this traffic. Otter Tail's regressions, which use mileage as the only independent variable, similarly treat distance traveled as the only movement characteristic that speaks implicitly to cost coverage. While it is clear that some costs are directly related to length of haul, the ability to recover costs also depends on the density of traffic moving over the on-SARR and off-SARR line segments.

Railroad economics instructs that the ability to recover joint and common costs is affected by the volume of traffic moving over the relevant facilities. In the *Coal Rate Guidelines* decision, the ICC discussed the existence of and reasons for the railroad industry cost structure characterized by marginal costs less than average costs:

> In our February 1983 [interim] decision, . . . we noted that (at least in current output ranges) the railroads' long-run marginal costs are less than their long-run average costs. We attributed this to the existence of significant production economies in the industry. As we explained (at p. 525, footnote omitted):
>
> Most importantly, railroads exhibit significant economies of scope and density. Economy of *scope* refers to the fact that the

> rail plant is indivisible and can produce numerous services at less cost than those services could be produced by separate rail plants for each service. Economy of *density* refers to the fact that greater use of the fixed plant results in a declining average cost. Thus, the marginal cost of rail service is less than the average cost, because the fixed plant is used in a progressively more efficient manner.
>
> The differential between marginal costs and average costs cannot be assigned directly to specific movements by any conventional account methodology. Hence, we refer to it as the "unattributable costs."

Coal Rate Guidelines.[25]

The Board recently reaffirmed these principles of cost recovery in its August 20, 2002 decision in *PPL Montana*:

> [I]t is preferable to allocate the capital carrying charges on a level annual basis *to reflect the declining capital investment needed per unit of output as the rail system is used more intensively. This pattern of capital recovery reflects the production economies that characterize the economic structure of the rail industry.*[26] PPL slip op. at 12 n.21 (emphasis added).

Here, in the discussion of the railroad economics principles that are a foundation of Constrained Market Pricing, there is support for an allocation rule that improves upon the modified mileage prorate rule by also accounting for *potential* differences in traffic densities on the SARR's main line (on which the putative cross-over traffic likely flows) and on the off-line portions of the residual incumbent's track. As the Board noted,"[g]reater use of fixed plant results in a declining average cost." Thus, observed measurable differences in the use of fixed plant on the pertinent portions of the SARR and the residual incumbent, should enable the Board reasonably to conclude that, all else being equal, the denser route has more sources of

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[25] 1 I.C.C.2d at 526.

[26] *PPL Montana v. The Burlington Northern and Santa Fe Railway Co.*, served Aug. 20, 2002, slip op. at 12 n.21 (emphasis added).

contribution per ton mile than the less dense route and thus may be able to make a sufficient contribution to the recovery of the pertinent costs (which prior to break up were part of the same railroad) with a lower share of the cross-over traffic net revenues as compared to the sparsely traversed route. Thus, all else being equal, the more traffic there is moving over a given line segment, the lower the amount of cost that needs to be recovered on average from each individual ton-mile in order to recover the total costs of the segment.[27]

The foregoing discussion suggests that in order for the residual incumbent not to be unduly disadvantaged in its ability to defray the full, forward-looking costs associated with the off-line movement and cross-over traffic, its share of the net revenues from cross-over traffic ought to be adjusted in some fashion to reflect the potentially lower density of traffic on the off-line facilities, as compared to the main line facilities of the SARR. On higher density segments, lower average net revenue per unit of traffic may be sufficient to recover total costs of the segment. On lower density segments, relatively higher average revenue per unit of traffic is needed to recover the same quantum of (prudently incurred) total costs.[28]

Taking traffic densities into account in allocating cross-over revenues is logically linked to the complaining shipper's incentive for including cross-over traffic in the first instance. The reason a shipper selects cross-over traffic rather than building additional facilities to handle that

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[27] It is important to bear in mind that Ramsey pricing principles only say that – all else being the same – the average mark up is lower the greater is the pool of demand from which the joint and common costs can be recovered. Under Ramsey principles any particular rate may be significantly above the associated variable cost. Breaking up the incumbent into differentially dense interlined parts does not allow for a straight-forward application of Ramsey pricing principles to the individual segments of an interline move.

[28] For example, if the cross-over traffic is the only traffic on the off-line and if it is prudent to serve that traffic, then the contribution from cross-over traffic has to be high enough to cover the full forward looking costs of the off-line. This could be substantially more than what would be allocated using a mileage prorate rule.

traffic is that it wants to garner increased revenues to cover the fixed costs of the SARR while leaving little or no remaining contribution towards the coverage of fixed costs on the off-line segment. It is neither logical nor equitable to allow the complaining shipper to increase its traffic density, and thus capture the linked contribution, while denying the contribution that the less dense off-line segments require to recover their costs. Since there is nothing stopping the shipper from constructing the railroad that serves at least the first "layer" of cross-over traffic,[29] it reasonably follows that the refusal to build out all the needed facilities is driven by the realization that such a build out would increase costs disproportionately to the incremental revenues. Hence, a refusal to build out facilities to serve the claimed cross-over traffic can be used as a rebuttable evidence that the complainant's SAC test reflects strategic revenue shifting and the concomitant risk of strategic cross-subsidy to the issue traffic.

BNSF's proposed density adjusted revenue allocation rule provides an allocation procedure that attempts to account for the critical differences in densities and thus is more likely to ensure that the off-line(s) of the residual incumbent will remain economically viable after the arbitrary split of the vertically related entities. Like any allocation rule, DARA is still arbitrary in the sense that it entails allocation of revenues that heretofore were making a contribution to the overall pool of indivisible joint and common costs. The improvement that DARA offers over the modified mileage prorate stems from the additional feature built into DARA, namely that the revenue allocation reflects differing traffic densities on the two railroads. If the off-line traffic is very sparse, its average cost per unit of traffic is high, thereby indicating that it should be allowed to keep a greater share of the contribution from cross-over traffic. Where traffic densities are the same on the pertinent portions of the SARR and the residual incumbent, DARA

[29] The first layer of cross-over traffic is defined as that traffic that actually shares some segments with the issue traffic.

will produce the same allocation as would the modified mileage prorate. But where the densities differ, as they likely will, the residual incumbent, who must shoulder its share of joint and common costs needed to support the cross-over traffic, will be more likely to remain viable even if the density of traffic on its off-lines is very low as compared to the density on the SARR's main line.

Verified Statement of Economists Supporting the Principles of Constrained Market Pricing

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Submitted to the
Interstate Commerce Commission
Coal Rate Guidelines – Nationwide,
Ex Parte No. 347 (Sub-No. 1)

June 1983

APPENDIX A

VERIFIED STATEMENT OF ECONOMISTS
SUPPORTING THE PRINCIPLES OF
CONSTRAINED MARKET PRICING

On February 24, 1983, the Interstate Commerce Commission announced its proposal to adopt a new policy called "Constrained Market Pricing" to govern the regulation of railroad rates on coal traffic subject to the Commission's jurisdiction. In many important respects, this proposal represents a breakthrough in bringing federal regulatory policy in line with modern economic theory. We, the undersigned economists, many of whom have participated in the development of this theory, join in this statement to express our support for the principles which the Commission has proposed to adopt to shape its new policy.

We understand the key principles of the new policy to include the following: (1) regulation must afford railroads the opportunity to earn a rate of return on their investment equal to the current cost of capital; (2) permitting railroads to set their rates in accordance with the principles of Ramsey Pricing will lead to economic efficiency in the market for railroad transportation; (3) in addition to promoting efficiency in other respects, the role of proper regulation is to prevent any abuse of monopoly power by ensuring that revenues derived from the rates for any particular rail

service or group of rail services do not exceed so-called "stand-alone costs," the minimum current costs of providing that service or group of services in isolation; and (4) attempts to impose rate ceilings based on arbitrary cost allocation schemes, such as fully allocated costs, will cause economic inefficiency in railroad transportation.

In the ensuing discussion, we shall explain the basis of our agreement with each of these points.

1. Regulation Must Permit Railroads To Earn A Competitive Return On Their Investment.

At page 7 of the decision, the Commission addresses the need for rate regulation to afford railroads the opportunity to earn "adequate revenues." The Commission states:

> In Ex Parte No. 393, Standards for Determining Railroad Revenue Adequacy, 364 I.C.C. 803 (1981), aff'd sub nom. Bessemer & Lake Erie R.R. Co., ___ F.2d ___ (No. 81-1492, 3d Cir., Oct. 1982), we concluded that railroads should have the opportunity to achieve earnings sufficient to yield a return on investment equal to the current cost of capital. As we explained in that case, railroads can obtain funds for investment only by offering rates of return comparable to other investment opportunities. Investments earning less than the cost of capital will not be able to retain existing funding or obtain new fundings, because investors could invest available funds elsewhere at a higher rate of return. Thus, if railroads are to provide adequate service to the shipping public, then we must construct a maximum rate standard which gives them the opportunity to earn adequate revenues.

We concur fully with the statement. If regulation is to serve the public interest, it must not only protect ratepayers from abuses of monopoly power; it must also allow the regulated entities (here, railroads) the opportunity to attract the capital necessary to build and maintain the facilities on which their service depends. The capital markets being highly competitive, railroads can only attract that capital if they have the opportunity to earn a rate of return that is comparable to the rates of return expected to be available on investments of similar risks. This is what is commonly understood to be a "current cost of capital" return. If a system of regulation is imposed which, a priori, forecloses the opportunity to earn such a rate of return, investors can be expected to take their funds elsewhere, and the railroads' services will eventually disappear. Thus, the Commission has properly recognized that its system of regulation must afford railroads the opportunity to earn a rate of return on their investment equal to the current cost of capital.

2. Pricing In Accordance With Ramsey Principles Will Lead To Economic Efficiency.

The decision poses the issue of what principles should govern the determination of maximum reasonable rates in an industry characterized by a significant proportion of

costs that are not directly attributable to any individual service, but are instead joint or common to groups of services. The Commission has chosen the principles of Ramsey pricing to fulfill this role. As the Commission explains:

> Ramsey pricing is designed to apply when marginal costs are less than average total costs. In such instances, marginal cost pricing would not permit recovery of total costs. Ramsey pricing assigns a mark up above marginal cost on the basis of inverse demand elasticity. Thus, the highest mark up would be charged to the traffic most dependent on the service provided (low elasticity traffic). By contrast, a highly competitive (highly elastic) rail service market would tolerate only a small markup over the attributable cost of providing that service. * * * Ramsey pricing analysis yields economically efficient rates, because the resulting rates do not bias the demand patterns that would be achieved under marginal cost pricing. We emphasize that Ramsey pricing is not the same as monopoly pricing because the markups above marginal cost can be constrained by whatever limits on the firm's overall earnings are set by the regulator * * *.
>
> * * *
>
> The constrained market pricing system we are proposing allows carriers to use market demand as the basis for their ratemaking. By this approach, the carriers take the ratemaking initiative, as contemplated by the statute, on all traffic. [Decision at 9-10.]

The Commission's adoption of Ramsey pricing principles is correct, and its analysis of why Ramsey pricing

leads to economically efficient rates is sound. By apportioning all unattributable costs on the basis of the values of the services to shippers, as reflected by their demand elasticities, Ramsey pricing maximizes shippers' total net benefits among the prices that are compatible with the financial viability of the railroad. Since it is the railroads themselves that are closest to the market and best apprised of demand and cost conditions, pricing and resource allocation will be most efficient when the railroads are permitted to take the ratemaking initiative. Unless otherwise constrained by regulation, they will have the incentive to price in accordance with the principles of Ramsey pricing.

3. The Stand-Alone Cost Test Is A Proper Check On The Abuse Of Any Monopoly Power.

To ensure that rates on captive traffic set in accordance with Ramsey principles do not exceed levels that could be charged under competition, the Commission proposes to adopt the "stand-alone cost test." As the Commission explains:

> The "stand-alone cost" to any given shipper (or shipper group) is the cost of serving that shipper alone, as if it were isolated from the railroads' other customers. It represents that level at which the shipper could provide the service itself. No shipper would reasonably agree to pay more to a railroad for transportation than it would cost to produce

> in isolation itself, or more than it would cost a competitor of the railroad to provide the service to it. Thus, the stand-alone cost serves as a surrogate for competition; it enforces a competitive standard on rail rates in the absence of any real competitive alternative.
>
> * * *
>
> Because the stand-alone cost represents the cost of obtaining service from another source (i.e., reproducing the service capability), the cost of facilities must be based on replacement cost, or the current cost of producing equipment or plant with equivalent capabilities. This is appropriate since, to insure continuity of service, a long-run pricing strategy must permit sufficient income to allow for replacement of existing assets. [Decision at 11-12; footnotes omitted.]

We agree with this analysis. To prevent abuse of any monopoly power, there is no need to regulate prices that are no higher than those which could prevail under effective competition. Where competition is effective, no railroad will be able to charge any shipper rates in excess of the minimum cost (including the capital costs) that would be incurred currently to provide the service in isolation. The reason for this constraint is simple: in a market subject to effective active or potential competition, any railroad charging in excess of that amount would invite entry into the market by a firm willing to charge no more than is necessary just to cover that level of costs. Since the stand-alone cost is the minimum current cost of providing a

service in isolation, the stand-alone cost test is the proper means to ensure that rates do not involve any abuse of monopoly power.

The Commission is also correct in recognizing that the stand-alone cost test applies to rates for groups of services or shippers as well as individual services. Just as rates that return revenues in excess of the minimum current cost of providing a single service will invite entry by a competitor willing to charge rates which earn no more than that level of costs, rates consistently in excess of the minimum current cost of providing any group of services will also invite competition.

We agree, further, that stand-alone costs must include or reflect the total current replacement costs of providing a service or group of services in isolation. This is so whether current costs are higher or lower than costs that were incurred in the past, for the costs that affect pricing in competitive markets, i.e., the costs of entry, are always current replacement costs.

Finally, the Commission has properly recognized that the stand-alone cost test serves as a check against cross-subsidy:

> The stand-alone cost defines the point at which cross-subsidy would begin to take place. No shipper can be said to be cross-subsidizing other shippers

> if it pays no more than the cost to the railroad of providing service dedicated soley to it. (If it pays less than the stand-alone cost, it simply benefits from the economies of scope and density that exist in the railroad's system.) Thus, with the stand-alone cost as a rate cap, shippers can be assured that they will not be required to contribute toward the cost of facilities that do not serve them. [Decision at 11; footnotes omitted.]

This is an entirely correct analysis of economic cross-subsidy. Cross-subsidies are properly of concern to economists and regulators because they may result in a mis-allocation of resources by encouraging inefficient investment. For customers of a railroad, they may be of concern because they are perceived as unfair. Yet, while shippers who pay more for their service than other shippers may feel that they are being forced to "cross-subsidize" the other shippers, mere payment of a relatively higher rate is not evidence of a cross-subsidy where fixed and common costs must be covered. Rather, as the Commission recognizes, a cross-subsidy can only occur in an economic sense where a shipper (or group of shippers) pays more than the total cost of serving it alone. Where no shipper or shipper group pays more than that amount, differences in their rates simply reflect differing contributions to the common costs of the system, and not cross-subsidies.

4. Regulation Based On Arbitrary Cost Allocations Will Lead To Economic Inefficiency.

In adopting Ramsey pricing as the theoretical framework for assessing the reasonableness of the common cost allocations reflected in rail rates, the Commission explicitly rejects the alternative of arbitrary cost allocation schemes:

> We seriously doubt that any system of rate regulation based soley upon an arbitrary cost-allocation formula will enable rail carriers to achieve revenue adequacy. We cannot assume that traffic will actually move in each market at the fully allocated cost rate level as determined by a cost allocation formula. Carriers must charge competitive rates in competitive markets or lose the traffic. * * * [T]he market ignores the "scientific" assignment of certain costs to each of the carrier's rates. Yet, if an arbitrary allocation of costs were used to formulate and impose a rate ceiling, the carrier could not make up for the revenue shortfall it would suffer on movements that fall below the rate necessary to contribute the allocated amount.
>
> It is only through a demand-based pricing system that the nonattributable costs can be allocated in an efficient manner. * * *
>
> * * *
>
> By incorporating demand elasticity into ratemaking, Ramsey pricing should encourage more shippers to purchase transportation service than if an arbitrary cost-apportionment formula were used to set rates. As noted earlier, "fully allocated cost" and other similar methodologies frequently "over-" or "underassign" to a particular service (relative to

> actual market demand) portions of the carrier's common or unattributable costs. As a result, a carrier actually levying such a rate would acquire less than maximum net revenue contribution. If, however, the carrier is allowed to allocate costs on the basis of demand elasticity, the contribution should be maximized and the carrier's resources more efficiently utilized. [Decision at 8-10.]

This discussion accurately points up the indefensibility of any arbitrary cost allocation approach to setting prices. By failing to reflect differences in shipper demand, rates based on such approaches can preclude carriers from covering their total costs. They also tend to promote economic inefficiency by unnecessarily diverting traffic that could make a positive contribution to the railroads' common costs at lower rates, and by failing to obtain required contributions from shippers of other, less elastic traffic which they are able and willing to pay.

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Professor Almarin Phillips
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APPENDIX B

VERIFIED STATEMENT OF

GEORGE J. STIGLER

My name is George J. Stigler, and I am a Professor in the Graduate School of Business at the University of Chicago. I have read the "Verified Statement of Economists Supporting the Principles of Constrained Market Pricing" signed by Professor William Baumol and others for submission in proceedings before the Interstate Commerce Commission in Coal Rate Guidelines -- Nationwide, Ex Parte No. 347 (Sub-No. 1). Since I have not participated in that proceeding nor have I participated in the development of the Ramsey Pricing Theory, it seems desirable to make a separate statement.

I have specialized in studies of prices and public regulation. I am confident that adoption of the Interstate Commerce Commission's proposed maximum rail rate policy set forth in its decision of February 8, 1983, with regard to coal and other traffic as well, would lead to a major improvement in and a rationalization of our railroads' rate structures, and in the efficiency of the rail industry.

Verification

George J. Stigler, being duly sworn, states that he has read the foregoing statement, knows the contents thereof, and that the same are true as stated.

George J. Stigler

Subscribed and sworn to before me this 13 day of June, 1983.

Notary Public

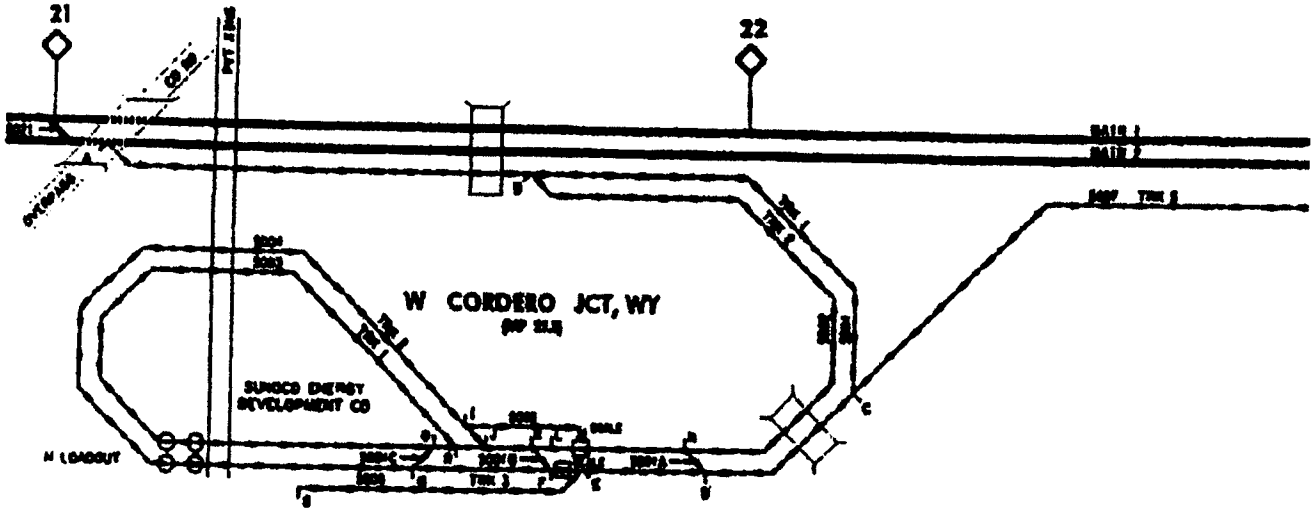
My Commission expires:

Cordero Mine Schematic

Exhibit III.A-3

← Donkey Creek Jct., WY

Bridger Jct., WY →



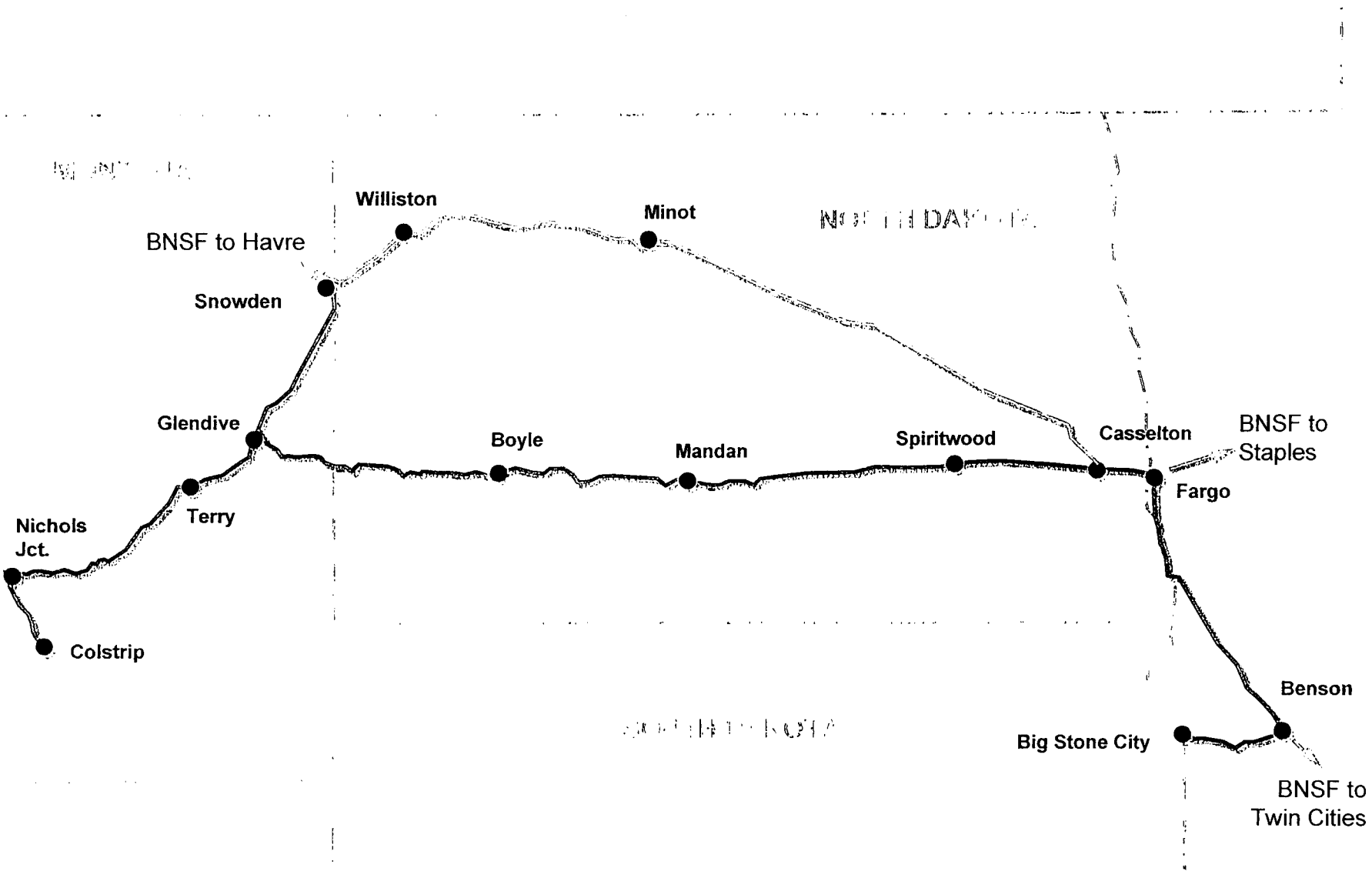
2458

CORDERO MINE, WY
M.P. 21
TRACK SCHEMATIC
(NOT TO SCALE)

Burlington Northern and Santa Fe Railway Company
Orin Subdivision

REDACTED

Exhibit III.A-5
Comparison of OTRR and Real-World BNSF Routes Between Snowden, MT and Fargo, ND



REDACTED

Battling Trucks, Trains Gain Steam

The Latest Strict Scheduling Helps Win Business for Railroads

By DANIEL MACHALABA and CHRISTOPHER J. CHIPELLO
Staff Reporters of THE WALL STREET JOURNAL

Delivery giant **United Parcel Service** Inc. owns and operates 88,000 trucks. So how is UPS speeding up deliveries between the East and West coasts? Trains.

Three weeks ago, railroads **Union Pacific** Corp. and **CSX** Corp. began operating trains for UPS between New York and Los Angeles that cross the country in just 63 hours. That shaves 12 hours from the fastest previous rail service and is competitive with team-driven trucks, which can make the trip in about 60 hours. The new trains allow UPS to guarantee deliveries between the nation's two largest cities in four business days, instead of five.

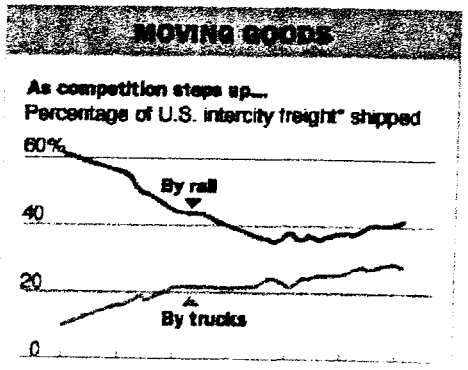
To make the express service work, the railroads are shunting aside slower freight trains and using new tracks that bypass some of the carriers' worst bottlenecks. "We're going to part the seas" to deliver for UPS, says John Childs, an assistant vice president of CSX.

The new trains and the new attitude are the latest signs of a revival at the nation's freight railroads. For decades, the railroads had been losing ground to trucks, which were more reliable and could go more places. A series of poorly executed mergers in the late 1990s further slowed deliveries and alienated customers.

Today, railroads are picking up steam. A new crew of executives is breaking a longstanding industry practice of waiting to move trains until they're full, which sometimes left loaded boxcars stranded in train yards for days. Now, railroads are putting trains on strict schedules and aggressively wooing customers.

Meanwhile, a growing number of state and local officials are funding rail projects, tempering the nation's 50-year preference for building new highways. One reason: People are sick of traffic jams and diesel fumes. Last month, the six major North American railroads announced a $1.5 billion plan to untangle their big Chicago rail hub, with about 85% of the money coming from the city, state and federal governments.

The changes are critical in an economy still trying to regain its footing. Transportation costs affect the price of virtually every product, from automobiles to breakfast cereal and washing machines. Reliable shipments help lower other costs by allowing businesses to carry less inventory.



In 1981, transportation and logistics costs accounted for 16.2% of the nation's economic output, according to the Eno Transportation Foundation, a nonprofit Washington-based research group. By last year, those costs had fallen to 8.7% of gross domestic product, thanks to deregulation, which lowered both truck and rail freight rates, and improved computer systems, which help businesses better track inventory.

Truckers notice the stepped-up competition. Railroads

"are more focused on the customer and growing their business than I've ever seen," says Bill Zollars, chief executive of trucking giant Yellow Corp. in Overland Park, Kan.

He says Yellow and other truckers will stay competitive by combining into larger, more efficient companies and adopting improved computer systems that plot faster routes. As customers demand improved service, "that usually means trucks rather than trains," he says. Two weeks ago, Yellow agreed to buy its biggest competitor, Roadway Corp., for almost $1 billion in cash and stock.

Trains had been the nation's predominant way of moving freight since the 19th century. Because they can carry 100 or 150 cars together, freight trains are naturally cheaper and more fuel-efficient than trucks.

Beginning in the 1950s, however, trains began losing traction amid big shifts in the postwar economy. Manufacturing and distribution moved beyond the population centers of the East and Midwest to places not served by rail. At the same time, the federal government began building interstate highways, ideal for long-distance trucking, at taxpayer expense. That put railroads, which must acquire land, build and maintain their own tracks, at a competitive disadvantage.

In 1980, both industries were deregulated, giving them more freedom to set routes and rates. Truckers benefited first, as new, low-cost competitors entered the field. Trucks got another boost as [of Cass Information Systems Inc., a freight-data company in St. Louis.

By 1986, less than 36% of the nation's intercity freight was shipped by rail, down from 61% in 1940. Trucks, meanwhile, had grown to carrying 25% of freight, up from 10% in 1940.

Railroads ripped up little-used tracks and postponed new investments, creating bottlenecks and additional delays. By the 1990s, most railroads had thrown up their hands, ceding much of their traditional general-merchandise cargo to truckers and focusing on bulky commodities, such as coal and grain. Trucks seemed so dominant that railroad employees themselves began referring to their lines by the interstate highways that they parallel, such as I-95, for the north-south East Coast route, and I-5 for the West Coast route.

Railroads' share of freight shipments began inching higher in the late 1980s, as utilities in the South and Midwest turned to low-sulfur coal from Wyoming to meet clean-air rules, and shippers increasingly put truck trailers on flatcars. The long economic slowdown has helped as well, as shippers seek to cut costs by using trains, which are cheaper than trucks. When sales are sluggish anyway, speedier truck deliveries seem less important.

"Taking the extra time and using rail is more viable with a slower economy," says Paul Bergant, executive vice president and chief marketing officer of **J.B. Hunt Transport Services** Inc., a Lowell, Ark.-based trucking company.

Freight railroads still face a host of challenges. Trucks command a premium for their services because of their greater flexibility. Trucks brought in 73% of the $423 billion spent on intercity freight shipments last year, compared with 8.7% for trains.

Moreover, most railroads aren't making enough money to invest in new tracks and equipment, making it hard to unclog bottlenecks. Many places are served by a single track, meaning trains have to wait for others to pass. Even where trains work well, shippers typically need trucks to pick up and deliver goods.

But a new generation of leaders is injecting life into long-overlooked railroads. The changes are most evident at Canadian National Railway Co., a once-sleepy government-owned railroad that quietly has become the most efficient carrier on the continent. Despite its name, Canadian National controls a key line from Chicago to New Orleans, and is the U.S.'s fifth largest railroad.

In 1998, E. Hunter Harrison, then Canadian National's chief operating officer, did something revolutionary in the stodgy rail business: He posted schedules, both for trains and for individual shipments, and promised to stick to them. Trains began to depart and arrive on time with whatever freight was available.

"People got into sloppy practices, and we had to make changes," says Mr. Harrison, a 58-year-old Tennessee native who became Canadian National's chief executive in January. He says the schedules reduce costs, by keeping cars and locomotives moving, and making better use of assets.

The company is hauling 20% more freight with 882 fewer locomotives than it had in 1998. It's carrying a growing share of Canada's massive lumber shipments. Equally important, after two decades of declining rates, Mr. Harrison is using service improvements to justify holding the line on rates, and even occasional increases. Net income at Canadian National quadrupled between 1998 and 2001, before sliding last year as the company set aside more money to cover injury claims.

The changes have "helped restore our faith in rail," says Alain Lalonde, corporate director of logistics for Abitibi-Consolidated Inc., the world's biggest newsprint maker. Blaming inconsistent deliveries, the Montreal-based company had cut back on its use of rail in the late 1990s. In 1999, less than 30% of its Canadian paper shipments to North America went by train. Last year, taking advantage of Canadian National's scheduled service and similar efforts by connecting U.S. carriers, Abitibi shipped nearly 60% of its Canadian paper by rail, cutting transportation costs by roughly C$10 million (US$7.1 million).

Competitors are copying Canadian National's approach. CSX and Norfolk Southern Corp., the U.S.'s third- and fourth-largest railroads behind Union Pacific and Burlington Northern Santa Fe Corp., are reconfiguring trains and using schedules. In an unusual move, CSX last year sent seven executives to visit Canadian National's operations center in Edmonton, Alberta.

The trip reflected the changing views of CSX's former chief executive John Snow, who became U.S. Treasury Secretary in February. In 1999, CSX was plagued by long delays, the result of holding freight shipments to build long trains. In 2000, however, Mr. Snow installed new managers who preferred tighter schedules, reducing backlogs and restoring confidence among customers.

Railroads' increasingly disciplined operations force customers to adjust. For years, Canadian National yards in Quebec were clogged with boxcars because customers often failed to complete the "waybill," which lists a car's contents, destination and routing instructions. Then, in 2000, the railroad instituted a C$400 fee for incomplete paperwork, cutting the number of delinquent cars to just a few a day from hundreds. Some shippers using the busy rail line between Toronto and Halifax, Nova Scotia now must reserve places on Canadian National trains.

Railroads also are benefiting from reluctance among some government officials to tackle the lengthy, complex process of building more roads. Delaware recently opened a 47-mile stretch of highway that took 20 years to complete. "States are coming to the conclusion that they have to

look beyond highways to also consider freight rail," says John Horsley, executive director of the American Association of State Highway and Transportation Officials, which represents state transportation departments.

About a dozen states are helping railroads fund improvements to relieve bottlenecks. In California, local, state and federal governments financed the $2.4 billion Alameda Corridor, a 20-mile rail line connecting the ports of Los Angeles and Long Beach to the national rail system at a hub east of downtown Los Angeles. The state of Missouri helped finance a three-mile-long rail overpass in Kansas City that enables long-distance trains, including the new UPS service, to avoid congested switches and hubs.

In Brandon, Vt., some residents are supporting a $24 million plan to build a railroad track to a nearby marble quarry in hopes that the steady stream of trucks rumbling through the picturesque village can be shifted to rail. Among the most vocal supporters of the rail project is the Brandon Inn, which has spent more than $200,000 to enclose its outdoor front porch and sound proof the facade of the building to shield guests from the noise, dust and vibrations of the trucks.

"They come to Vermont for peace and quiet and get what they thought they had left behind," says Sarah Pattis, co-owner of the inn.

In the Northeast, railroads are seeking $6.2 billion in government funding to unclog bottlenecks from Virginia to New Jersey. Delaware is spending $13 million to restore the Shellpot Bridge, a dilapidated rail crossing of the Christina River in Wilmington that has been closed for more than eight years. Officials hope the reopened rail line will take some trucks off congested I-95. Norfolk Southern will reimburse the state for most of the money by paying tolls on every freight car that crosses the bridge.

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Updated July 25, 2003

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RAILROAD NEWS PHOTOS
September 2003 trainsmag.com

UP wins, BNSF loses big United Parcel contract

Bullet train starts July 1 on UP, CSX between New York-Boston, and Los Angeles

In a stunning turnabout, United Parcel Service has taken away from Burlington Northern Santa Fe and given to Union Pacific *all* its coast-to-coast business between the New York City and Boston metro areas, and Los Angeles. This includes the much-anticipated, super-fast "bullet train," running once weekly, plus four more expedited trains per week.

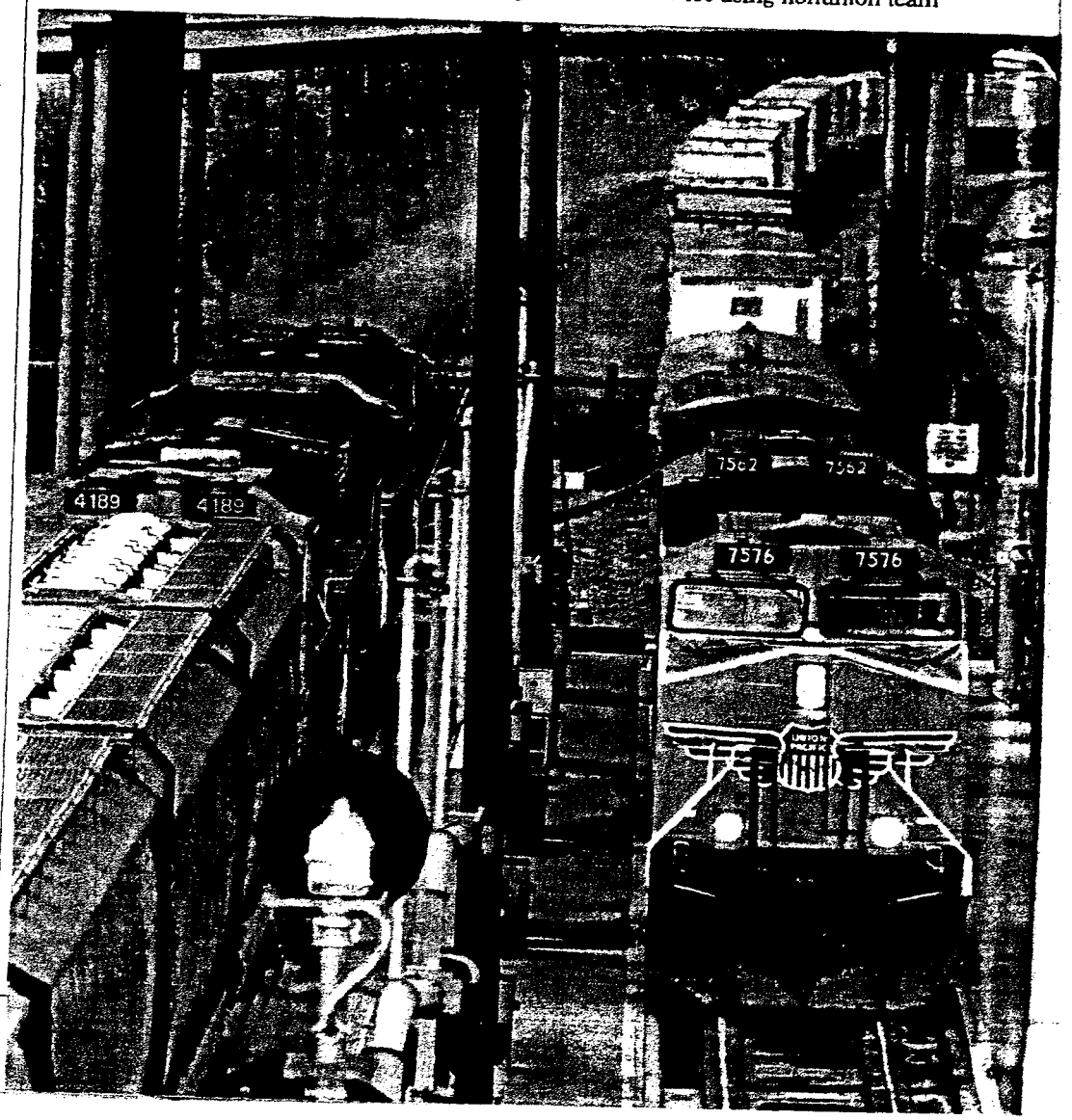
An inability by BNSF and United Parcel to agree on price for the bullet train apparently precipitated the change to Union Pacific. CSX will handle the trains east of Chicago.

As a morale killer at BNSF (and a morale booster at UP), the impact is enormous. Even bigger is the revenue switch: a reported $50 million of the $250 million that UPS does annually with BNSF.

The original idea, easily BNSF's to run because it already had UPS's business, was the once-weekly bullet train. But, according to UP sources, after working through the details of the bullet train, UPS said, "Oh, why don't you run the other four days of the week, too."

Until now, BNSF has been UPS's preferred rail-service provider in the West. United Parcel went to Union Pacific after BNSF worked with UPS for the better part of three years to prove the feasibility of a bullet train. The bullet train can take packages tendered to UPS on Monday to the opposite coast for delivery on Friday ["Blank Bullet," February TRAINS]. The other four weekdays a normal expedited train can handle the coast-to-coast UPS business, taking advantage of the weekend to meet UPS's fourth-business-day delivery schedule.

UPS is losing market share to FedEx Ground, which advertises four-business-day coast-to-coast service using nonunion team



Deep in foreign territory, UP's test bullet train of April 20 stops at BNSF's mainline fuel pad at Argentine Yard in Kansas City.

THE BULLET TRAIN

COAST TO COAST IN 2 DAYS

Eastward (read down)		Westward (read up)
CSX Q153		CSX Q100
4:30 a.m. ET Tu	Little Ferry, N.J.	11:30 p.m. ET Thur
12:30 a.m. CT Wed	McCook, Ill.	1:15 a.m. CT Thur
UP ZLFLA3		UP ZLALF2
1:00 a.m. CT Wed	McCook, Ill.	12:30 a.m. CT Thur
9:30 a.m. CT Wed	Kansas City	4:00 p.m. CT Wed
12:50 a.m. MT Thur	El Paso, Texas	10:30 p.m. MT Tu
4:30 p.m. PT Thur	Los Angeles	5:00 a.m. PT Tu

drivers and sleepercabs, versus UPS's five-day standard using rail. UPS wants to match the FedEx times; the weekends will deliver on that promise, except for Monday shipments.

The first bullet trains left Los Angeles and Little Ferry, N.J., on July 1. Eastward train ZLALF2 departed Los Angeles at 4:46 a.m. with 21 three-trailer-capacity TTRX articulated flats, seven for Worcester, Mass., and 14 for Little Ferry. Powering it were four UP 7500-series 6000 hp locomotives, for an astonishing 9.5 hp/ton. Westward CSX train Q153 left Little Ferry at 4:27 a.m.

Union Pacific will route via Kansas City and El Paso, Texas. The bullet trains run through Chicago without yarding. The other four trains are yarded by UP at Canal Street and CSX at 59th Street. The trailers are rubbered between the two yards on city streets.

UP is using a 41.5-hour schedule (42-hour was the initial plan), a 54-mph start-to-stop average speed over its 2242 miles of the route. Only 52 minutes of standing time are allowed for crew changes, inspections, and refueling; most of which is consumed by two 20 minute stops in El Paso and Pratt, Kans. The locomotives have a top speed of 74 mph.

How BNSF let No. 1 competitor Union Pacific walk away with the most lucrative business of its No. 1 customer, UPS, should be the subject of a Harvard Business School case study. The service quality BNSF provided apparently was not the issue, several BNSF sources insist. But price was.

"They [UPS] came to us with the whole package," explains a Union Pacific vice president. "After we demonstrated our ability to run the train to meet their hot-day requirement, we sat down and worked through the issues with both UPS and CSX. They were very eager for us to run this."

TWO IDEOLOGIES ARE AT WORK HERE: ONE SAYS CHARGE EXTRA FOR GOOD SERVICE. THE OTHER SAYS FIRST GET THE BUSINESS

Price was a key issue. A 42-hour (or better) schedule between Chicago and Los Angeles is key to making the delivery commitment, as opposed to the normal 52-hour schedule. Fast schedules delay slower trains. An eastbound test train on BNSF overtook 38 slower eastbound trains. BNSF insisted on extra compensation for this collateral damage. Union Pacific did not.

This is the second big traffic lane United Parcel has moved from BNSF to UP since 2001—the first being Atlanta to Los Angeles via Memphis in 2001, run by one train daily.

"It used to be this was your business to lose," says a rueful BNSF executive. In other words, if you got the trailers to the other end in time for the UPS sort, you kept the traffic. That's apparently no longer the case, because UPS is now emphasizing cost, too.

For several years, UP has run the ZDVSC and ZSCDV between Denver and Salt Lake City for the benefit of UPS. They're short trains—sometimes very short—and probably don't earn back their cost of fuel. But run they do, symbolic of UP's desire to return to the good graces of United Parcel following the railroad's colossal service collapse of 1997-98.

More dominoes could fall. If good service didn't cement the bond between UPS and BNSF, then perhaps all of BNSF's UPS franchises are at risk. Union Pacific is reportedly pressing UPS for its traffic between Dallas-Fort Worth and Los Angeles, as well as the smaller volume between Chicago and Denver, where on-time performance has been an issue. Two other lanes vulnerable because Union Pacific has shorter mileage are Chicago to Dallas-Fort Worth, and Chicago to San Francisco. Most of these UPS lanes have one train each way.

"If you can't get a premium price for premium service," asks a BNSF vice president, "what's the point?"

To this, Union Pacific has now provided a rejoinder: If you can't get the business in the first place, what's the point?

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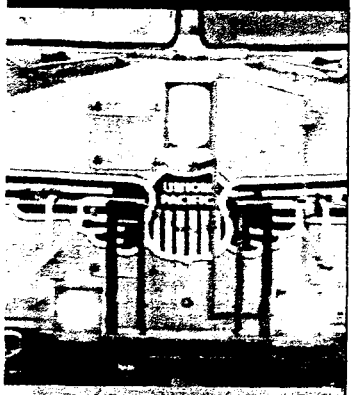


Fast train facts

- Key to UP's route is trackage rights over BNSF between Kansas City and Chicago, granted to Southern Pacific as a condition of the BNSF merger, and inherited by UP.
- Most of UP's route west of Kansas City is single-track, whereas BNSF is mostly multiple track.
- CSX only handles the eastbound trailers to Worcester—the westbound trailers are trucked to Little Ferry and loaded on the train.

Dan Munson

Comparison of Otter Tail's Coal Tonnage Forecast and BNSF's Reply for the OTRR

	Otter Tail Opening	BNSF Reply	Difference
2002	180,373,333	112,321,697	68,051,636
2003	179,048,001	111,791,933	67,256,068
2004	180,717,966	112,920,707	67,797,259
2005	182,345,726	113,248,930	69,096,796
2006	186,007,720	115,772,099	70,235,620
2007	190,197,509	117,206,309	72,991,200
2008	193,195,547	119,226,266	73,969,281
2009	195,406,961	120,610,726	74,796,235
2010	198,829,685	122,752,418	76,077,267
2011	200,409,240	123,638,309	76,770,931
2012	201,481,066	123,986,270	77,494,796
2013	202,171,952	124,136,569	78,035,383
2014	202,542,858	124,294,368	78,248,490
2015	202,885,707	124,440,230	78,445,477
2016	203,381,200	124,656,289	78,724,911
2017	203,949,080	124,916,528	79,032,552
2018	204,276,824	125,060,465	79,216,359
2019	204,648,787	125,245,297	79,403,490
2020	204,990,204	125,463,436	79,526,768
2021	205,069,305	125,510,775	79,558,530

Comparison of Otter Tail's Non-Coal Tonnage Forecast and BNSF's Reply for the OTRR

	Otter Tail Opening	BNSF Reply	Difference
2002	25,243,569	21,172,296	4,071,273
2003	25,243,569	21,172,296	4,071,273
2004	25,243,569	21,172,296	4,071,273
2005	25,243,569	21,172,296	4,071,273
2006	25,243,569	21,172,296	4,071,273
2007	25,243,569	21,172,296	4,071,273
2008	25,243,569	21,172,296	4,071,273
2009	25,243,569	21,172,296	4,071,273
2010	25,243,569	21,172,296	4,071,273
2011	25,243,569	21,172,296	4,071,273
2012	25,243,569	21,172,296	4,071,273
2013	25,243,569	21,172,296	4,071,273
2014	25,243,569	21,172,296	4,071,273
2015	25,243,569	21,172,296	4,071,273
2016	25,243,569	21,172,296	4,071,273
2017	25,243,569	21,172,296	4,071,273
2018	25,243,569	21,172,296	4,071,273
2019	25,243,569	21,172,296	4,071,273
2020	25,243,569	21,172,296	4,071,273
2021	25,243,569	21,172,296	4,071,273

REDACTED

REDACTED

REDACTED

REDACTED

REDACTED

Comparison of Otter Tail's Coal Revenue Forecast and BNSF's Reply for the OTRR

	Otter Tail Opening	BNSF Reply	Difference
2002	$675,307,260	$364,345,961	$310,961,299
2003	$671,043,473	$362,512,748	$308,530,725
2004	$686,893,957	$363,936,253	$322,957,704
2005	$706,430,450	$363,761,415	$342,669,035
2006	$738,715,695	$377,825,193	$360,890,502
2007	$773,959,107	$373,296,744	$400,662,363
2008	$805,015,310	$387,542,269	$417,473,041
2009	$834,280,543	$399,894,965	$434,385,578
2010	$867,816,885	$415,704,996	$452,111,889
2011	$896,438,352	$426,183,291	$470,255,060
2012	$922,971,982	$430,488,004	$492,483,978
2013	$947,869,972	$438,212,977	$509,656,995
2014	$971,164,708	$441,679,478	$529,485,231
2015	$994,872,230	$449,768,446	$545,103,784
2016	$1,020,075,734	$458,193,547	$561,882,186
2017	$1,046,223,019	$466,732,584	$579,490,435
2018	$1,071,613,393	$475,177,106	$596,436,287
2019	$1,097,983,585	$483,862,242	$614,121,343
2020	$1,125,053,268	$492,778,461	$632,274,806
2021	$1,150,944,869	$500,738,750	$650,206,120

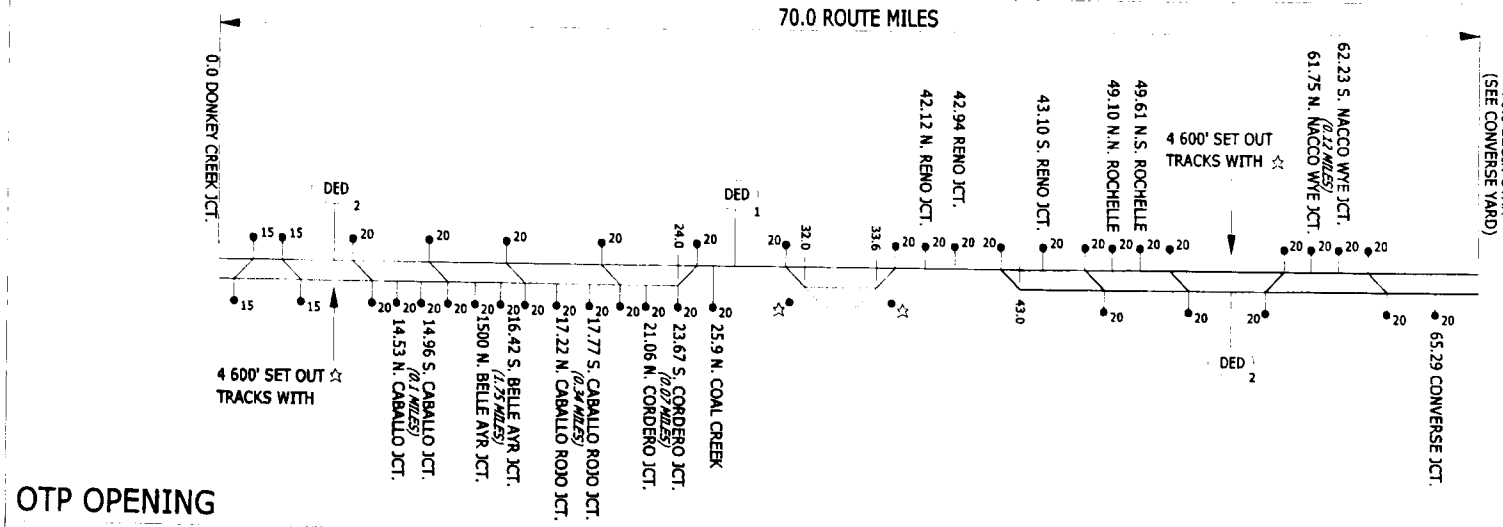
Comparison of Otter Tail's Non-Coal Revenue Forecast and BNSF's Reply for the OTRR

	Otter Tail Opening	BNSF Reply	Difference
2002	$201,472,447	$135,017,748	$66,454,699
2003	$202,400,480	$135,691,178	$66,709,302
2004	$203,338,587	$136,372,069	$66,966,518
2005	$204,286,921	$137,060,533	$67,226,389
2006	$205,245,640	$137,756,686	$67,488,954
2007	$206,214,903	$138,460,647	$67,754,256
2008	$207,194,870	$139,172,533	$68,022,337
2009	$208,185,707	$139,892,467	$68,293,240
2010	$209,187,580	$140,620,572	$68,567,008
2011	$210,200,658	$141,356,972	$68,843,686
2012	$211,225,114	$142,101,796	$69,123,319
2013	$212,261,124	$142,855,172	$69,405,952
2014	$213,308,865	$143,617,232	$69,691,633
2015	$214,368,518	$144,388,109	$69,980,408
2016	$215,440,267	$145,167,940	$70,272,327
2017	$216,524,299	$145,956,863	$70,567,436
2018	$217,620,805	$146,755,017	$70,865,788
2019	$218,729,977	$147,562,546	$71,167,431
2020	$219,852,011	$148,379,593	$71,472,418
2021	$220,987,108	$149,206,308	$71,780,801

Comparison of Otter Tail's Tonnage and Revenue Forecast and BNSF's Reply for the OTRR

	Otter Tail Opening		BNSF Reply		Difference	
	Tonnages	Revenue	Tonnages	Revenue	Tonnages	Revenue
2002	205,616,902	$876,779,708	133,493,993	$499,363,710	72,122,909	$377,415,998
2003	204,291,570	$873,443,952	132,964,229	$498,203,926	71,327,341	$375,240,026
2004	205,961,535	$890,232,543	134,093,003	$500,308,322	71,868,532	$389,924,222
2005	207,589,295	$910,717,371	134,421,226	$500,821,947	73,168,069	$409,895,424
2006	211,251,289	$943,961,335	136,944,395	$515,581,879	74,306,893	$428,379,456
2007	215,441,079	$980,174,010	138,378,605	$511,757,391	77,062,473	$468,416,619
2008	218,439,116	$1,012,210,181	140,398,562	$526,714,802	78,040,554	$485,495,378
2009	220,650,530	$1,042,466,250	141,783,022	$539,787,433	78,867,508	$502,678,818
2010	224,073,254	$1,077,004,465	143,924,714	$556,325,568	80,148,540	$520,678,897
2011	225,652,809	$1,106,639,010	144,810,605	$567,540,263	80,842,204	$539,098,746
2012	226,724,635	$1,134,197,096	145,158,566	$572,589,799	81,566,069	$561,607,297
2013	227,415,521	$1,160,131,096	145,308,865	$581,068,149	82,106,656	$579,062,948
2014	227,786,427	$1,184,473,573	145,466,664	$585,296,709	82,319,763	$599,176,864
2015	228,129,276	$1,209,240,748	145,612,526	$594,156,556	82,516,750	$615,084,192
2016	228,624,769	$1,235,516,001	145,828,585	$603,361,488	82,796,184	$632,154,513
2017	229,192,649	$1,262,747,319	146,088,825	$612,689,447	83,103,825	$650,057,872
2018	229,520,393	$1,289,234,198	146,232,761	$621,932,123	83,287,632	$667,302,075
2019	229,892,356	$1,316,713,562	146,417,593	$631,424,787	83,474,763	$685,288,774
2020	230,233,773	$1,344,905,279	146,635,732	$641,158,055	83,598,041	$703,747,224
2021	230,312,875	$1,371,931,977	146,683,071	$649,945,057	83,629,803	$721,986,920

REDACTED



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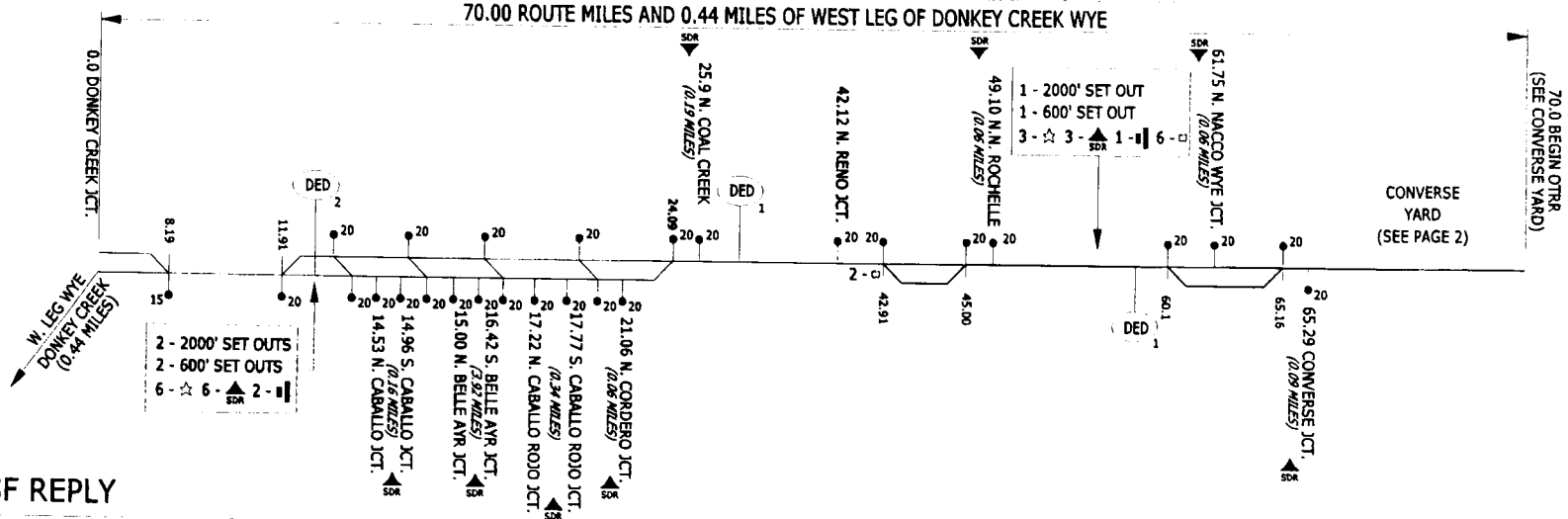


BNSF REPLY

DISTRICT:

ORIN

FROM: CONVERSE YARD

TO: DONKEY CREEK JCT

MP: 70.00

MP: 0.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

(0.1 MILES) = RR-OWNED MINE TRACK

DED — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

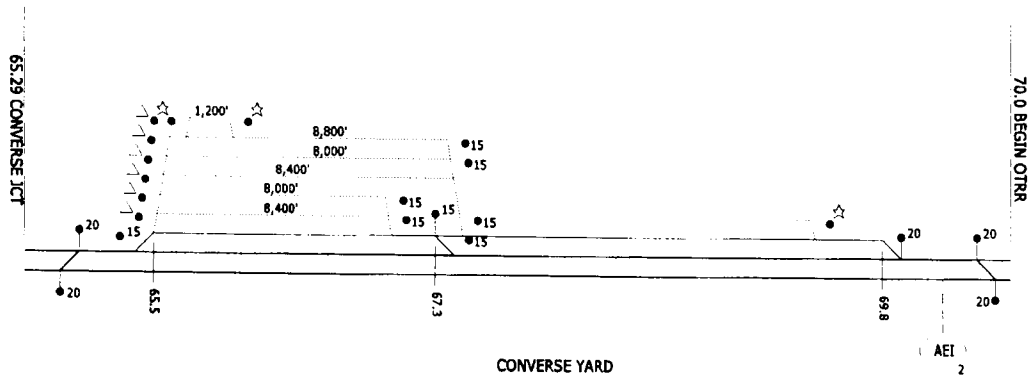
AEI — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES
20 - #20 ELECTRIC
15 - #15 ELECTRIC
△ - #15 HAND-THROWN
☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL
SDR - SWITCH POINT DERAIL
DR - HINGED DERAIL
WHEEL STOP
COMPROMISE JOINT

EXHIBIT III.B-1
Page 1



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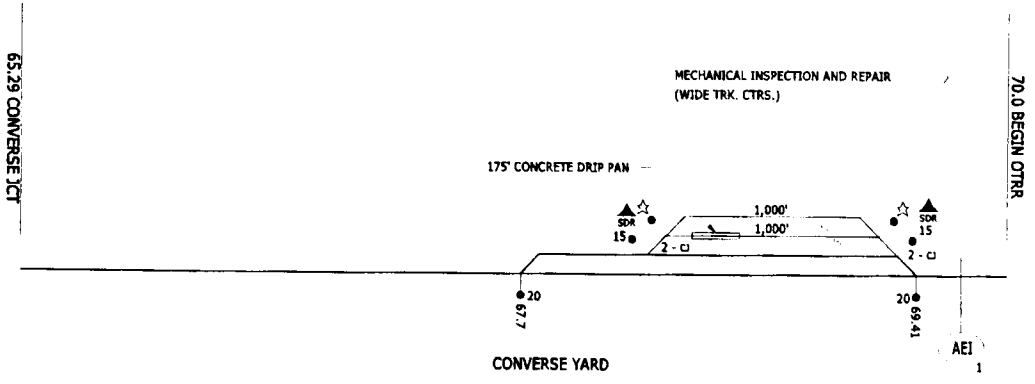

BNSF REPLY

DISTRICT:

ORIN

FROM: S. END CONVERSE YARD MP: 70.00

TO: CONVERSE JCT. MP: 65.29

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NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

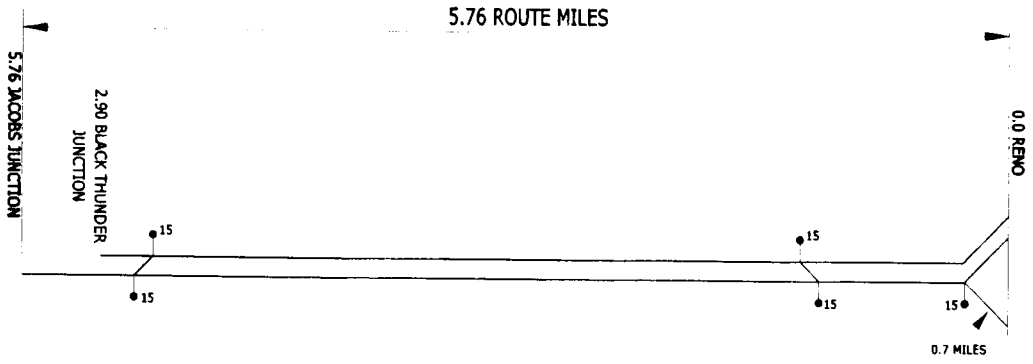
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

▮ - WHEEL STOP

▭ - COMPROMISE JOINT

EXHIBIT III.B-1
Page 2



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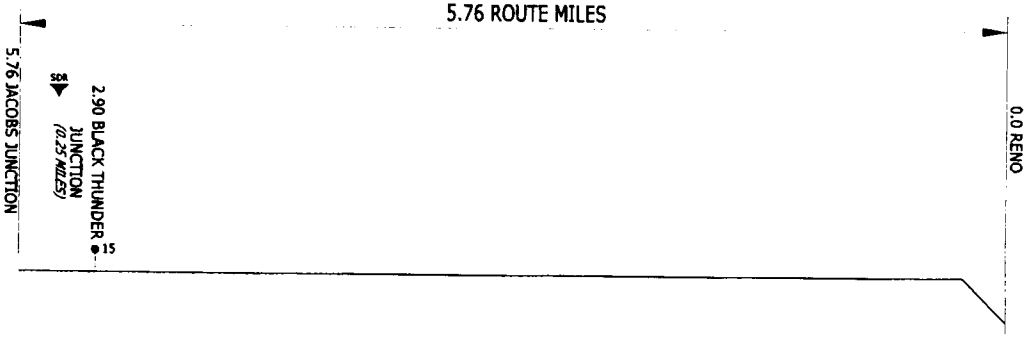

BNSF REPLY

DISTRICT:

RENO

FROM: RENO

TO: JACOBS JUNCTION

MP: 0.00

MP: 5.76

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NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

(0.1 MILES) = RR-OWNED MINE TRACK

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AEI (1) AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

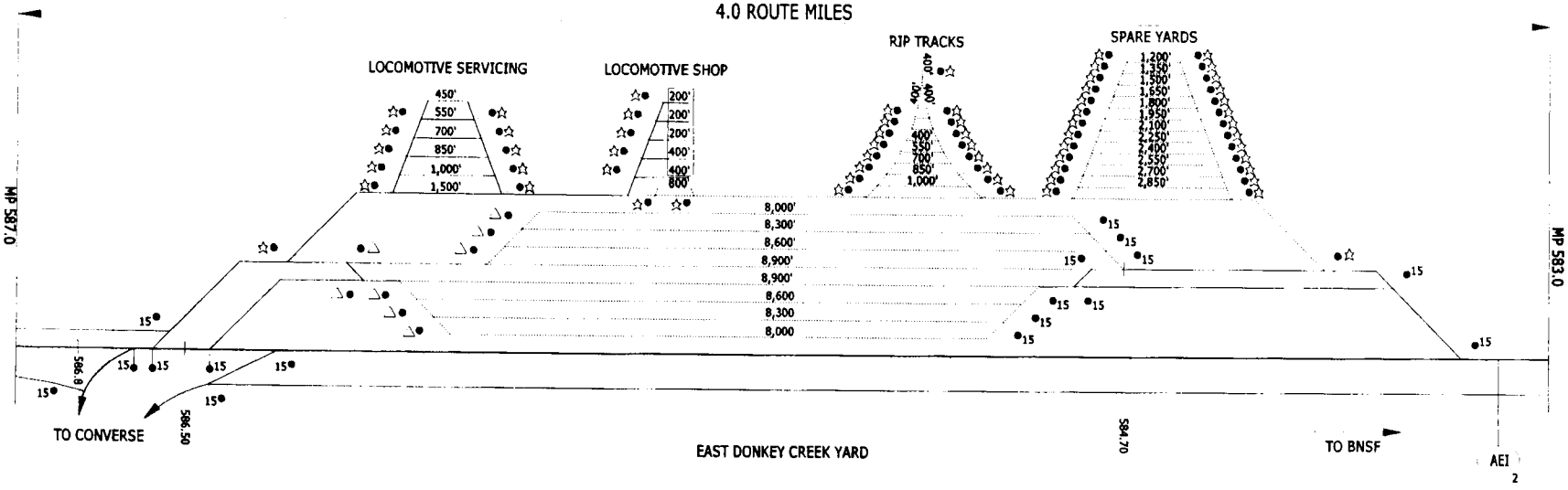
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING

DISTRICT:

BLACK HILLS

FROM: EAST DONKEY CREEK MP: 583.0

TO: DONKEY CREEK JCT. MP: 587.0

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NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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*TURNOUT TYPES

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15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

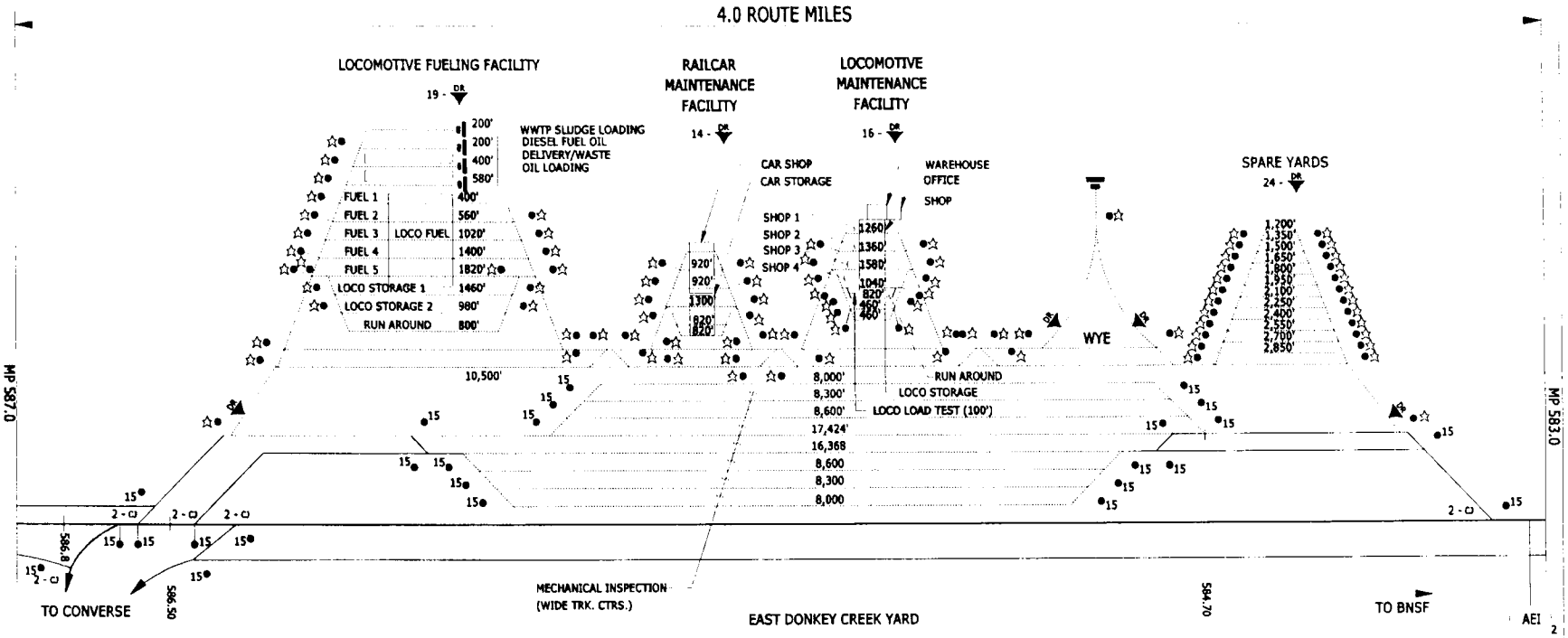
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



BNSF REPLY

DISTRICT:

BLACK HILLS

FROM: EAST DONKEY CREEK MP: 583.0

TO: DONKEY CREEK JCT. MP: 587.0

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NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

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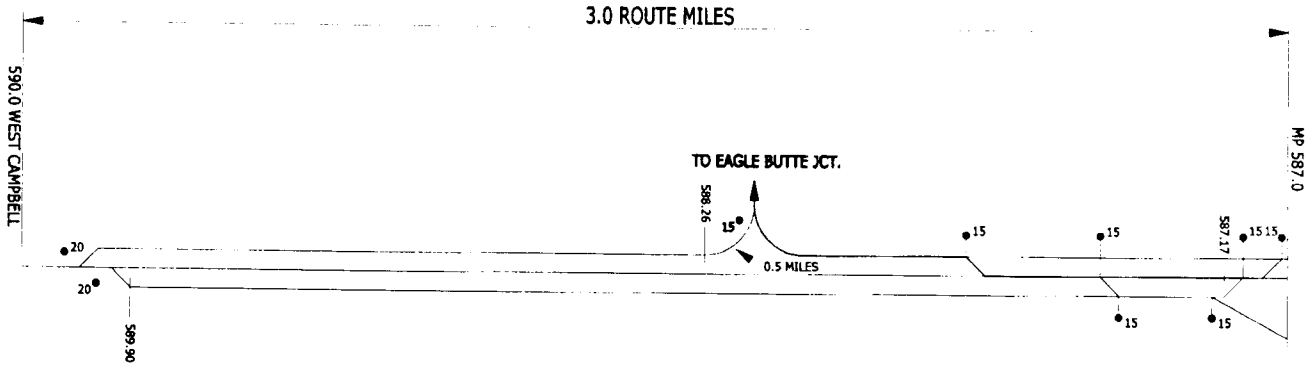
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

O - COMPROMISE JOINT



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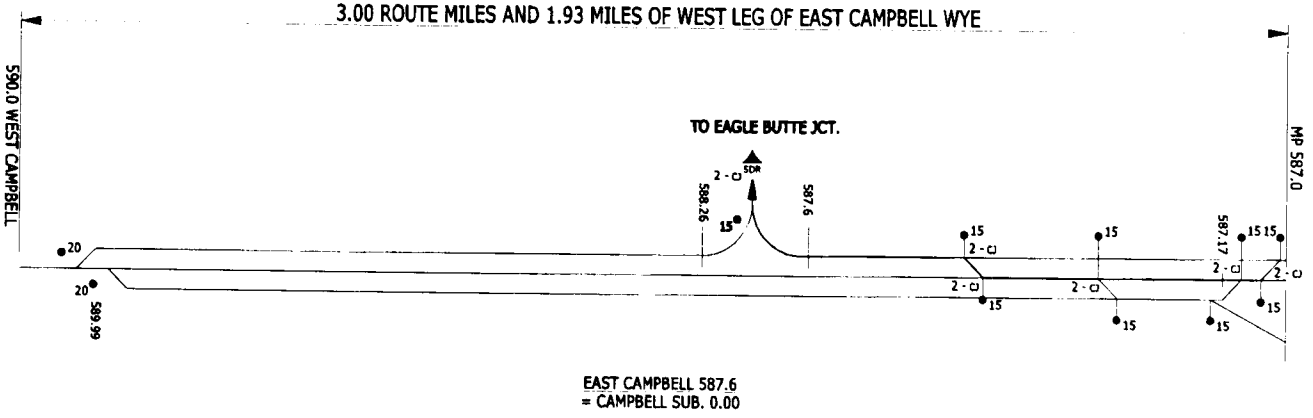

BNSF REPLY

DISTRICT:

BLACK HILLS

FROM: DONKEY CREEK JCT. MP: 587.0

TO: WEST CAMPBELL MP: 590.0

N

NOT TO SCALE

LEGEND:

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132# RAIL

132# RELAY RAIL

DED - DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI - AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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*OTHER TRACK MATERIAL

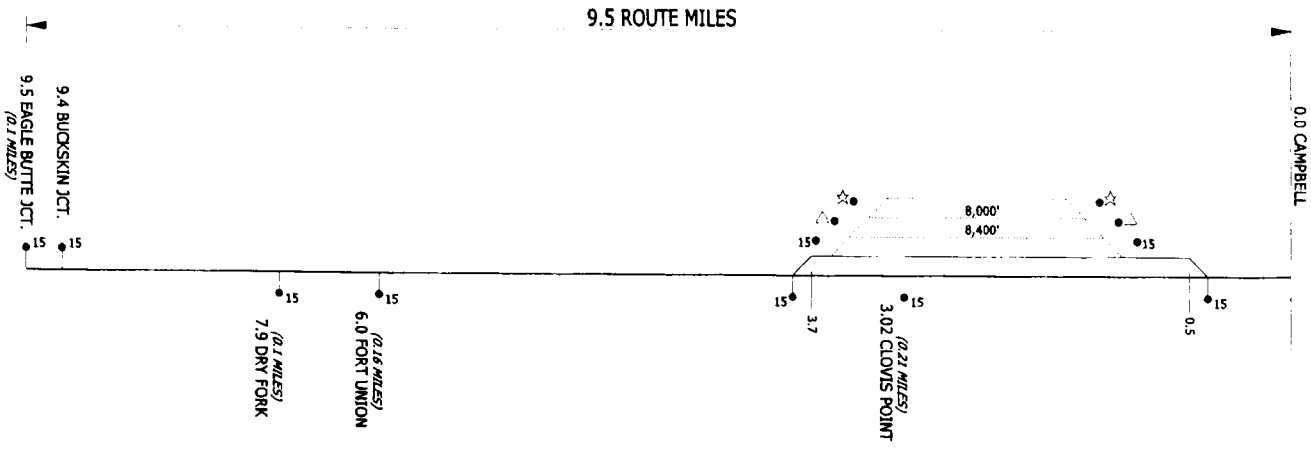
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

C - COMPROMISE JOINT

EXHIBIT III.B-1
Page 5



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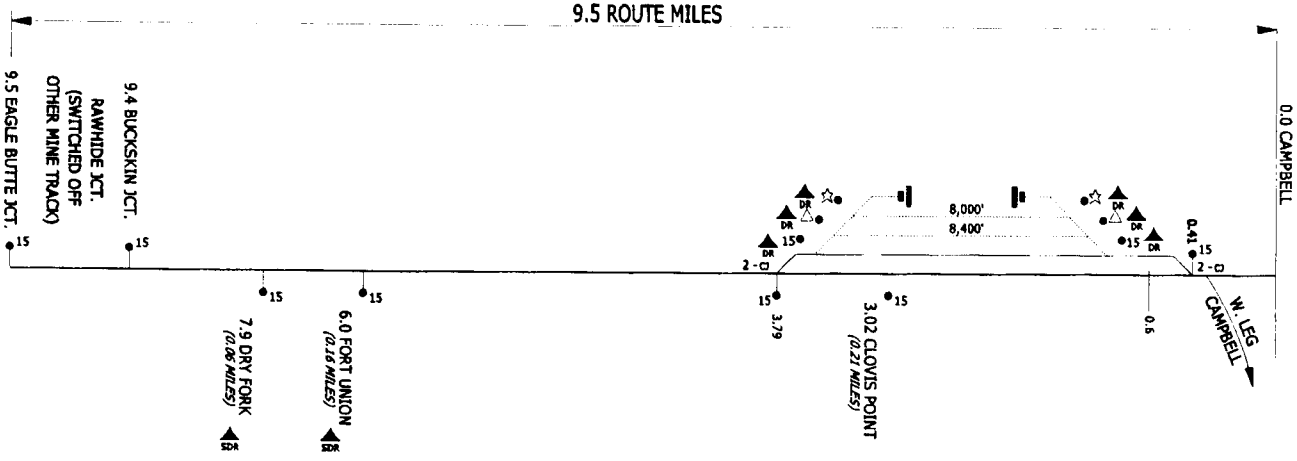


BNSF REPLY

DISTRICT:

CAMPBELL

← N

FROM: EAGLE BUTTE JCT. MP: 9.5

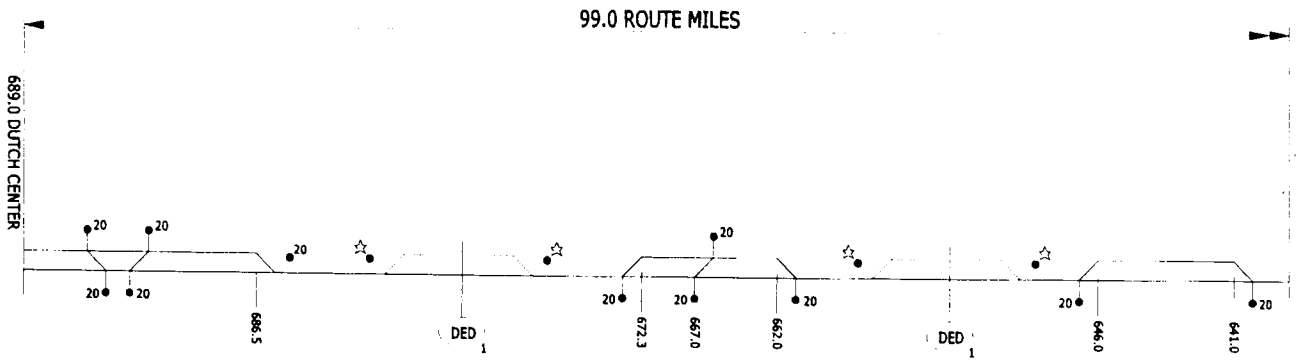
TO: CAMPBELL MP: 0.0

NOT TO SCALE

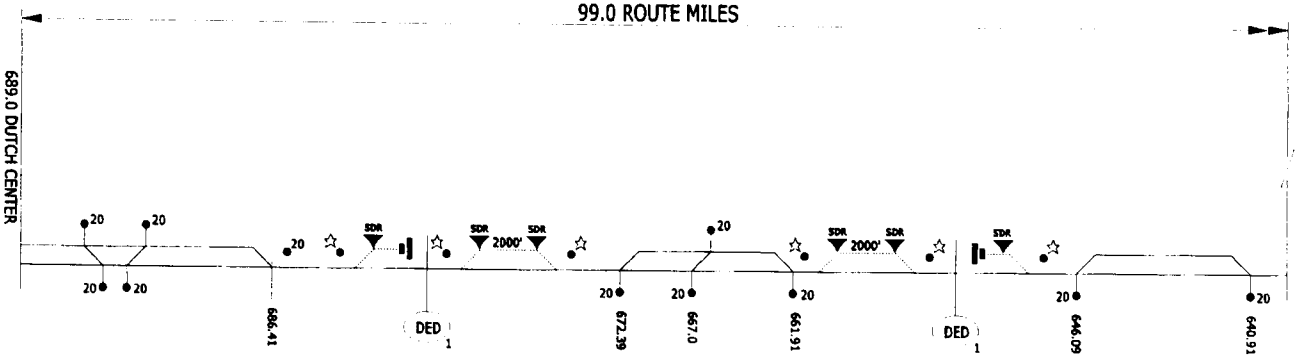
LEGEND:

136# RAIL
132# RAIL
132# RELAY RAIL
(0.1 MILES) = RR-OWNED MINE TRACK
DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED
AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE
TURNOUT
*TURNOUT TYPES
20 - #20 ELECTRIC
15 - #15 ELECTRIC
△ - #15 HAND-THROWN
☆ - #11 HAND-THROWN
*OTHER TRACK MATERIAL
SDR - SWITCH POINT DERAIL
DR - HINGED DERAIL
- WHEEL STOP
- COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

BLACK HILLS/BIG HORN

FROM: WEST CAMPBELL MP: 590.0

TO: DUTCH CENTER MP: 689.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

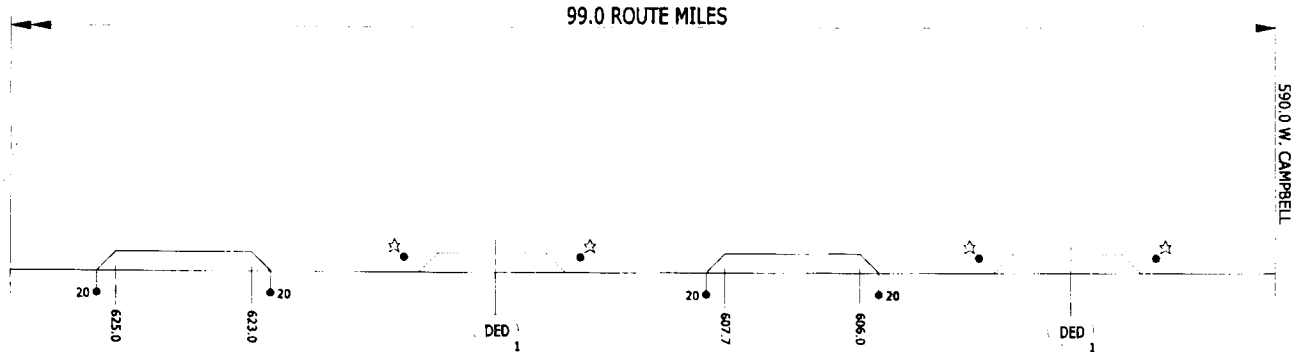
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



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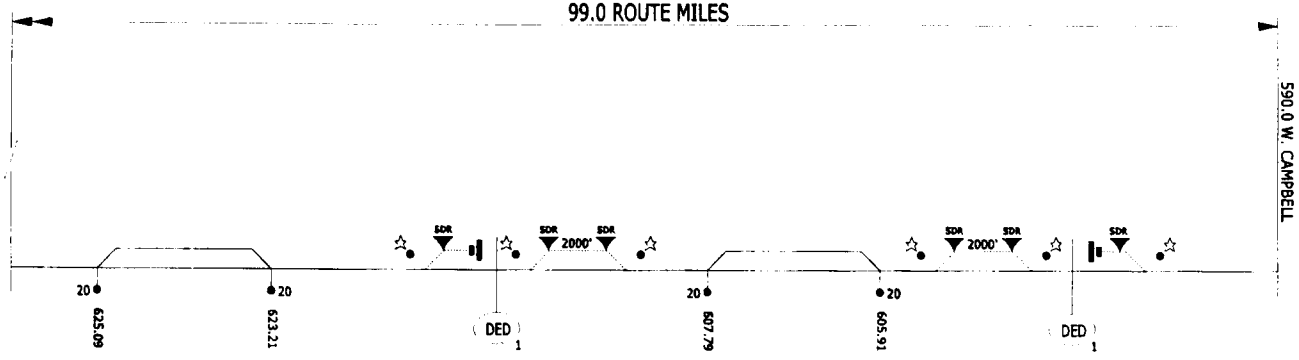


BNSF REPLY

DISTRICT:

BLACK HILLS/BIG HORN

FROM: WEST CAMPBELL MP: 590.0

TO: DUTCH CENTER MP: 689.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

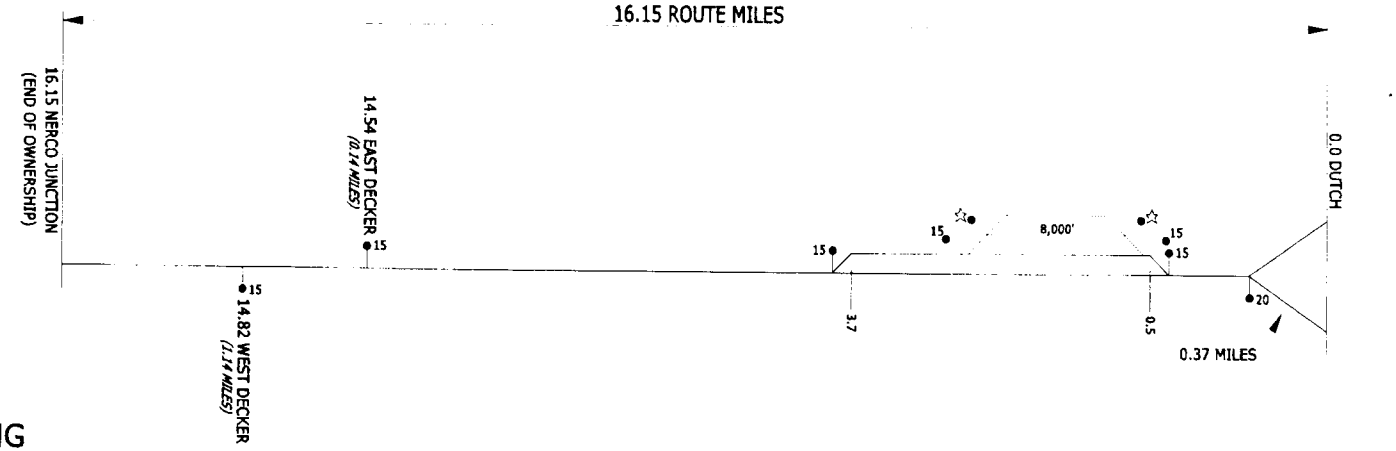
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

C - COMPROMISE JOINT



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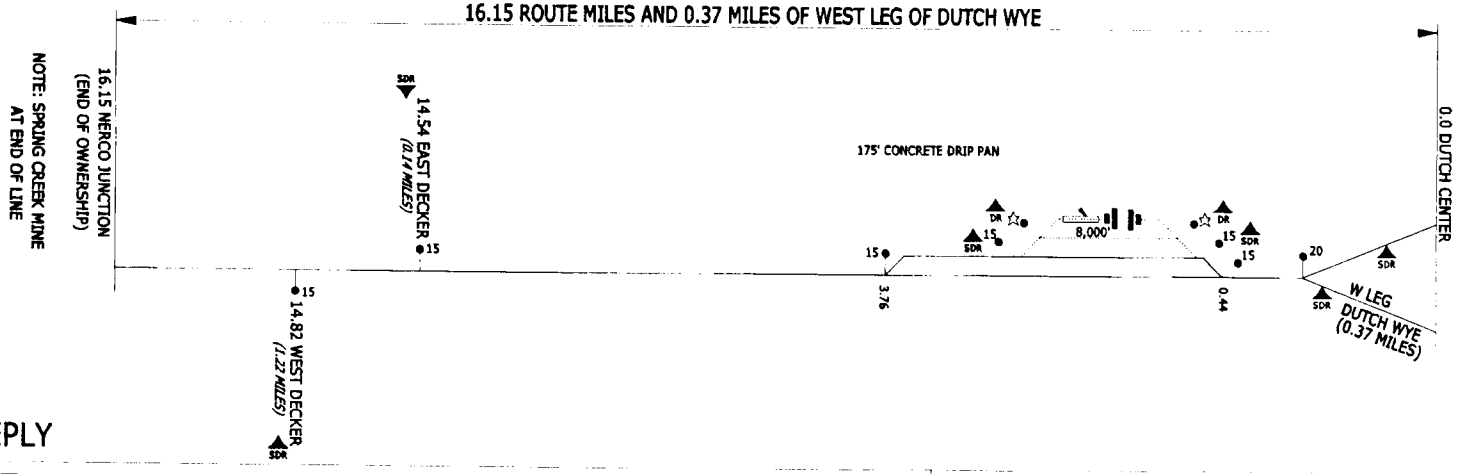


BNSF REPLY

DISTRICT:

DUTCH

FROM: DUTCH CENTER

TO: NERCO JCT.

N

MP: 0

MP: 16.15

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

(0.1 MILES) = RR-OWNED MINE TRACK

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

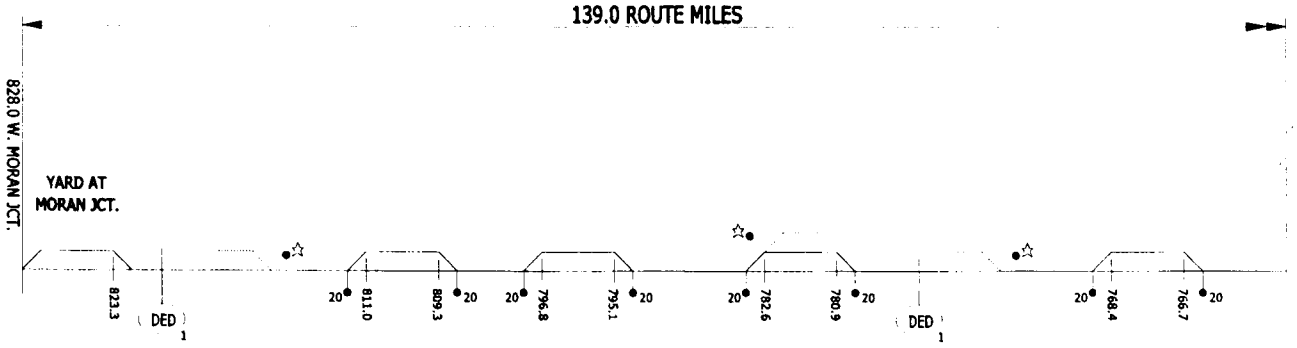
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
Page 8



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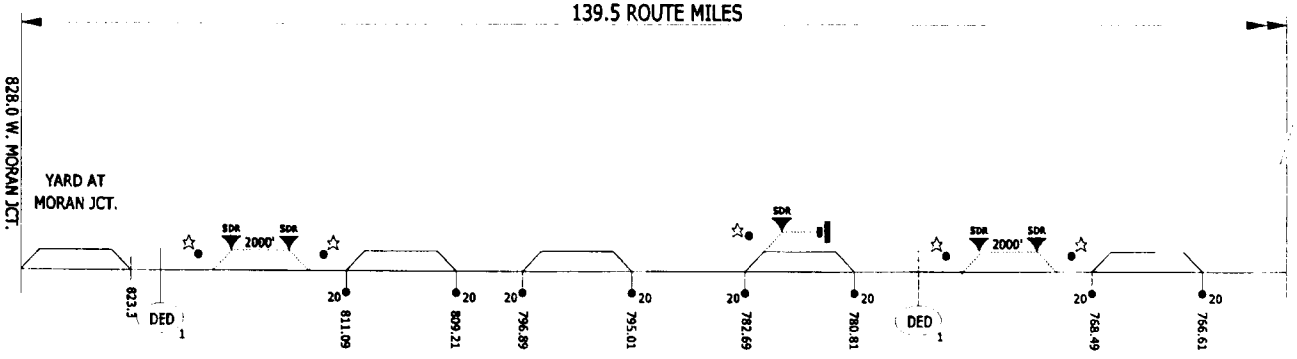


BNSF REPLY

DISTRICT:

BIG HORN

FROM: DUTCH CENTER MP: 689.0

TO: W. MORAN JCT. MP: 828.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

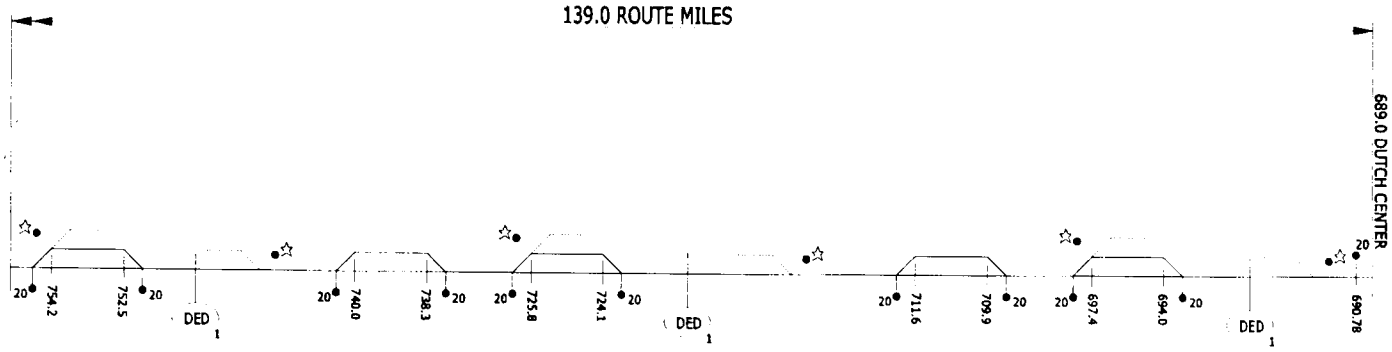
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

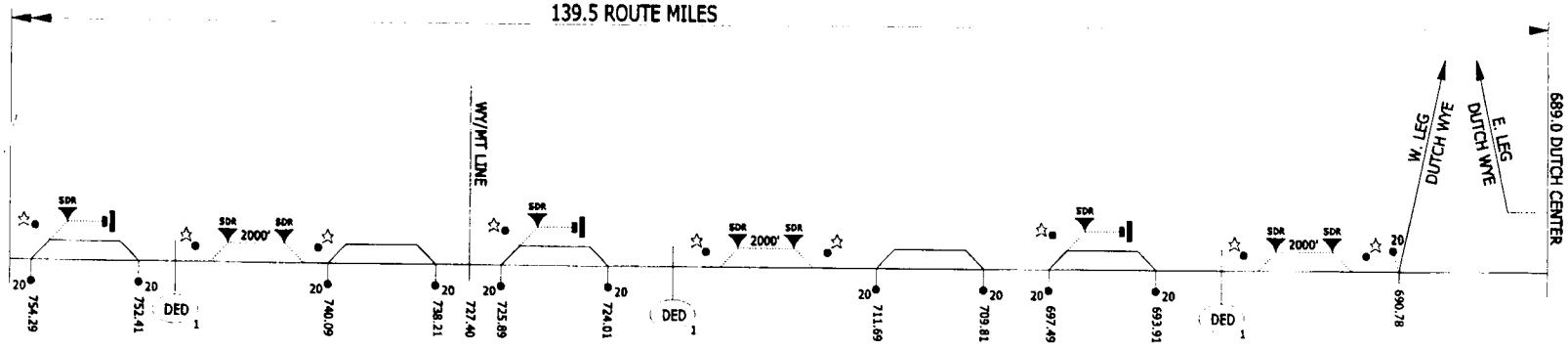
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

BIG HORN

FROM: DUTCH CENTER MP: 689.0

TO: W. MORAN JCT. MP: 828.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

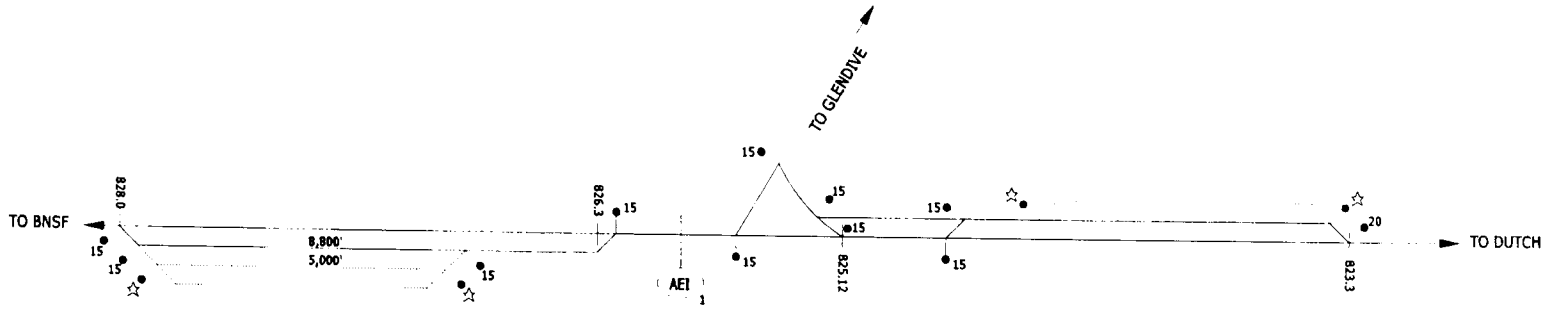
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

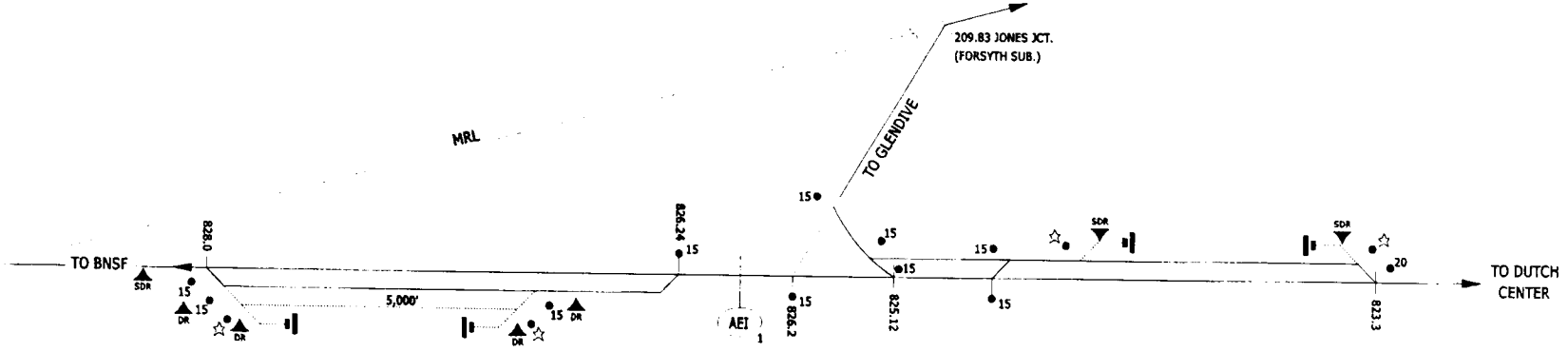
- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING

MORAN JCT. YARD



BNSF REPLY

MORAN JCT. YARD

DISTRICT:

BIG HORN

MORGAN JCT. YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

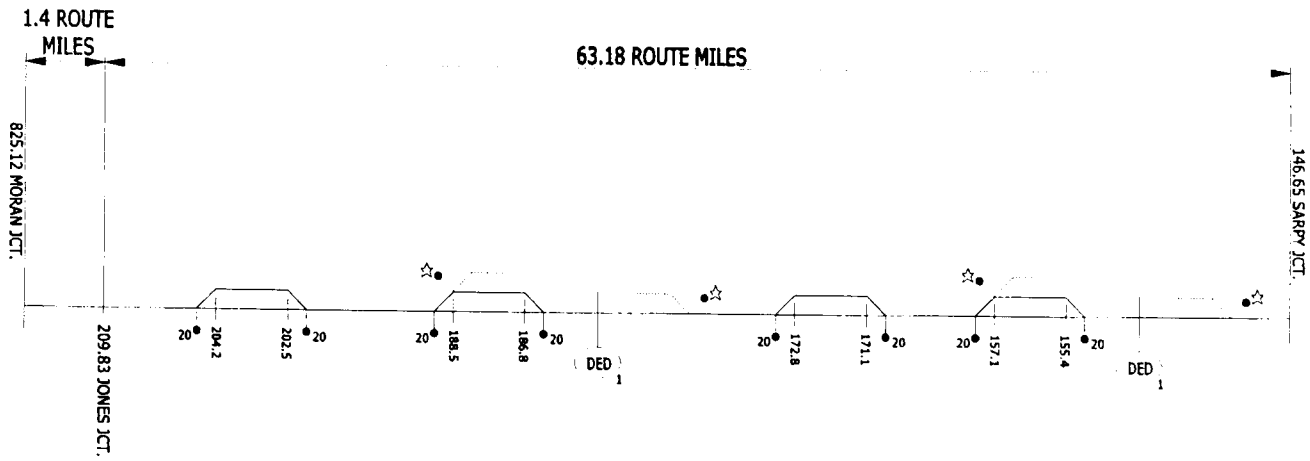
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
Page 10



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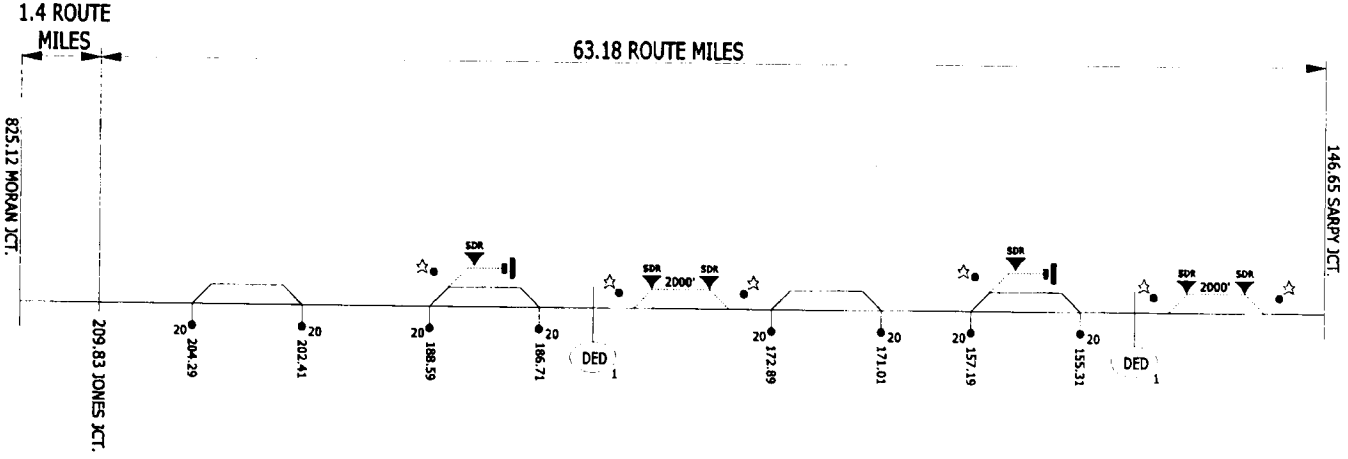


BNSF REPLY

DISTRICT:

FORSYTH

FROM: MORAN JCT. MP: 825.12

TO: SARPY JCT. MP: 146.65

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
Page 11

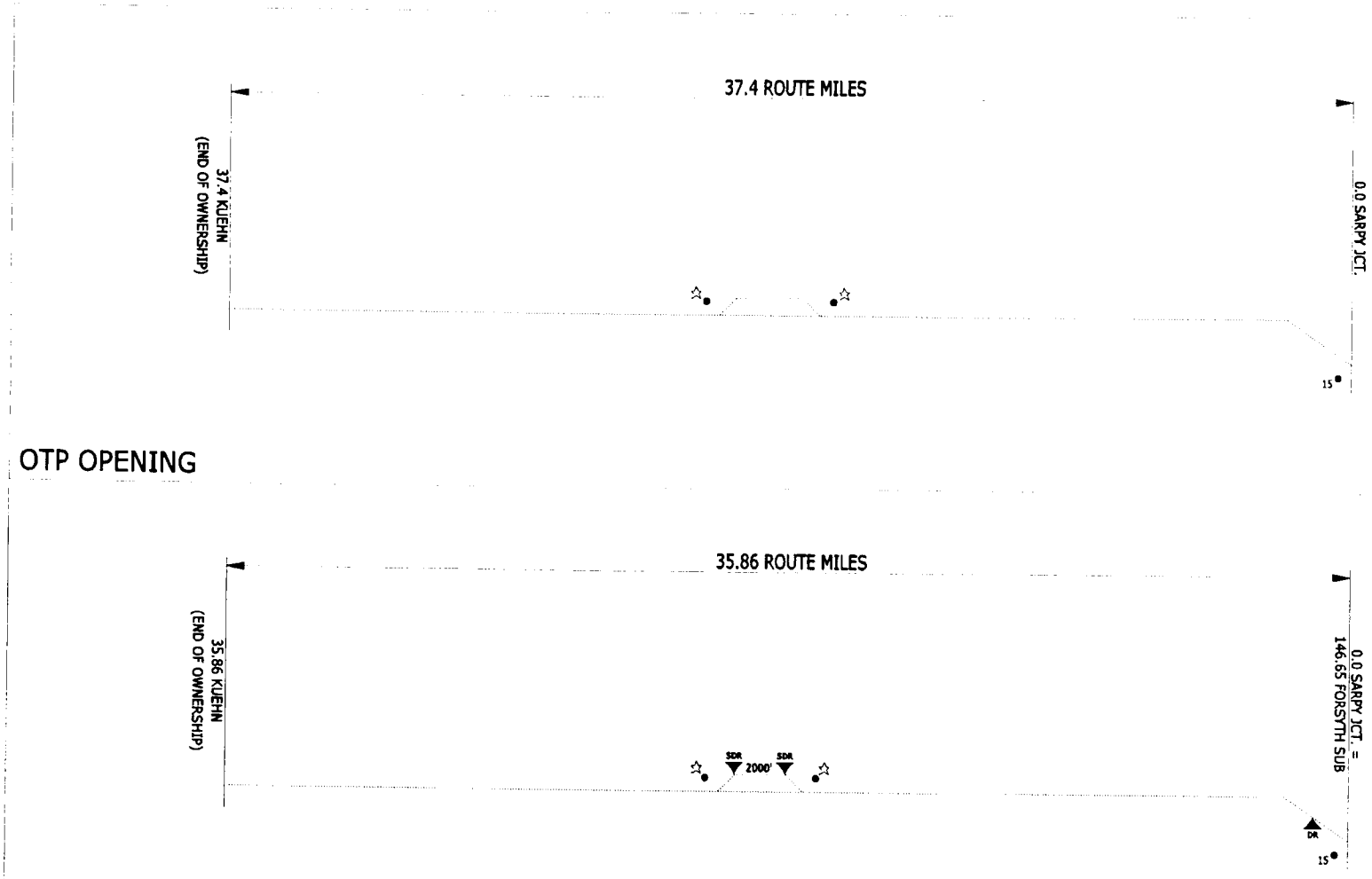
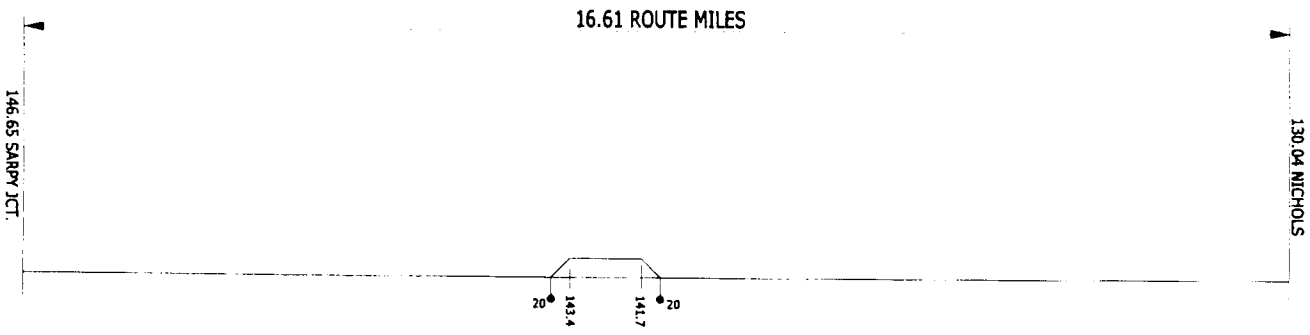


EXHIBIT III.B-1
Page 12



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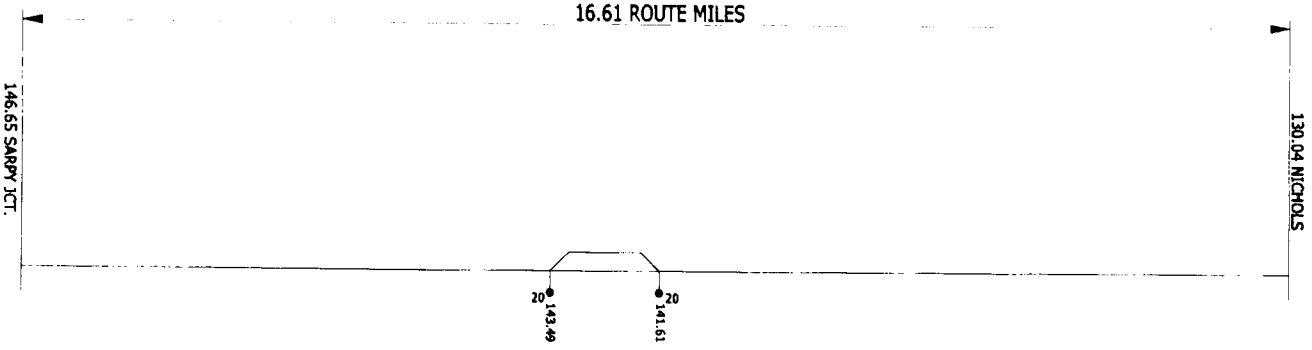


BNSF REPLY

DISTRICT:

FORSYTH

FROM: SARPY JCT. MP: 146.55

TO: NICHOLS MP: 130.04

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

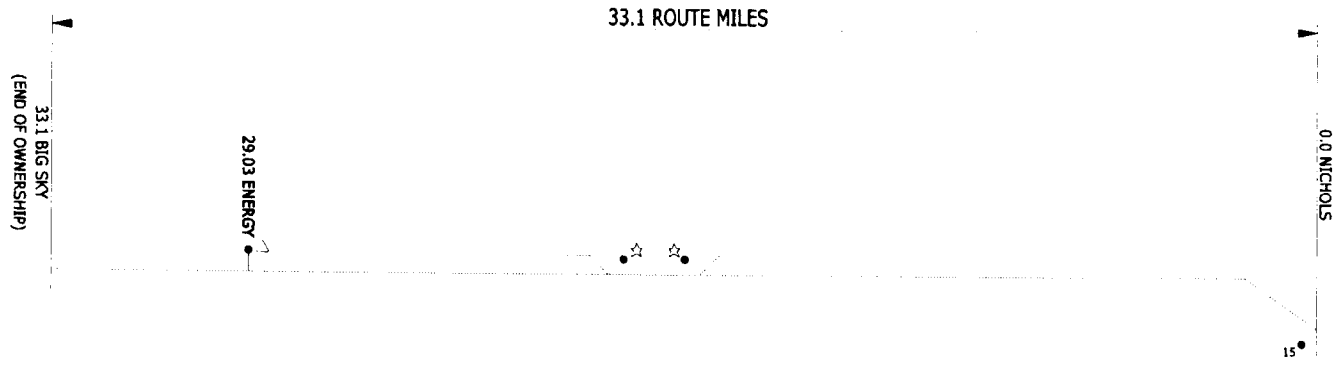
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

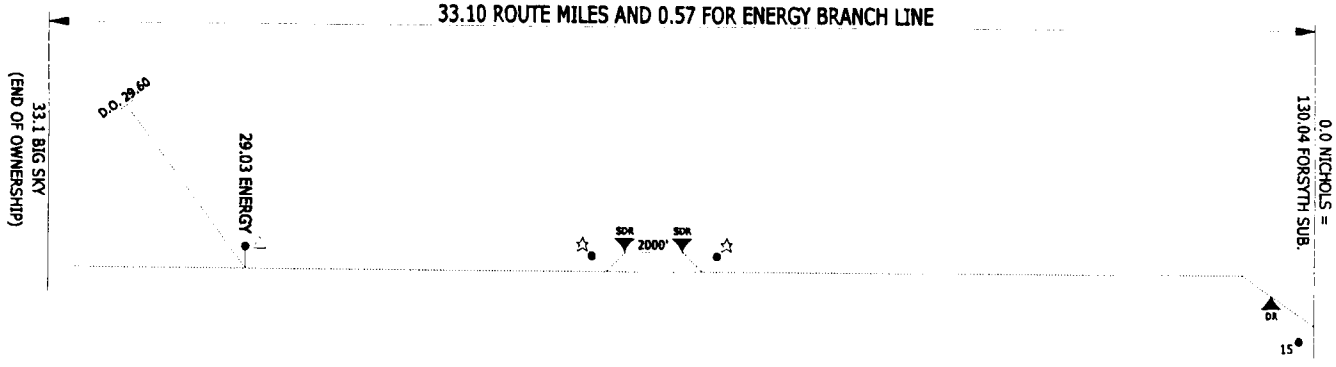
- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
Page 13



OTP OPENING



BNSF REPLY

DISTRICT:

SARPY

FROM: NICHOLS MP: 0.0

TO: BIG SKY (End of Ownership) MP: 33.1

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

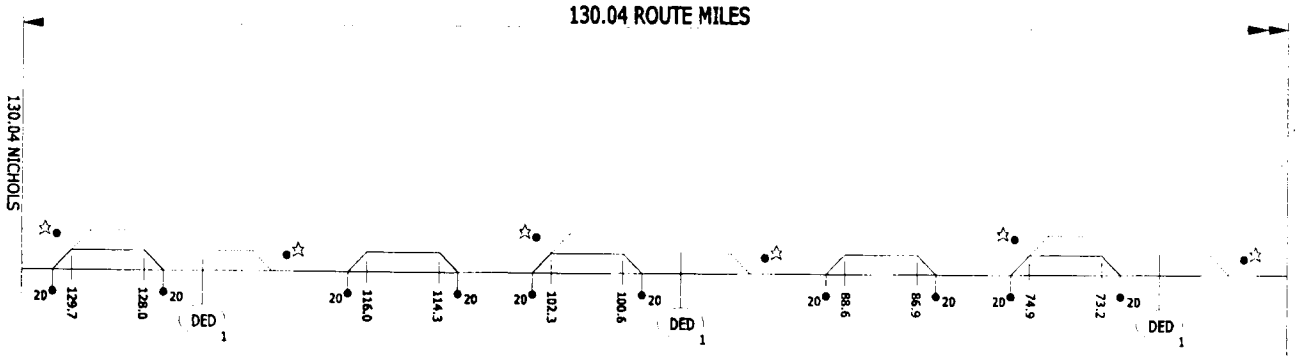
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

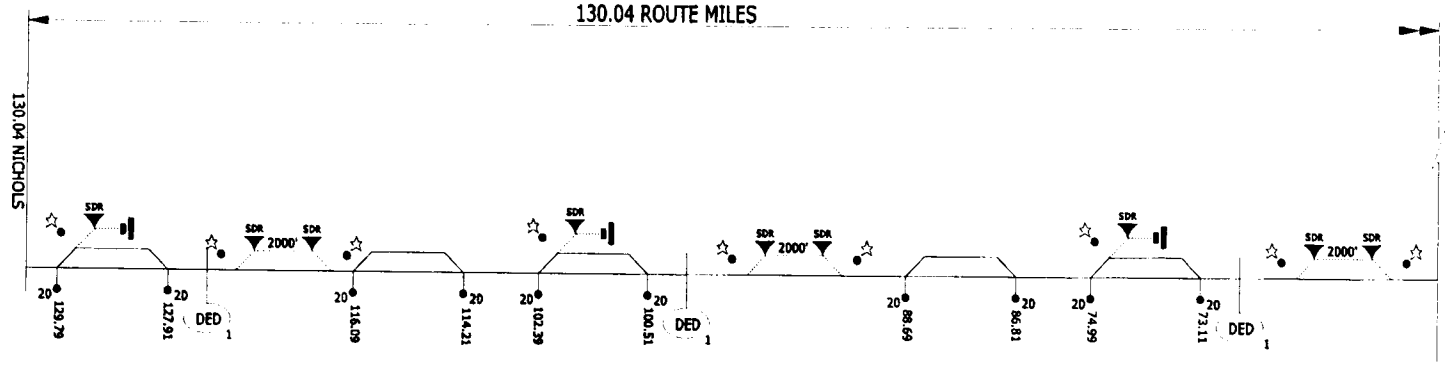
- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
Page 14



OTP OPENING



BNSF REPLY

DISTRICT:

FORSYTH

FROM: NICHOLS

TO: GLENDIVE

MP: 130.04

MP: 0.00

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED (1) DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI (1) AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

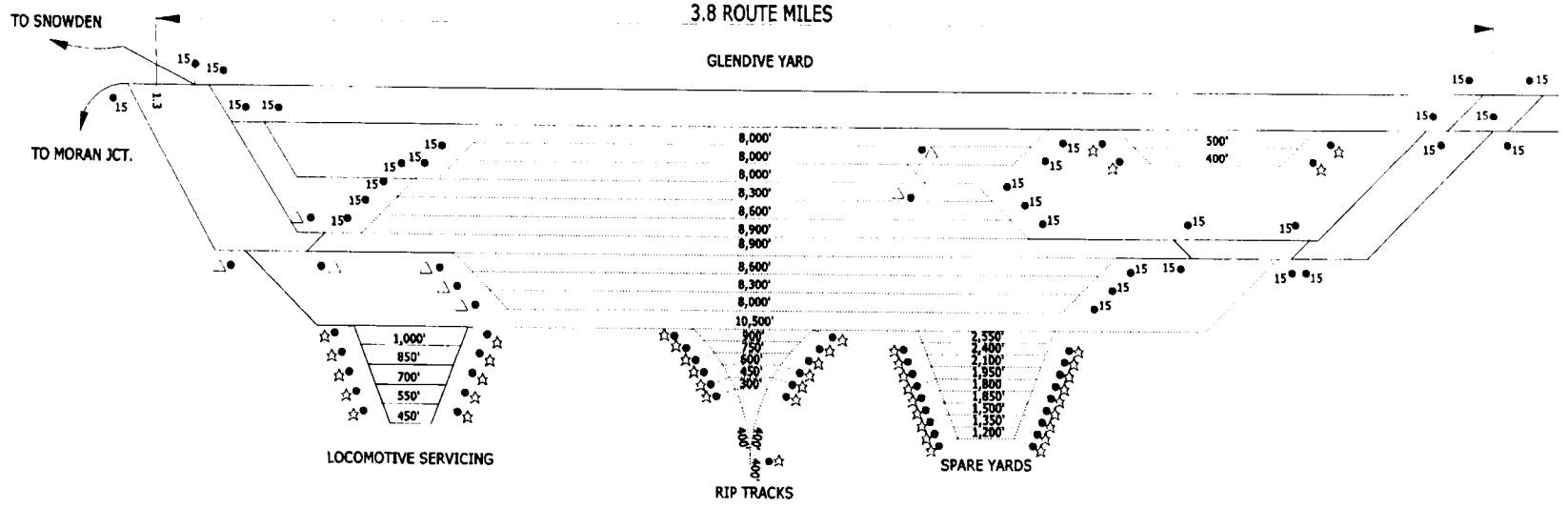
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING
DISTRICT:

GLENDIVE YARD

N

NOT TO SCALE

LEGEND:

136# RAIL
132# RAIL
132# RELAY RAIL

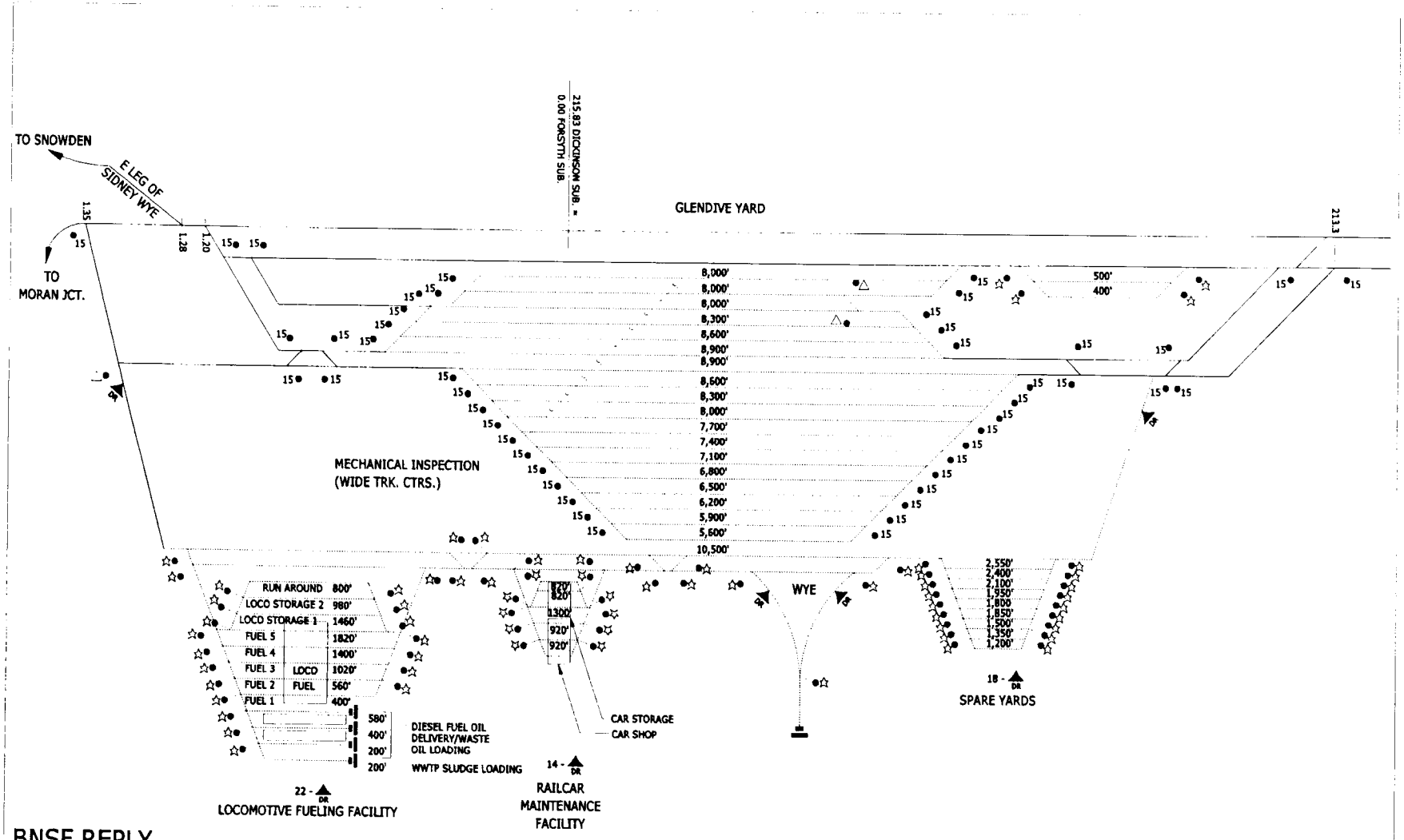
DED — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES
20 - #20 ELECTRIC
15 - #15 ELECTRIC
△ - #15 HAND-THROWN
☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL
SDR - SWITCH POINT DERAIL
DR - HINGED DERAIL
WHEEL STOP
COMPROMISE JOINT



BNSF REPLY

DISTRICT:

GLENDIVE YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

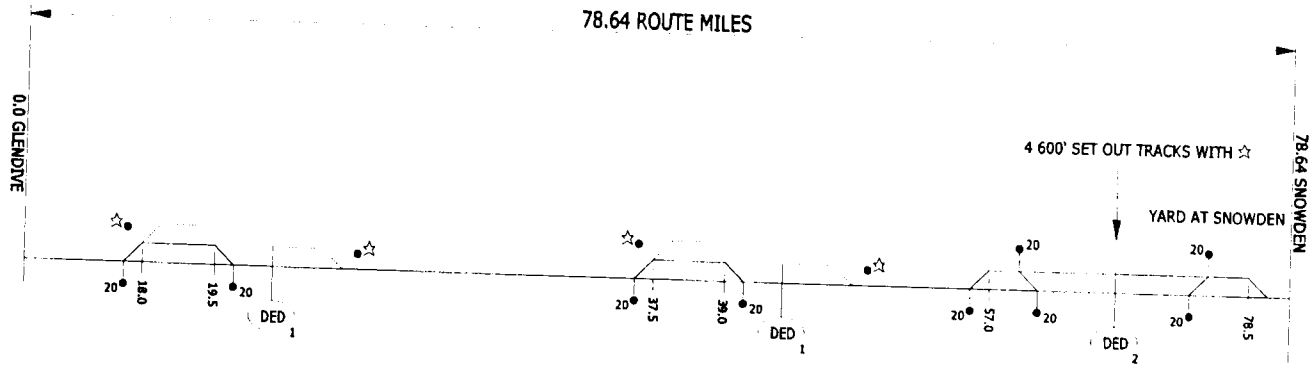
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

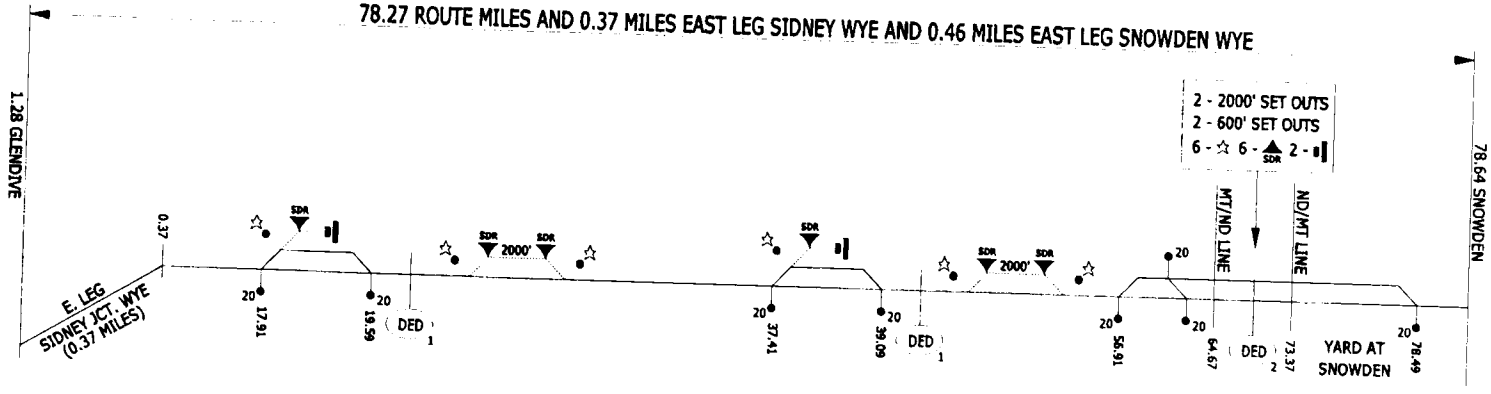
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

SIDNEY

FROM: GLENDIVE

TO: SNOWDEN

MP: 1.28

MP: 78.64

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

▲ SDR - SWITCH POINT DERAIL

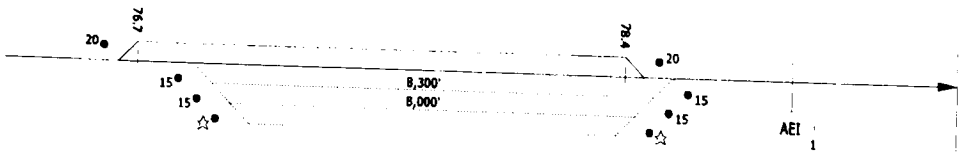
▲ DR - HINGED DERAIL

▮ - WHEEL STOP

◘ - COMPROMISE JOINT

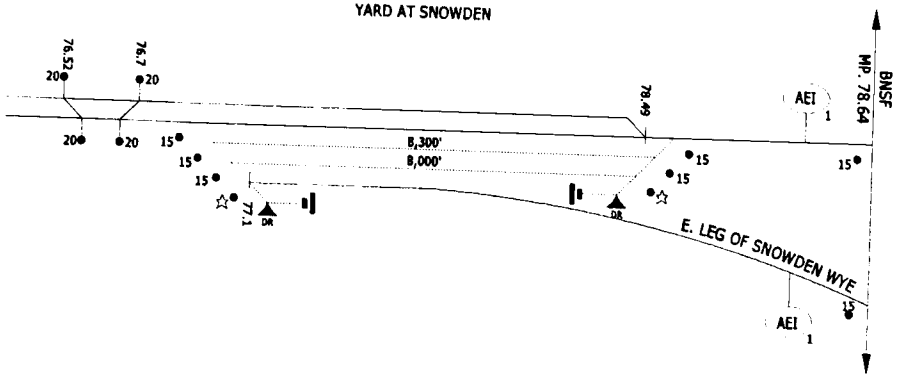
EXHIBIT III.B-1
Page 17

YARD AT SNOWDEN



OTP OPENING

YARD AT SNOWDEN



BNSF REPLY

DISTRICT:

SIDNEY

SNOWDEN YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
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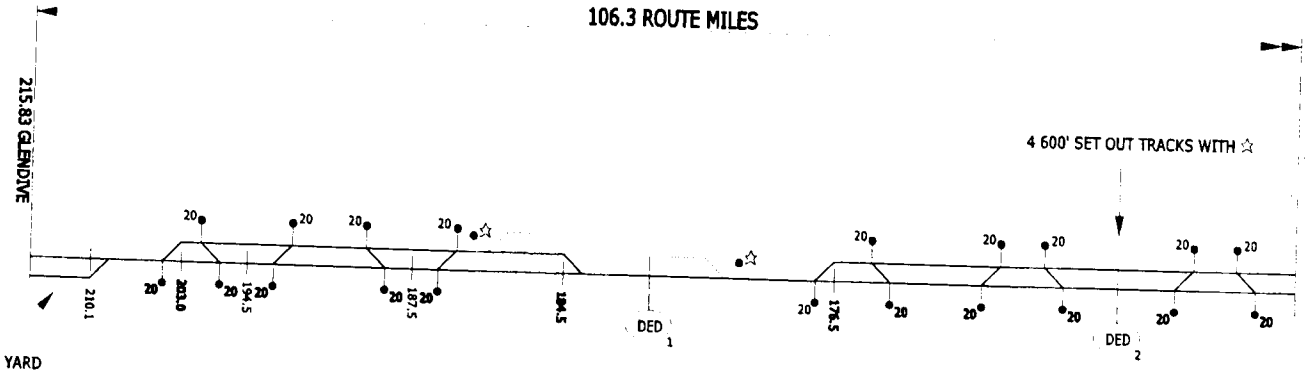
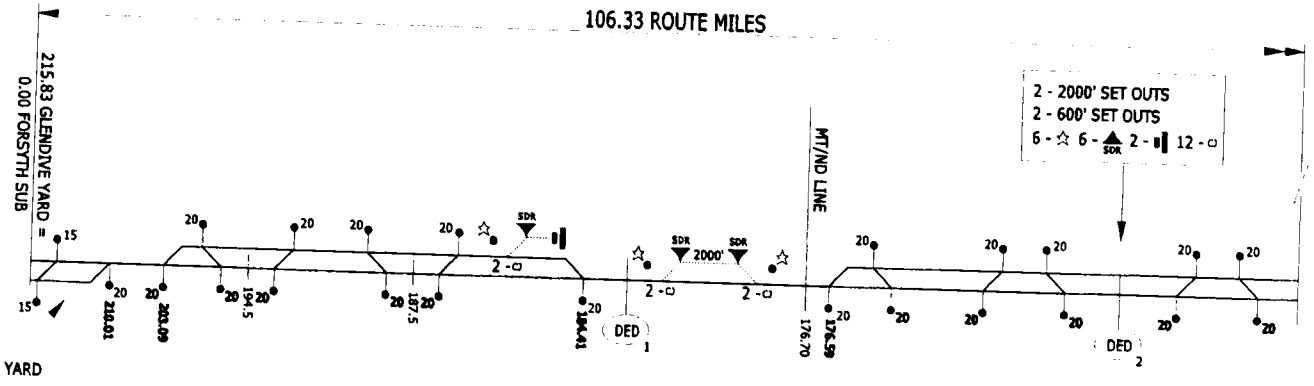
106.3 ROUTE MILES



OTP OPENING

106.33 ROUTE MILES



BNSF REPLY

DISTRICT:

DICKINSON

FROM: GLENDIVE MP: 215.83

TO: DICKINSON MP: 109.50

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

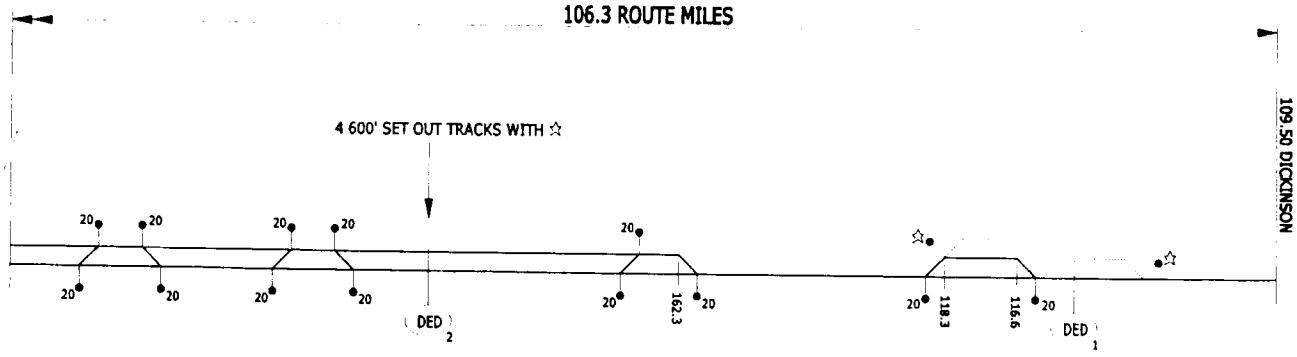
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

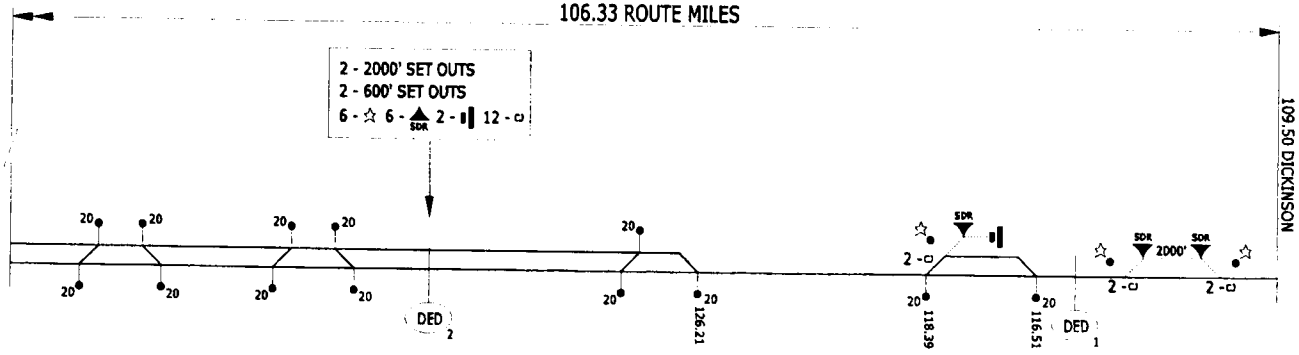
DR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

DICKINSON

FROM: GLENDIVE MP: 215.83

TO: DICKINSON MP: 109.50

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

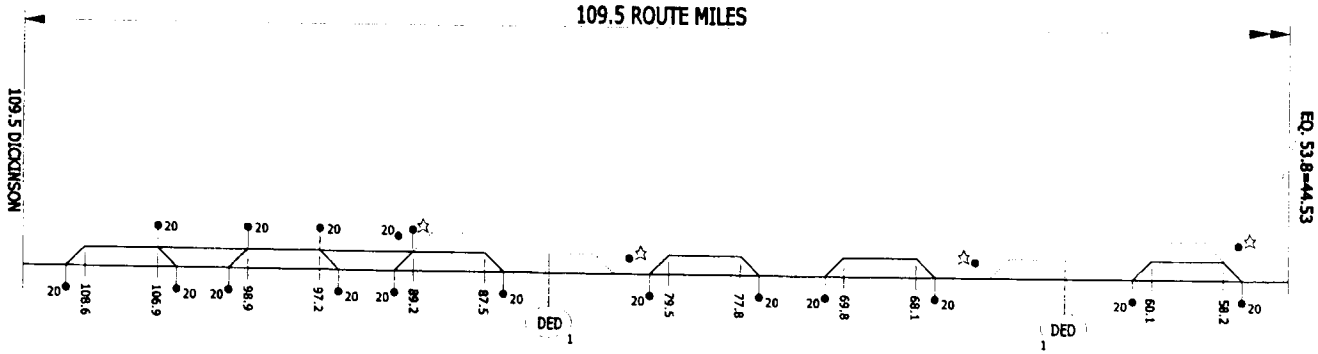
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

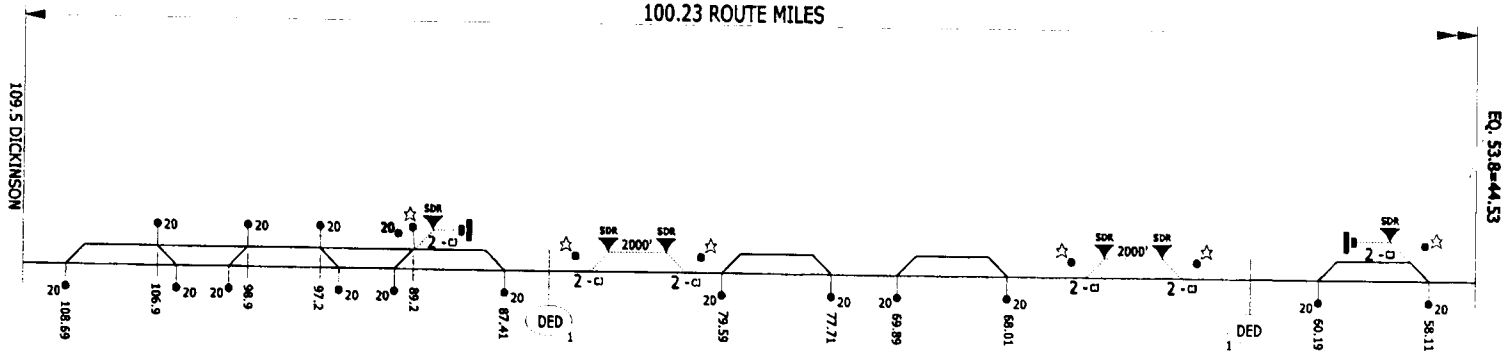
- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING

NOTE: OTP ERRATA EXHIBIT III-B-1 PAGE 20
OMITTED DOUBLE TRACK BETWEEN
106.9-98.9 AND 97.2-89.2.



BNSF REPLY

DISTRICT:

DICKINSON

FROM: DICKINSON MP: 109.5

TO: MANDAN MP: 0.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED (1) DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI (1) AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

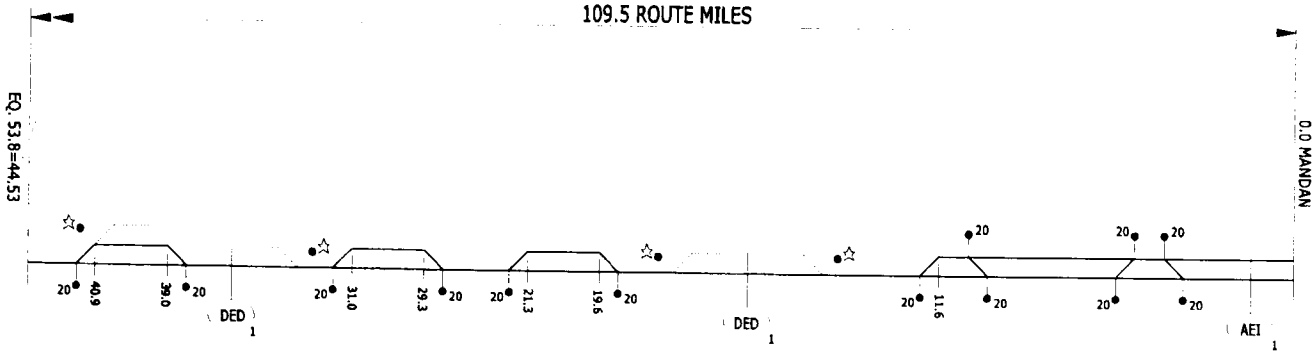
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT



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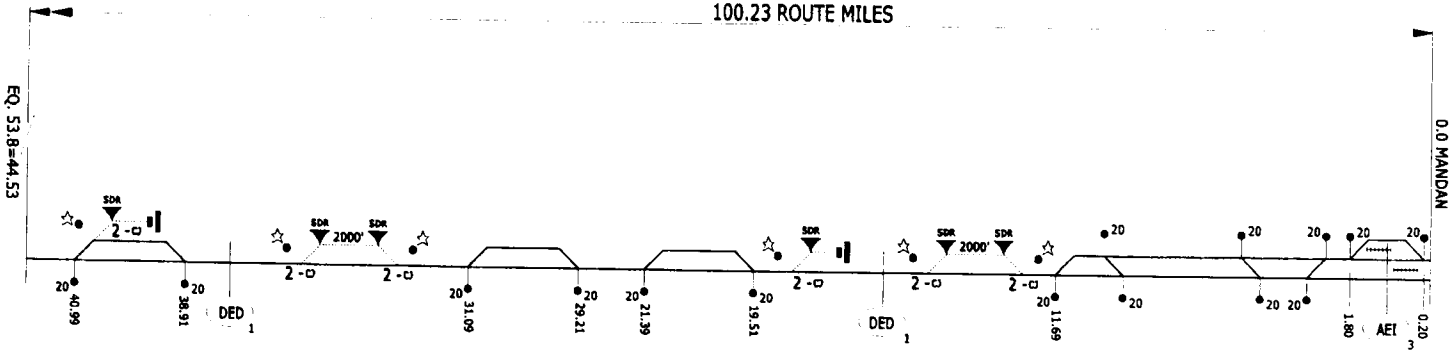


BNSF REPLY

DISTRICT:

DICKINSON

FROM: DICKINSON

TO: MANDAN

MP: 109.5

MP: 0.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

FUEL RACKS

DED — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

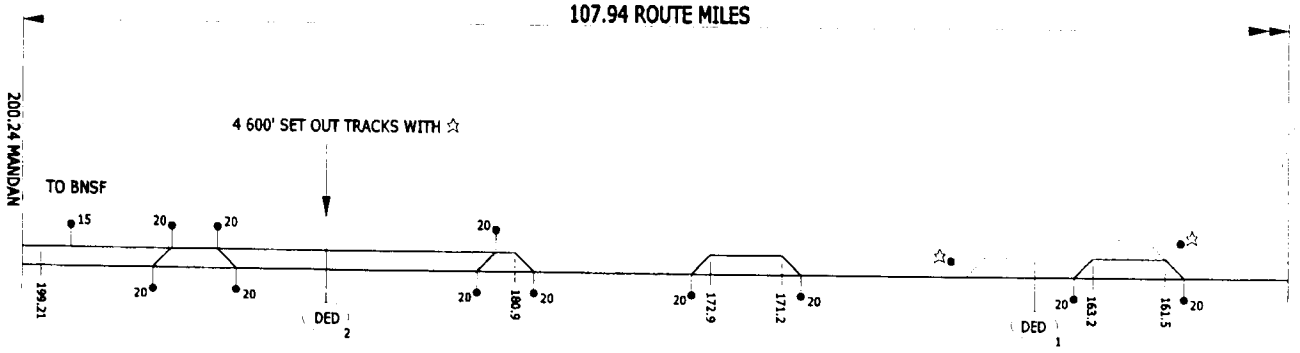
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

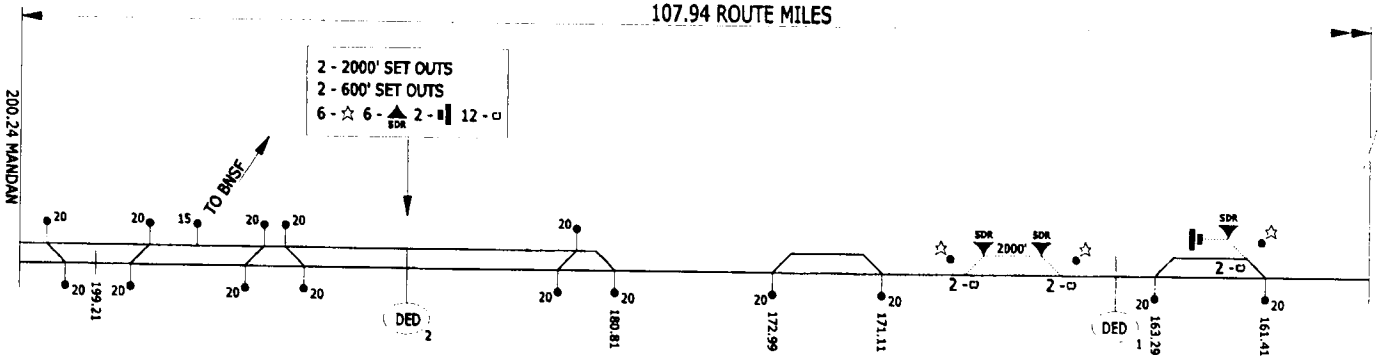
DR - HINGED DERAIL

WHEEL STOP

COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

JAMESTOWN

FROM: MANDAN MP: 200.24

TO: JAMESTOWN MP: 92.30

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED (1, 2) DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI (1) AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

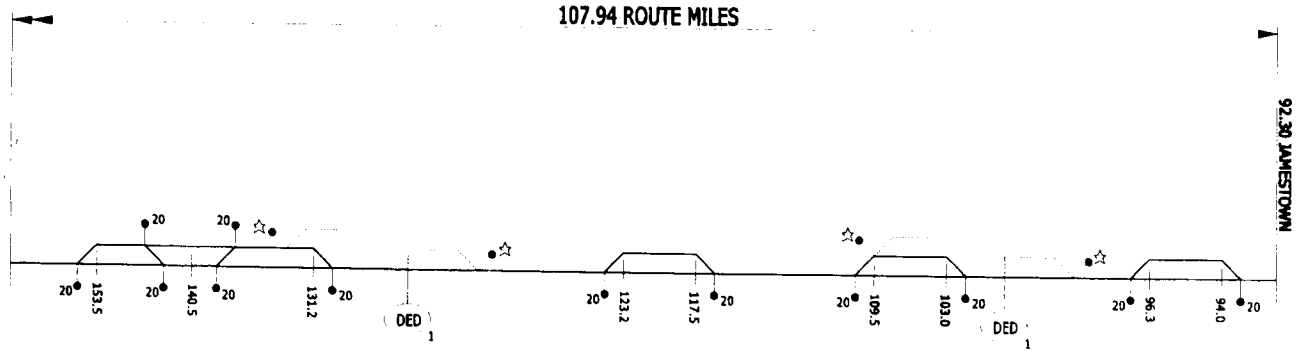
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

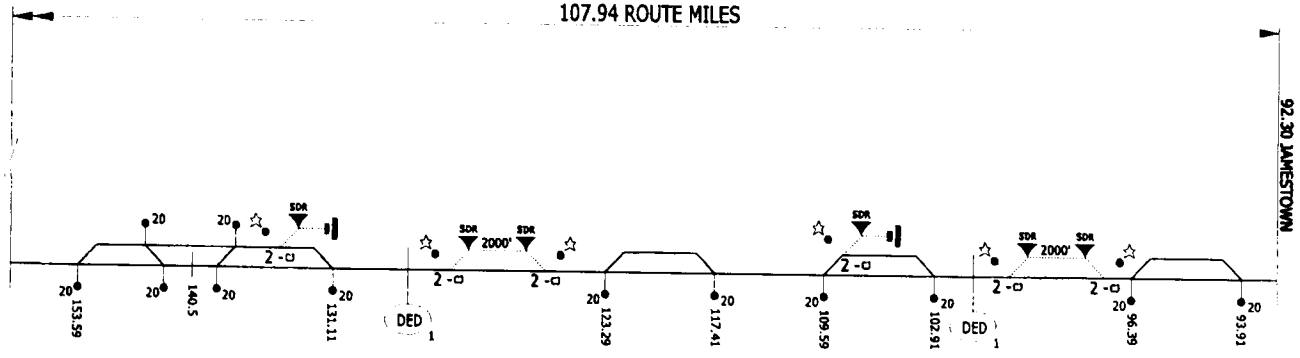
DR - HINGED DERAIL

▮ - WHEEL STOP

▫ - COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

JAMESTOWN

FROM: MANDAN

TO: JAMESTOWN

MP: 200.24

MP: 92.30

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

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☆ - #11 HAND-THROWN

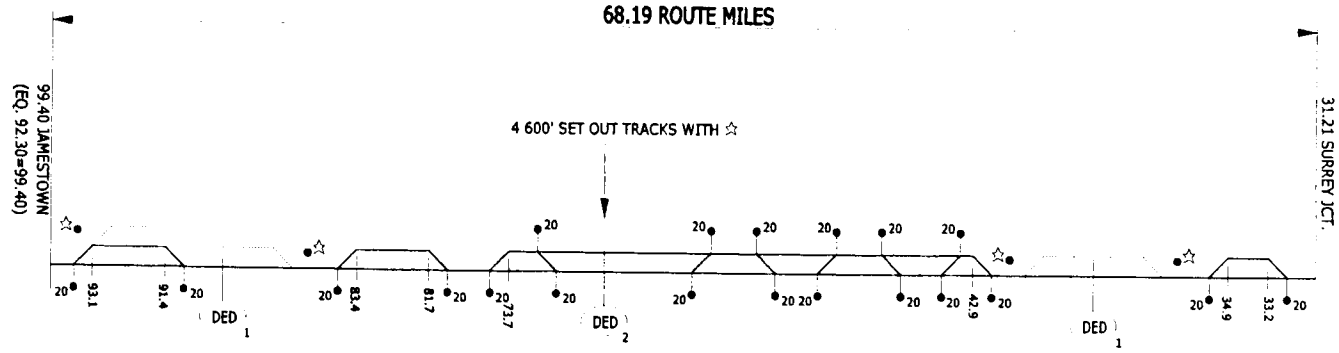
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

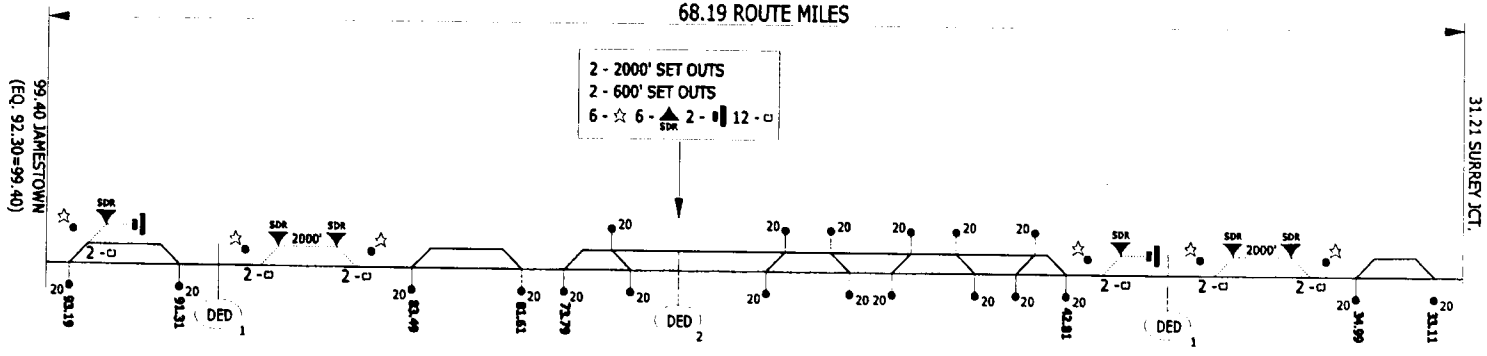
SDR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

JAMESTOWN

FROM: JAMESTOWN MP: 99.40

TO: SURREY JCT. MP: 31.21

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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*OTHER TRACK MATERIAL

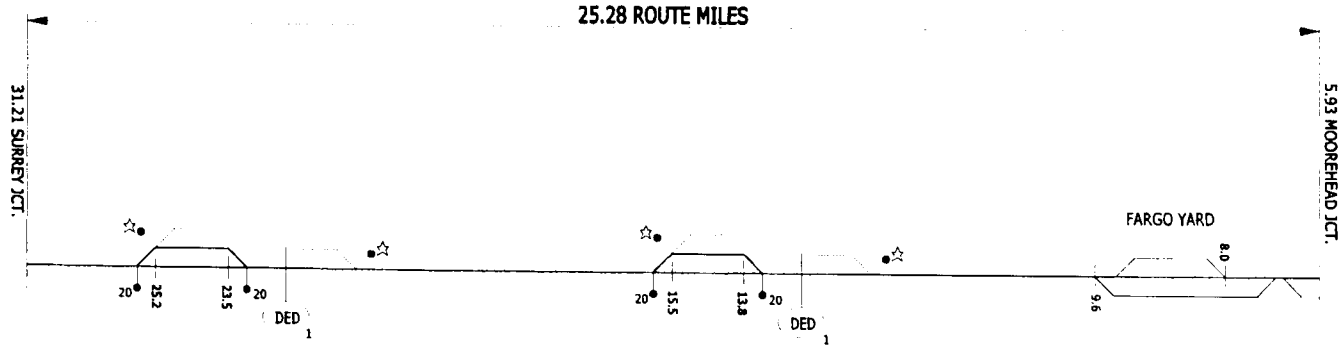
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT

EXHIBIT III.B-1
Page 22



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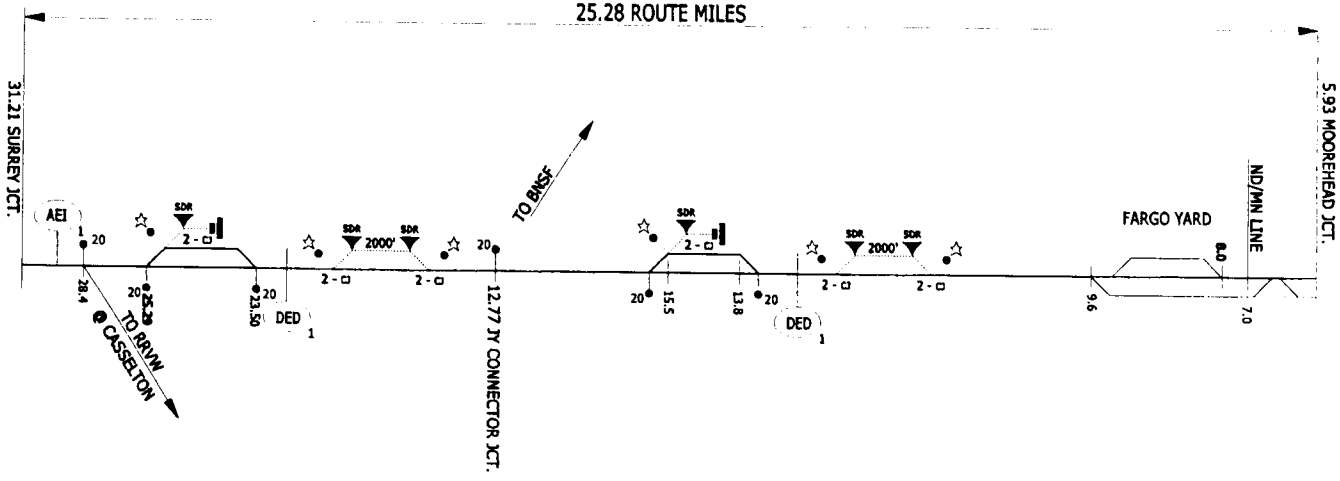

BNSF REPLY

DISTRICT:

KO

FROM: SURREY JCT. MP: 31.21

TO: MOORHEAD JCT. MP: 5.93

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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*TURNOUT TYPES

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15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

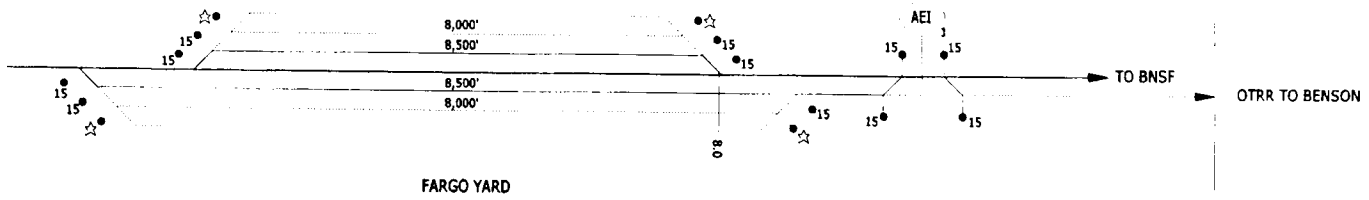
*OTHER TRACK MATERIAL

SDR ▲ - SWITCH POINT DERAIL

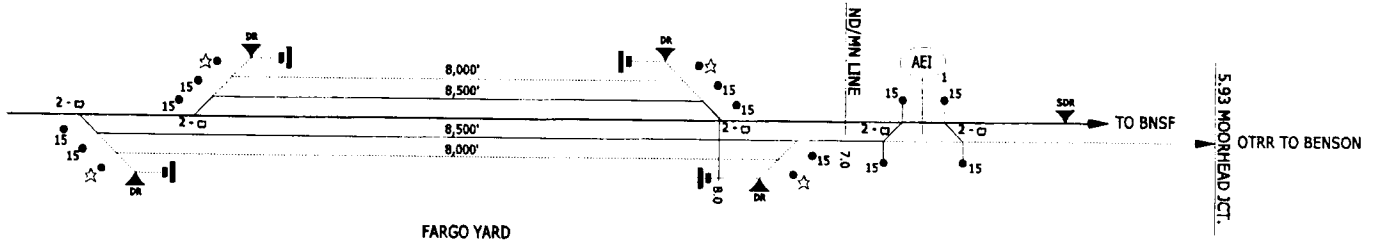
DR ▲ - HINGED DERAIL

▮ - WHEEL STOP

□ - COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

KO

FARGO YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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20 - #20 ELECTRIC

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△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

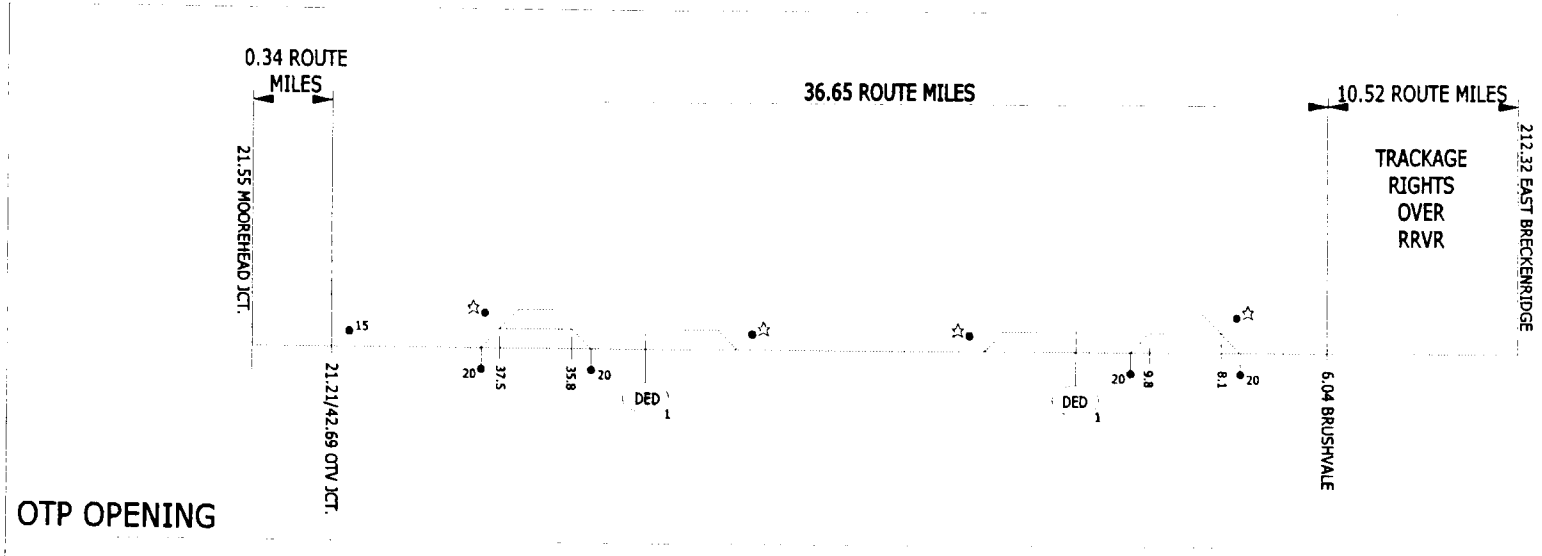
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

D - COMPROMISE JOINT

EXHIBIT III.B-1
Page 24



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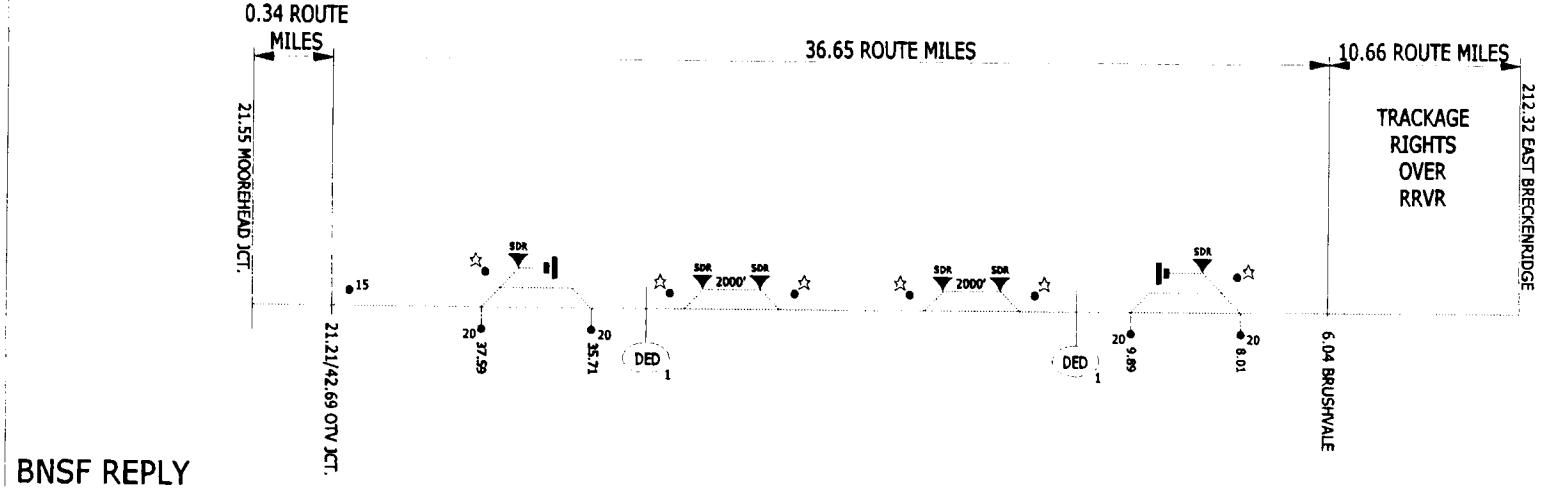

BNSF REPLY

DISTRICT:

PROSPER/MOORHEAD

← N

FROM: MOORHEAD JCT. MP: 21.55

TO: EAST BRECKENRIDGE MP: 212.32

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

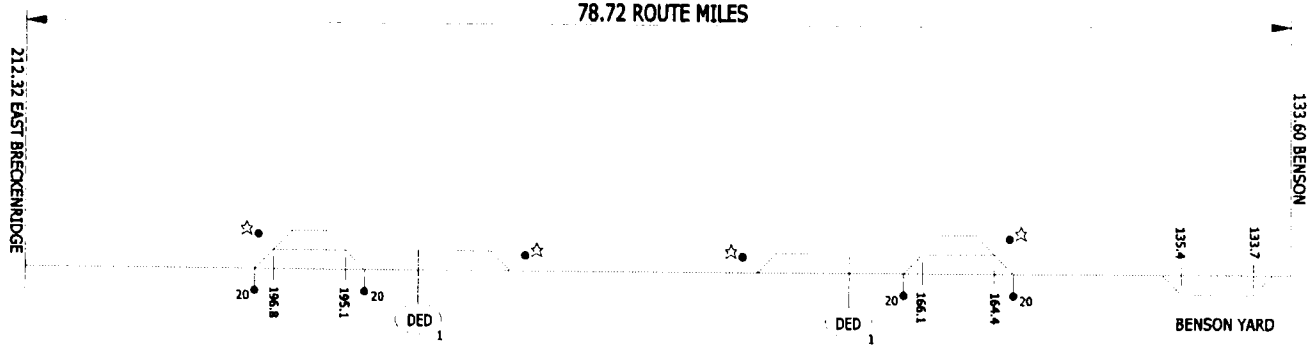
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

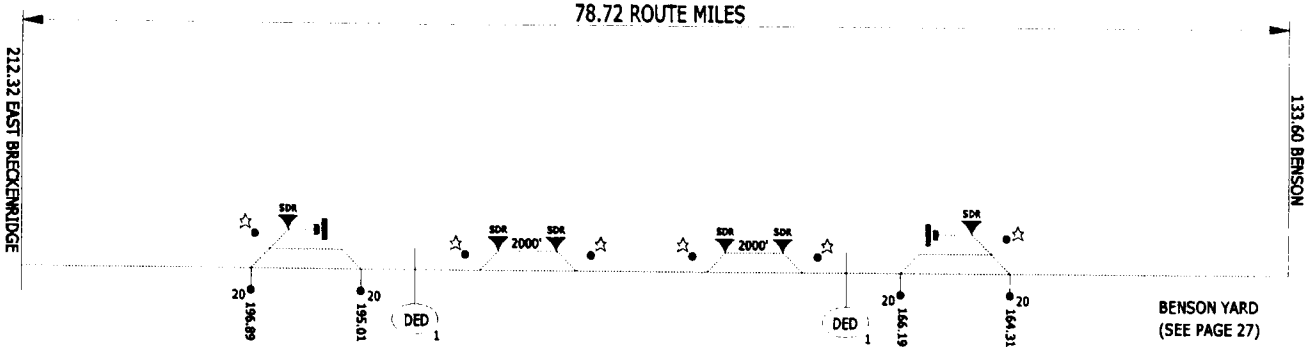
▮ - WHEEL STOP

□ - COMPROMISE JOINT

EXHIBIT III.B-1
Page 25



OTP OPENING



BNSF REPLY

DISTRICT:

MORRIS

FROM: EAST BRECKENRIDGE MP: 212.32

TO: BENSON (APPLETON JCT.) MP: 133.60

← N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

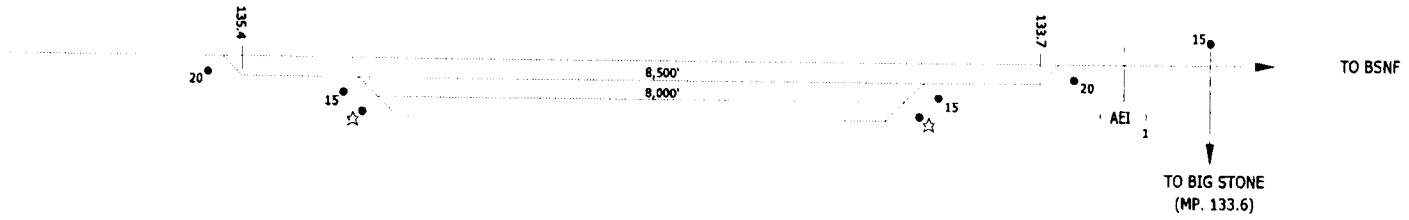
DR - HINGED DERAIL

▮ - WHEEL STOP

□ - COMPROMISE JOINT

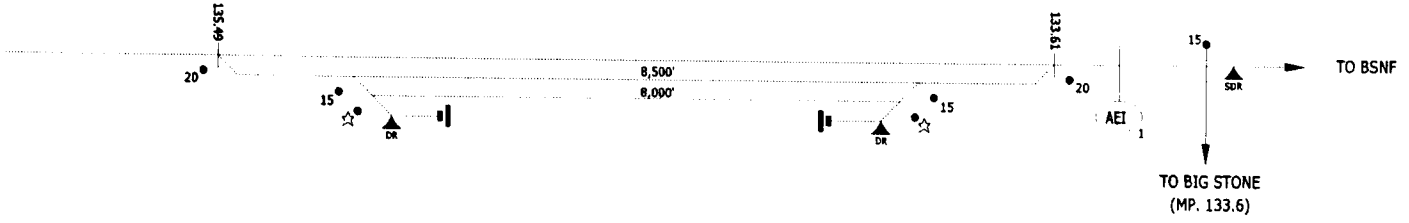
EXHIBIT III.B-1
Page 26

BENSON YARD



OTP OPENING

BENSON YARD



BNSF REPLY

DISTRICT:

MORRIS

BENSON YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

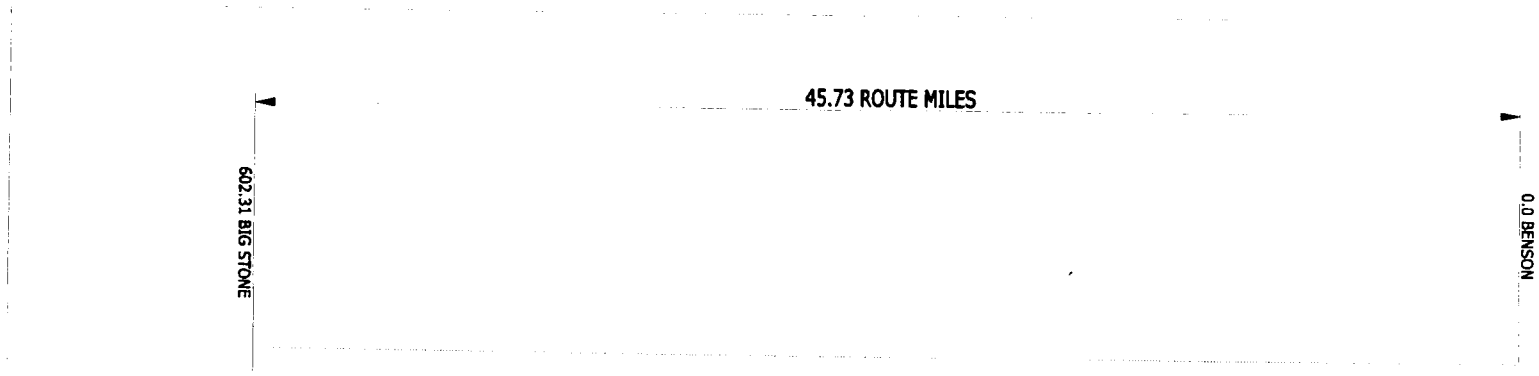
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

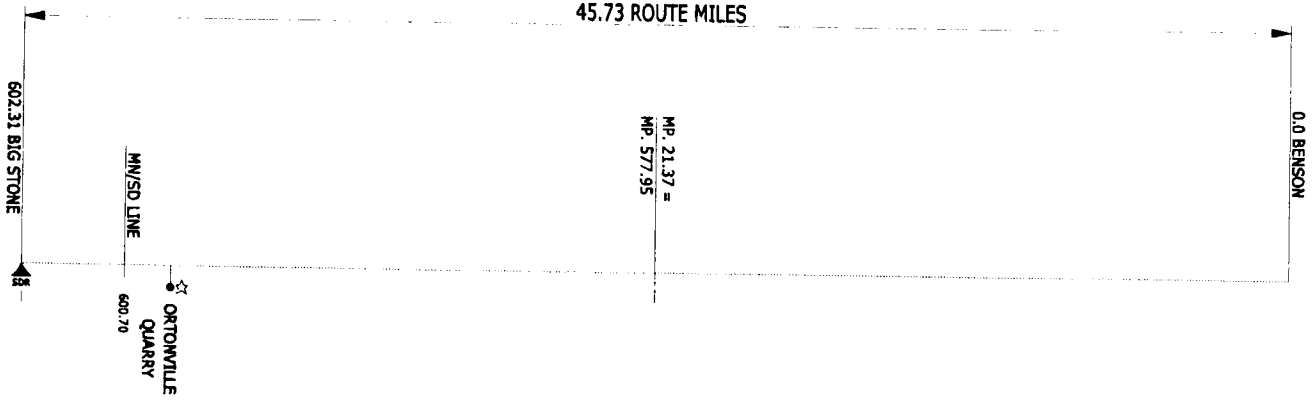
- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.B-1
Page 27



OTP OPENING



BNSF REPLY

DISTRICT:

APPLETON

FROM: BENSON

TO: BIG STONE

N

MP: 0.0/577.95

MP: 21.37/602.31 NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

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☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

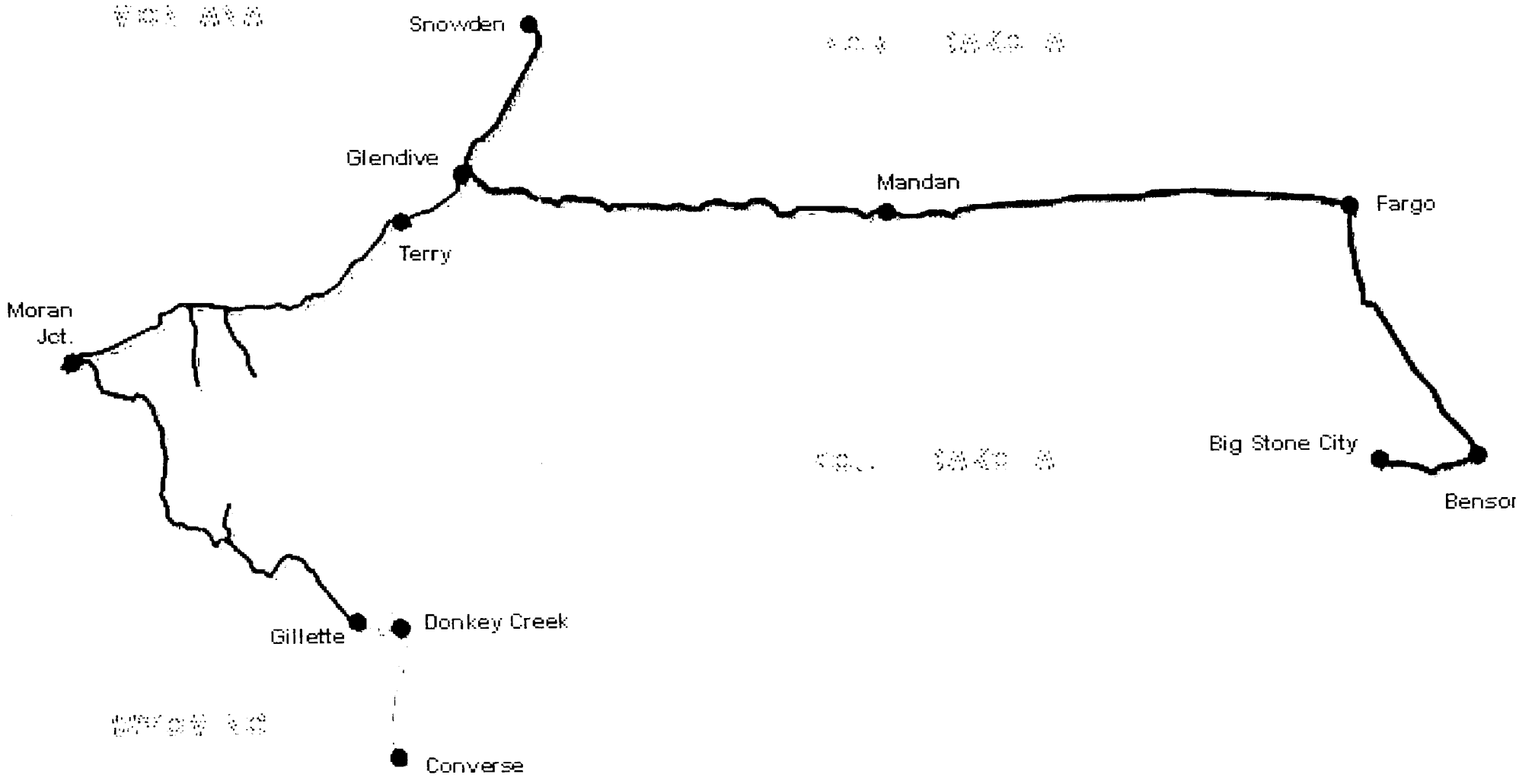
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

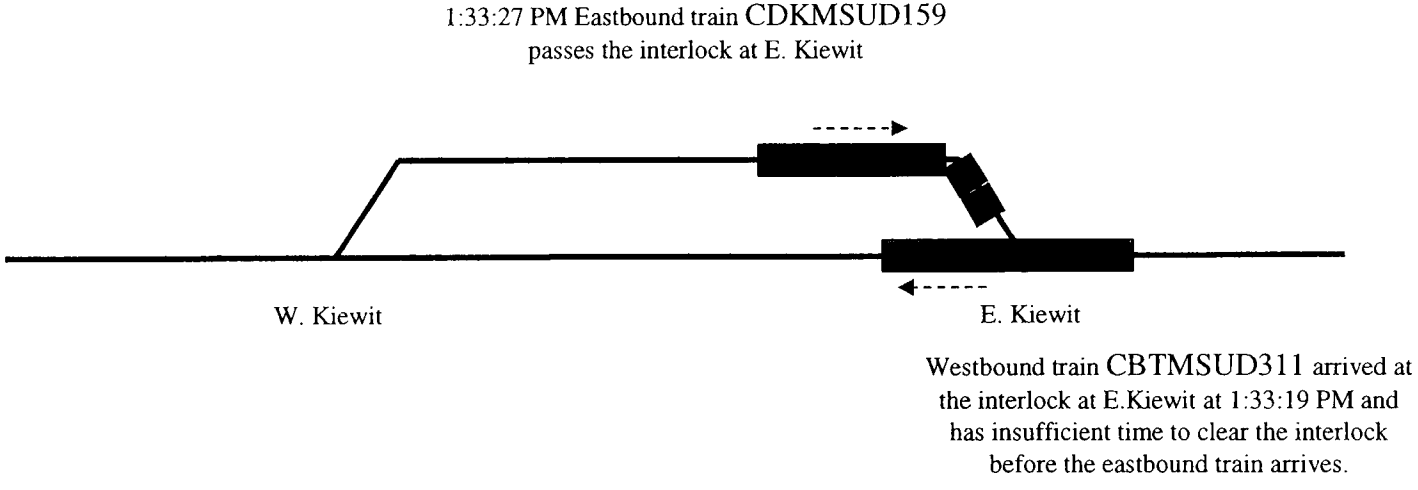
EXHIBIT III.B-1
Page 28

Exhibit III.B – 2
Page 1 of 1
OTRR Configuration



Example Of "T-Bone" Train Collision From Otter Tail's String Program

Graphic depiction of Example

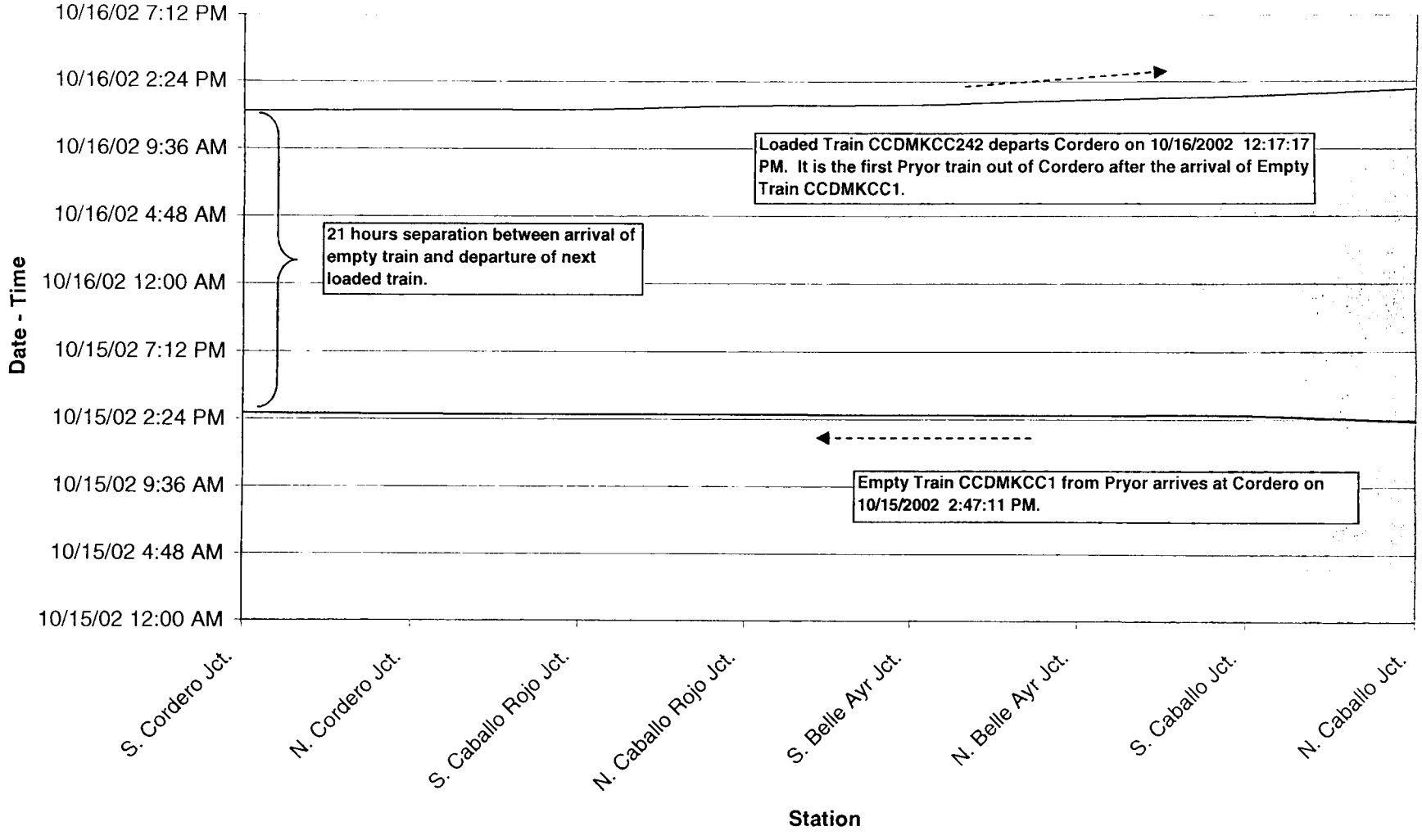


The OTP string program output shows Eastbound train CDKMSUD159 passing the interlock at E. Kiewit before the Westbound train CBTMSUD311 passing on the main line can clear the interlock, resulting in a "T-Bone" train collision.

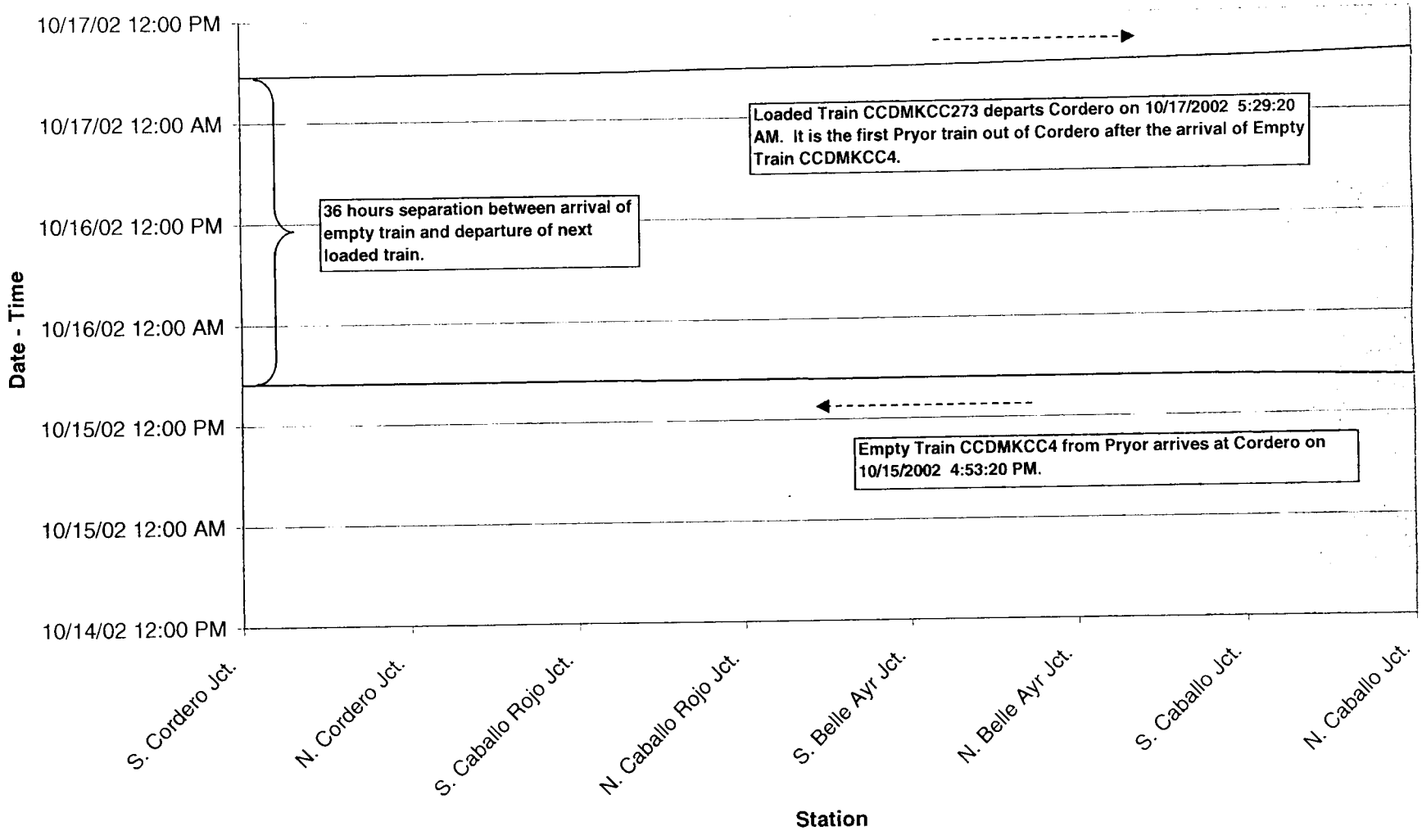
= Westbound train CBTMSUD311 moving along main track

= Eastbound train CDKMSUD159 departing siding

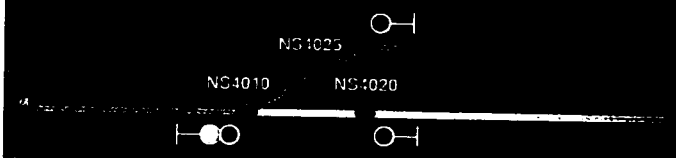
Actual Cordero Mine Time In Otter Tail String Program
Example A



Actual Cordero Mine Time In Otter Tail String Program
Example B



RAIL TRAFFIC CONTROLLER (RTC)™



Rail Traffic Controller™ is the rail industry standard in dispatch simulation software, serving both the freight and passenger sectors.

Rail Traffic Controller ©2001 Berkeley Simulation Software

What is RTC?

RTC is a powerful software package that dispatches trains using the same elements as a human dispatcher. The difference between RTC and the human is that RTC solves the dispatching problem on a much larger scale: greater distances and longer periods of time, while improving both safety and efficiency. No other software in the rail industry offers this portfolio of functionality.

The power of RTC

Sophisticated meet-pass N-train logic™ facilitates dispatch operations and capacity analysis

RTC dispatches trains at the network level

Integrated train performance calculator (TPC) accounts for different equipment types, train consists, terrain and track conditions

Simulation results are displayed in graphical formats that are easy to understand

Intuitive interface makes changes and what-if scenarios simple

Results have been validated with hundreds of real-world networks

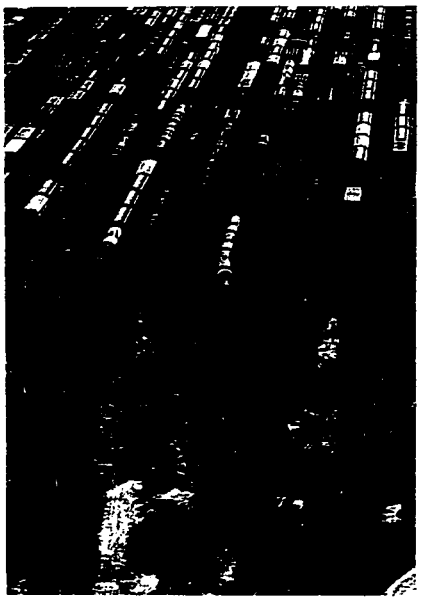
Common uses for RTC

Develop operating plans

Diagnose bottlenecks and recommend schedule changes

Evaluate various capital improvement scenarios

Assess the impact of adding new trains to a network



What RTC produces

Animation of traffic flow

Time-distance diagrams (stringlines)

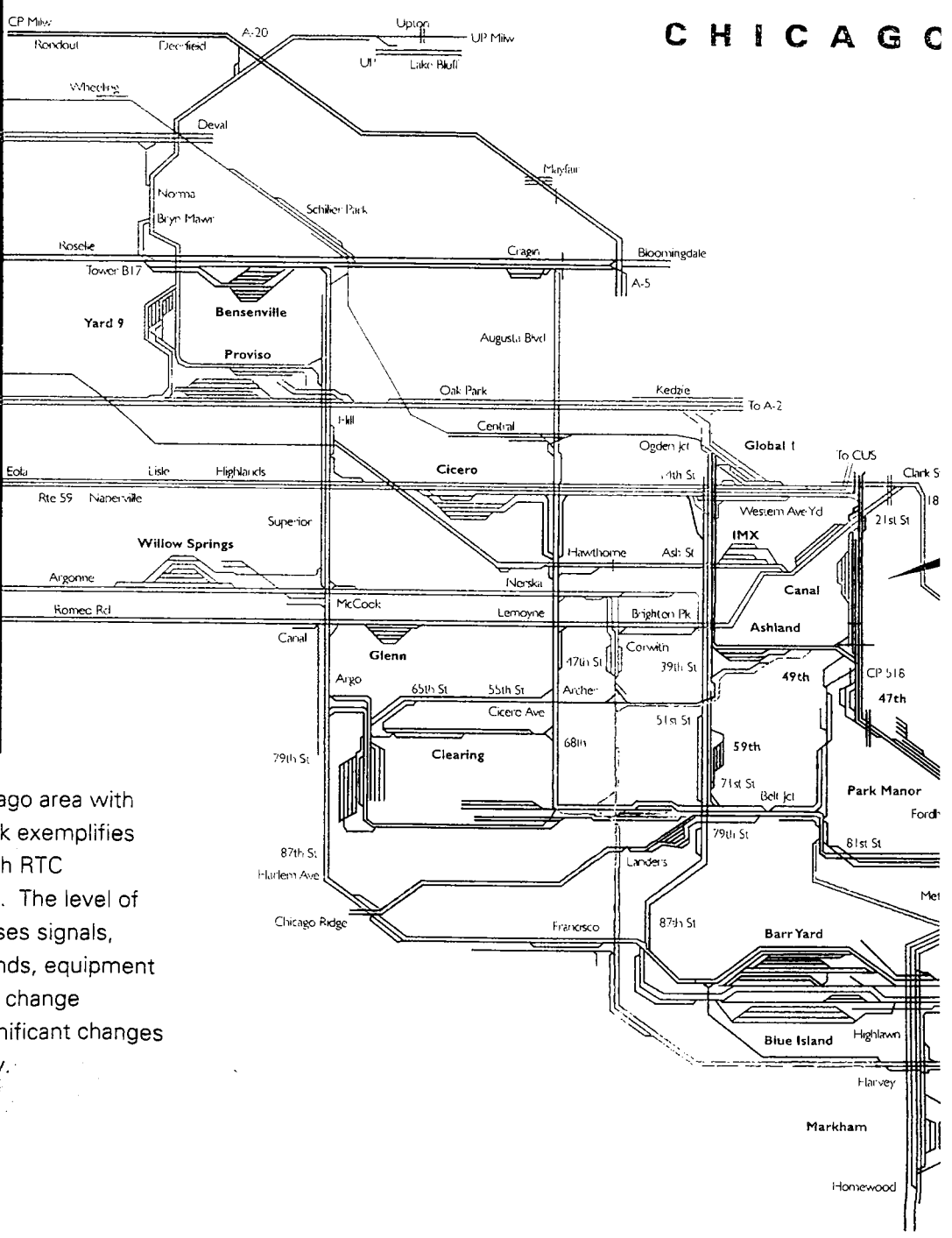
TPC profiles displaying elevations, speed, throttle, brake settings, cumulative distance and run time

Track occupancy charts

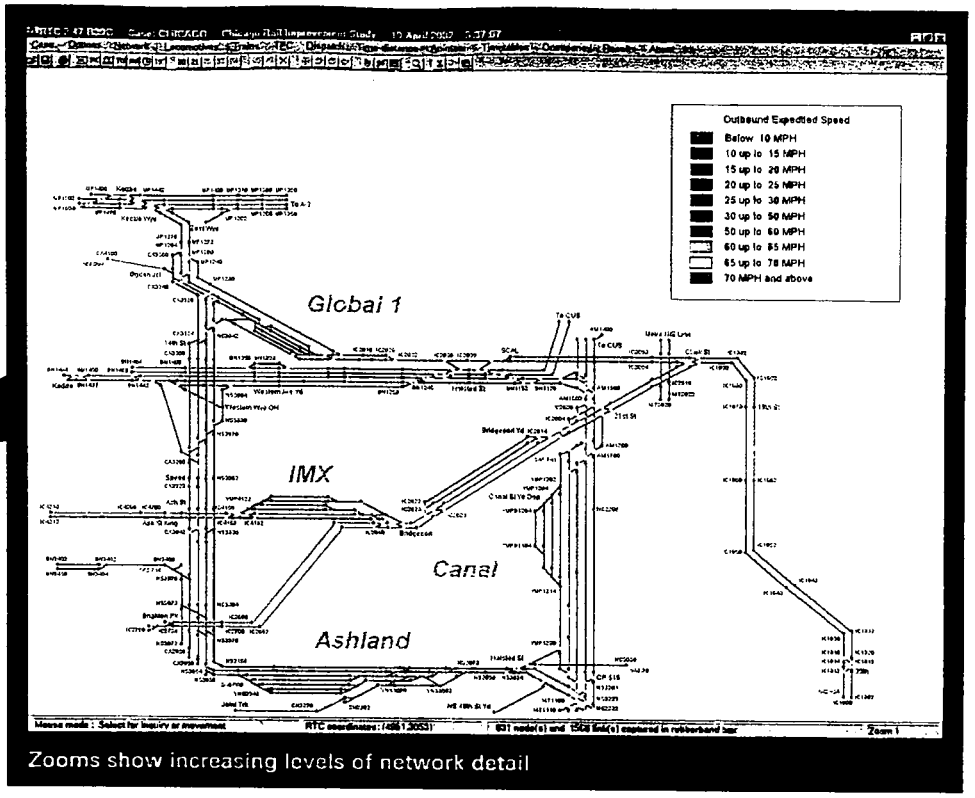
Detailed individual train schedules

Timetables - at various levels of detail (from traditional list of stations and train departure times to complete meet/pass plans)

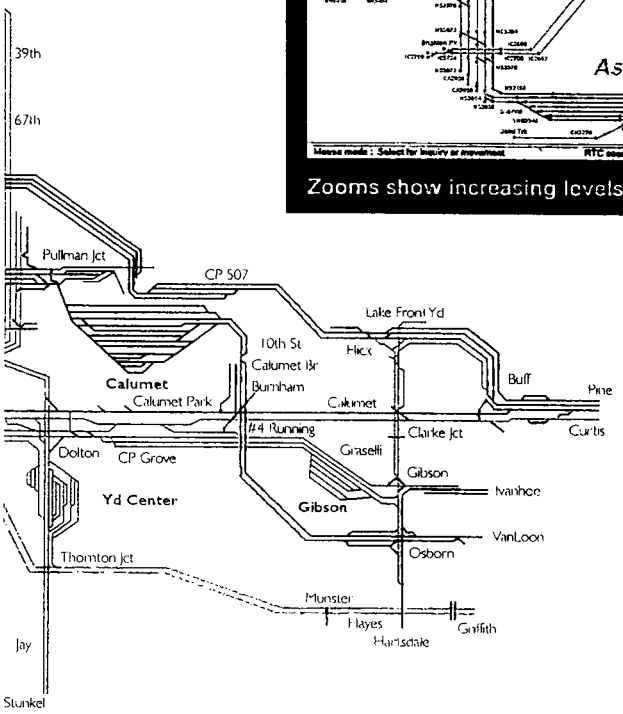
Operating statistics
- at the individual train level
- or summarized by train type
- or at a system-wide level



The greater Chicago area with 900 miles of track exemplifies the scale at which RTC dispatches trains. The level of detail encompasses signals, switches, diamonds, equipment detectors, speed change locations and significant changes in track geometry.

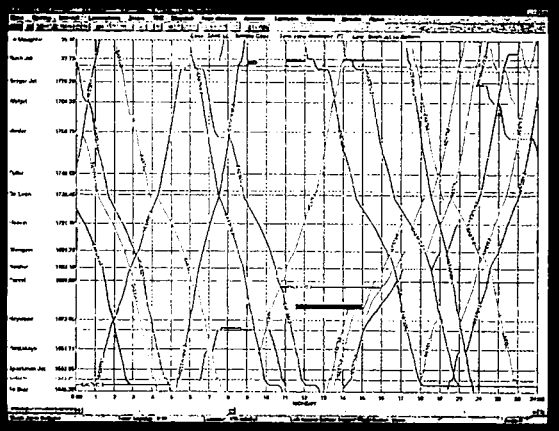


Zooms show increasing levels of network detail

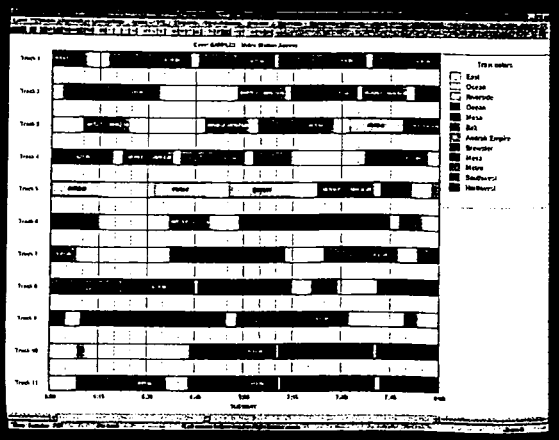


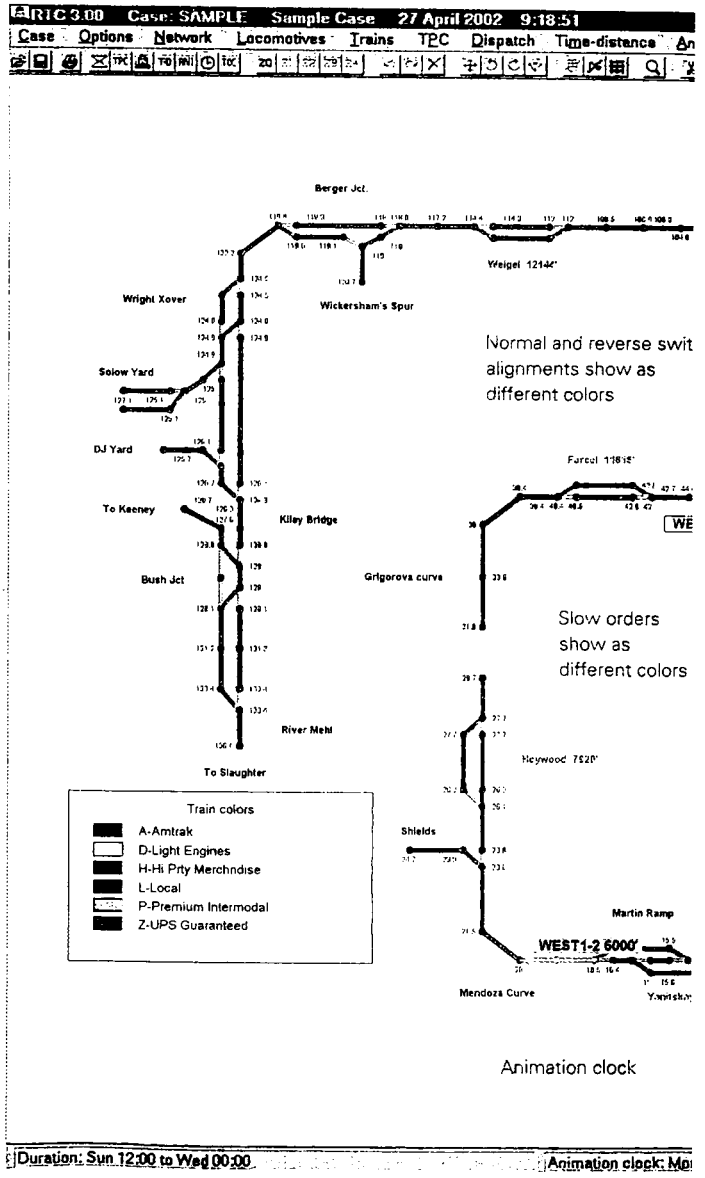
RTC networks typically include both mainline track as well as some track within terminals. This combination is essential for the "global view".

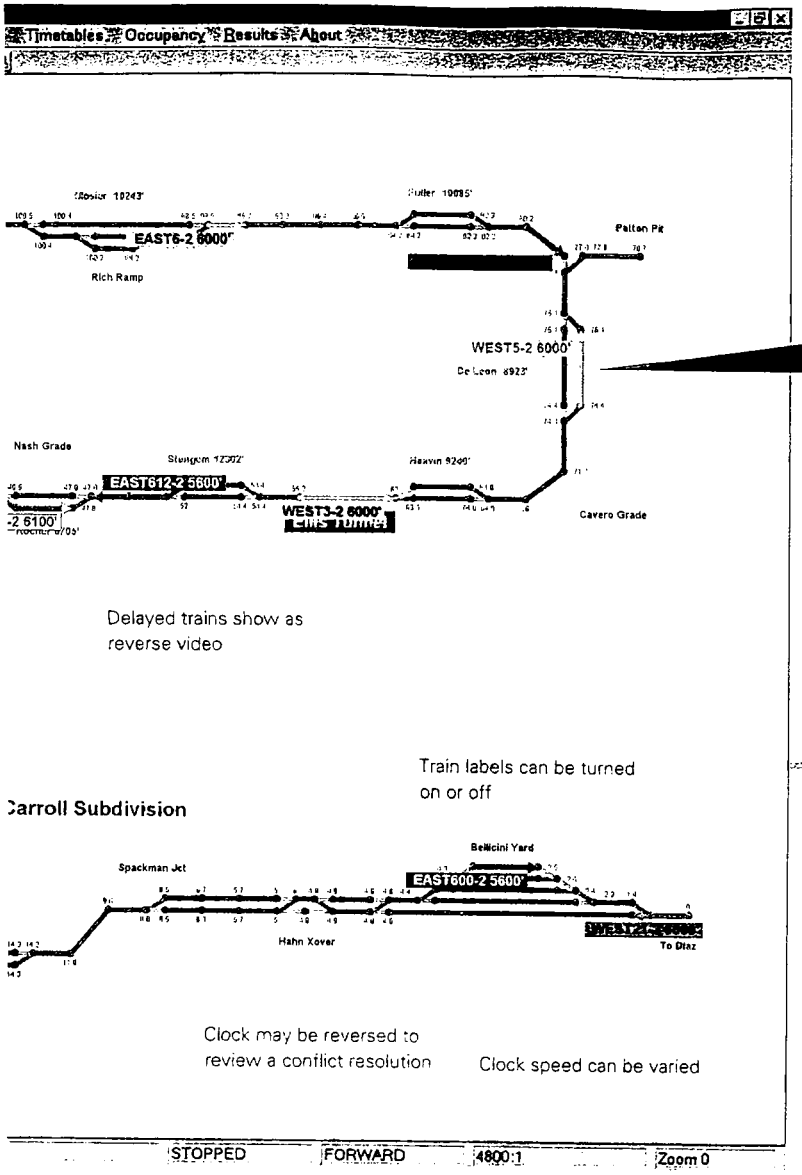
Time-distance diagram—This classic tool for plotting train schedules is generated after trains have been dispatched. Train labels display automatically. Users can pan, zoom and click to get more detail about trains.

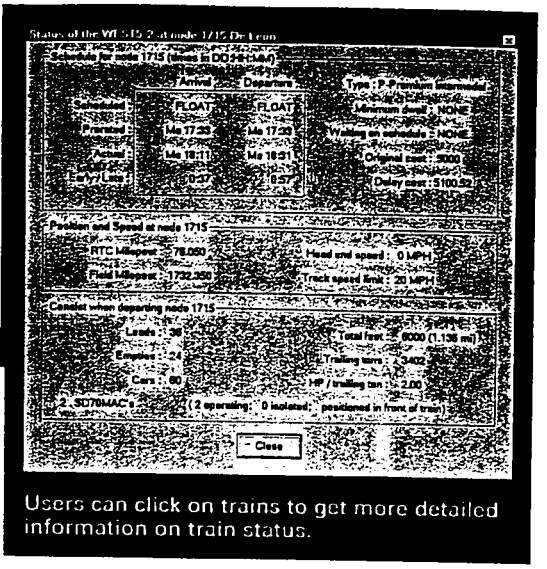


Track occupancy chart -- Another classic tool for plotting track occupancy in stations and yards. Users can evaluate their schedules by comparing planned track occupancy with simulated track occupancy









Animation of results

Animation is the ultimate tool for validating a train plan. Users can observe how conflicts are resolved without poring over abstract reports. Animation also eliminates any mystery as to how RTC has resolved meets and passes in a cluster of conflicting trains. Animation speed can be varied, stopped, and reversed. The status of trains during animation can be queried by clicking on them.

RTC's features make operating analysis easy

Evaluate train performance

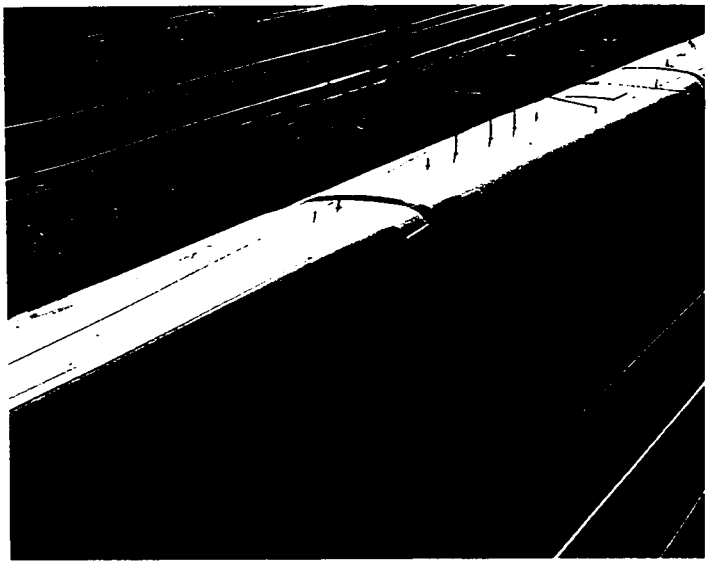
RTC contains an easy-to-use train performance calculator (TPC). Use the TPC to compute minimum run times for trains running over a network without interference from other trains. Experiment with various stopping patterns and locomotive types to select the most suitable engines for a particular train type and terrain.

Set realistic schedules

- Make operating plans more achievable by eliminating the traditional but oversimplified practice of setting train schedules based on average run times.
- Dispatch the trains so that their interactions can be accounted for in their schedules.
- Adjust arrival and departure times (as well as other parameters) to improve schedules.
- Test the robustness of a schedule by randomizing departure and dwell times.

Change speed limits

Simulate the impact of track speed changes on schedules and fuel consumption by changing speed limits for a train or a stretch of track.



Add new priority service

Evaluate the effects of adding new priority service.

- Measure the delay and performance changes for each train.
- Assess performance at aggregated levels such as train type or for the overall system.
- Let simulations run long enough to encompass all days of the week (or month) so that both "light" and "heavy" days can be observed.

Analyze track modifications:

CTC vs. non-CTC

Evaluate the costs and benefits of investing in Centralized Traffic Control to relieve congestion. Change appropriate network parameters and observe the operation over a period of time.

Interlockings

Evaluate the costs and benefits of modifying, eliminating, or simplifying interlockings within a complicated terminal zone or district.

Evaluate various switch types

RTC distinguishes between controlled, electrically locked, self-restoring, spring and manual switches. Different switch types can be easily selected with mouse clicks.

Move or set crossover locations

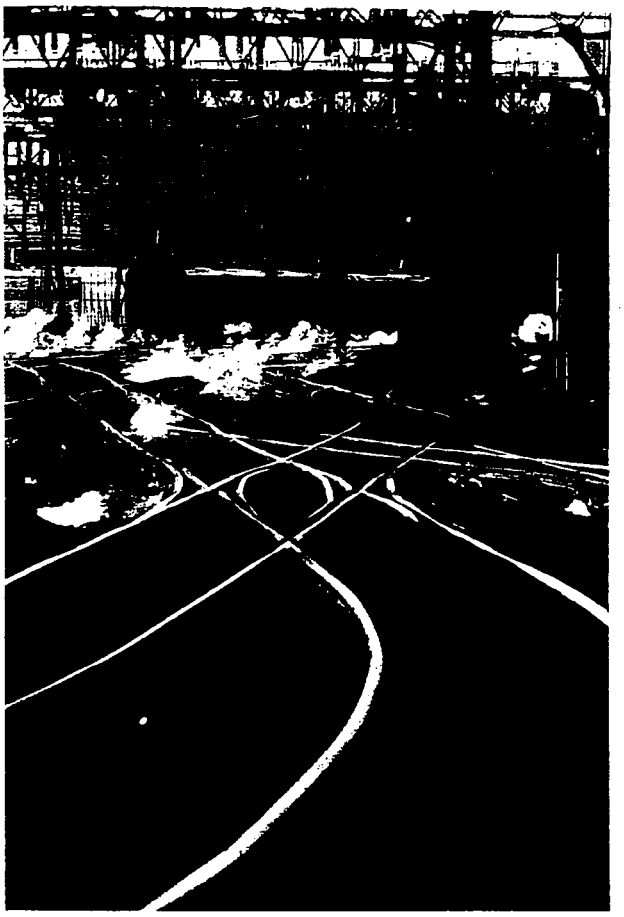
Placement of crossovers can have dramatic effects on congestion in multiple track territories. Move crossovers around on a network to find locations that are best suited to the level of traffic.

Extend or remove sidings

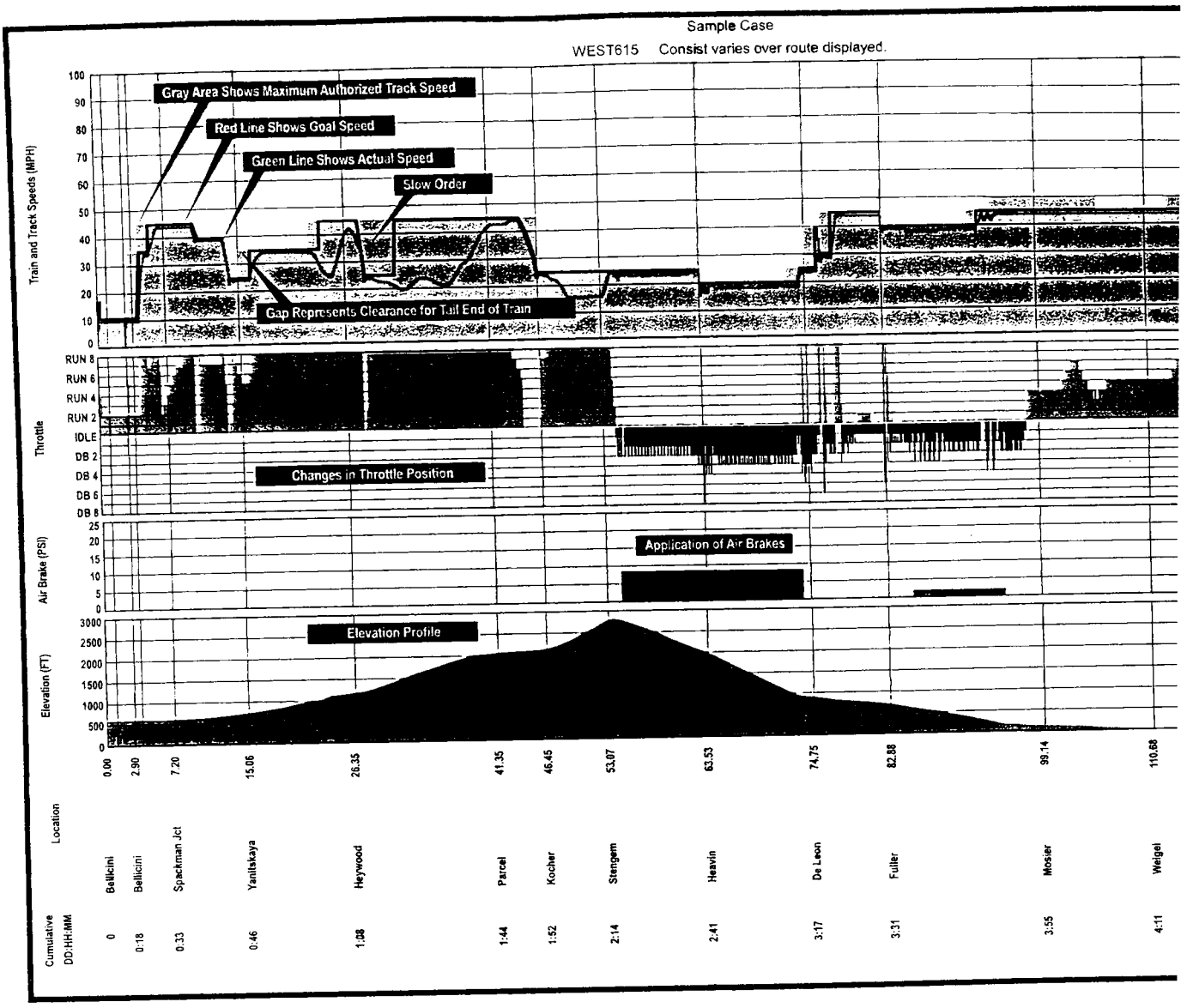
The usefulness of a siding or passing loop is determined by its size and location. For example, the ideal siding location for 50KPH/30MPH mainline track can be quite different than that for 80KPH/50MPH track. Determine whether siding lengths and locations are adequate for the size and speed of trains being operated. Or, conversely, determine the best train sizes and operating speeds to match a given track configuration.

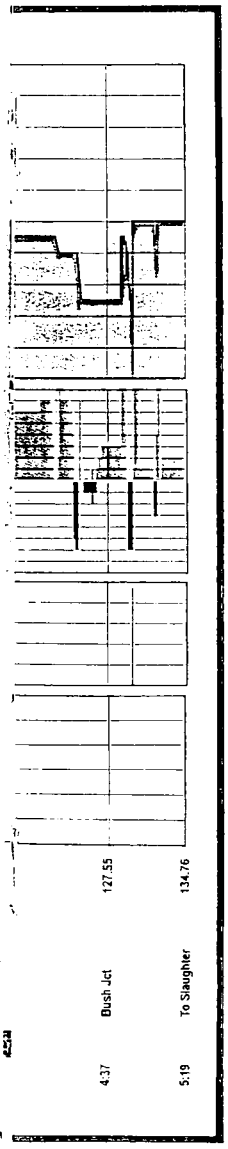
Improve scheduling of maintenance-of-way (MOW) windows

Map out the inevitable train delay from MOW windows. RTC displays the effects of restricted speed orders and track impedances on train schedules with explicit graphics. Experiment with various MOW windows to determine the best time to perform track work.

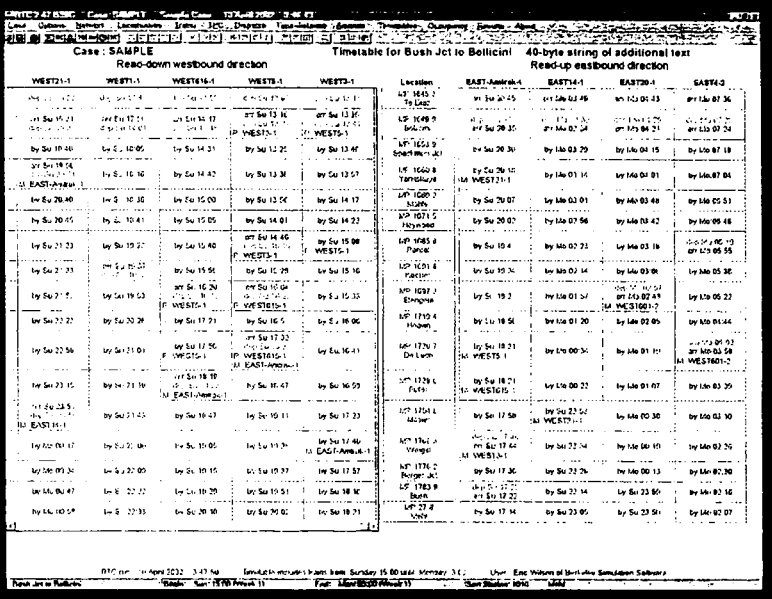


Train Performance Calculator (TPC) results



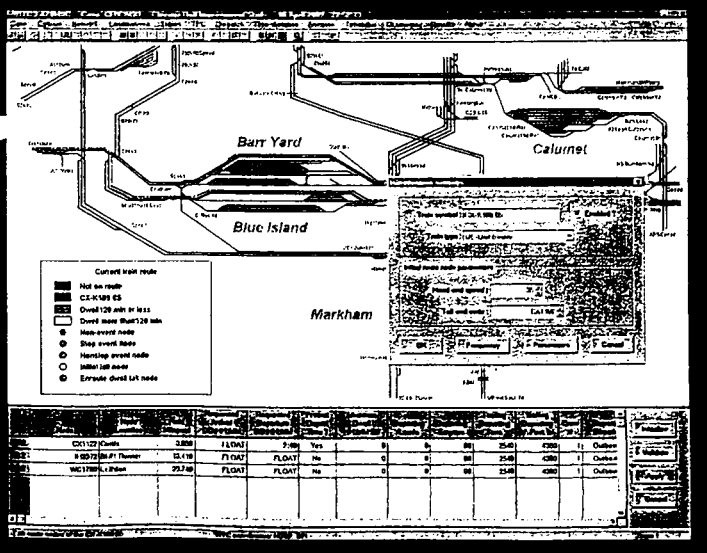


Timetable



RTC timetables are generated automatically after trains have been dispatched. Timetables can have many different levels of detail, ranging from arrival and departure times to complete meet-pass operating plans.

Graphical Train Entry and Modification Interface

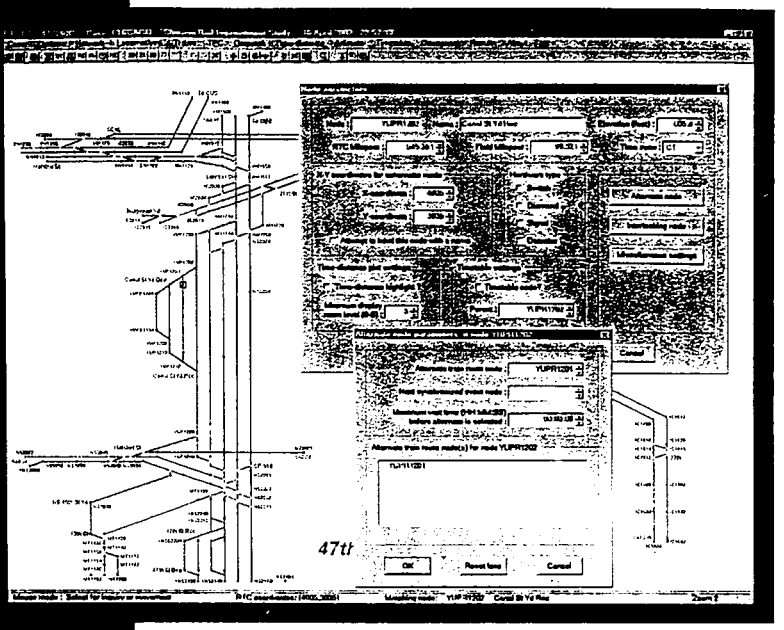


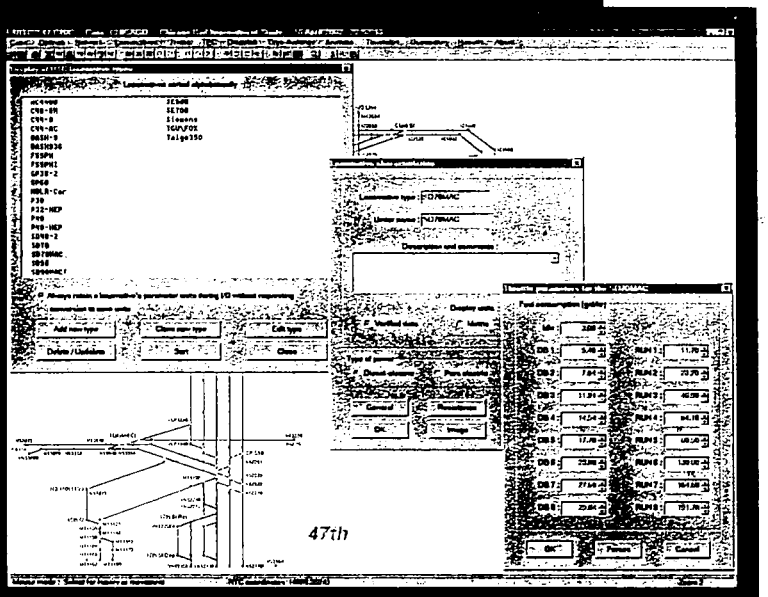
Users can enter and modify train routes either graphically or through the adjoining spreadsheet. Clicking on route nodes with the mouse automatically enters route data into a train's spreadsheet.

RTC provides a complete set of interfaces

Location Interface

Locations are defined in RTC networks as nodes. Nodes can represent switches, signals, detectors, speed change points or whatever the user deems as relevant to train operations.



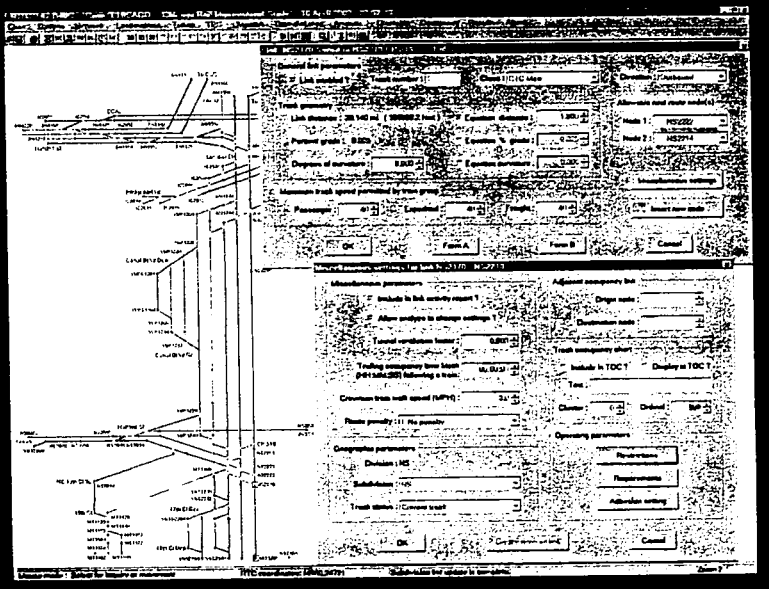


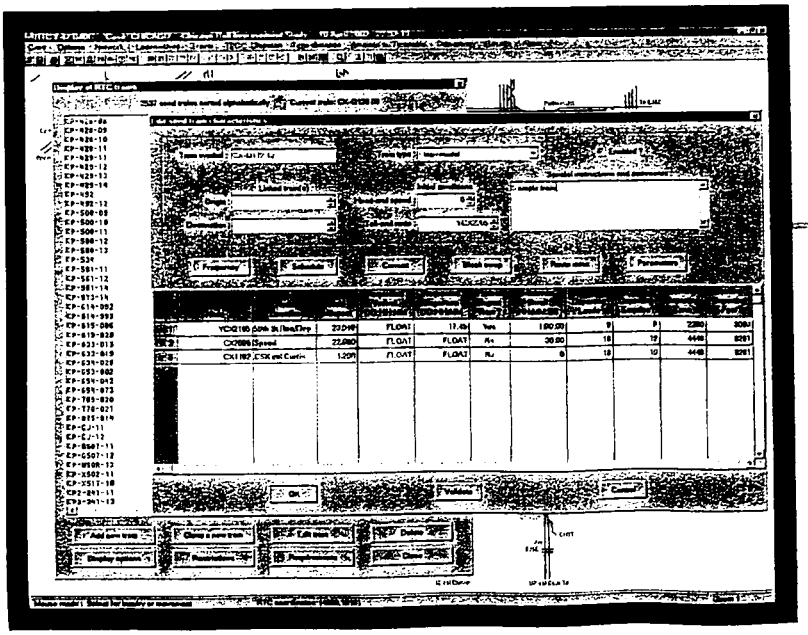
Locomotives

RTC users can customize their locomotive data with any types for which they have specifications. This is particularly useful for evaluating which locomotive types are best suited for a given territory and train type.

Track Interface

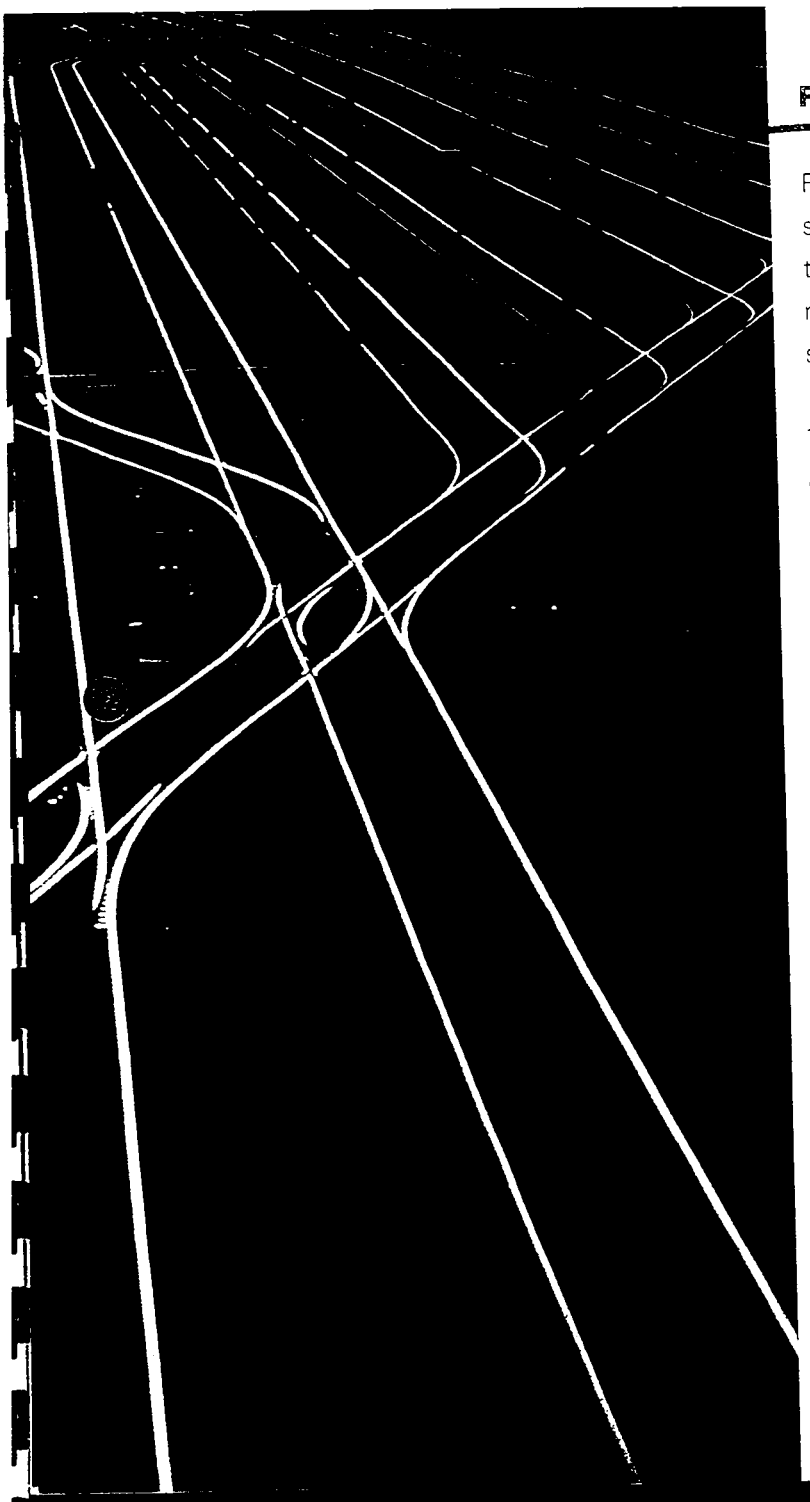
Track between locations is defined as directional links. Links have characteristics such as speed limits, grade, curvature, and operating rules.





Train Spreadsheet

RTC contains a spreadsheet interface for entering and modifying train data. All entries are cross-referenced with previously entered data to catch errors.



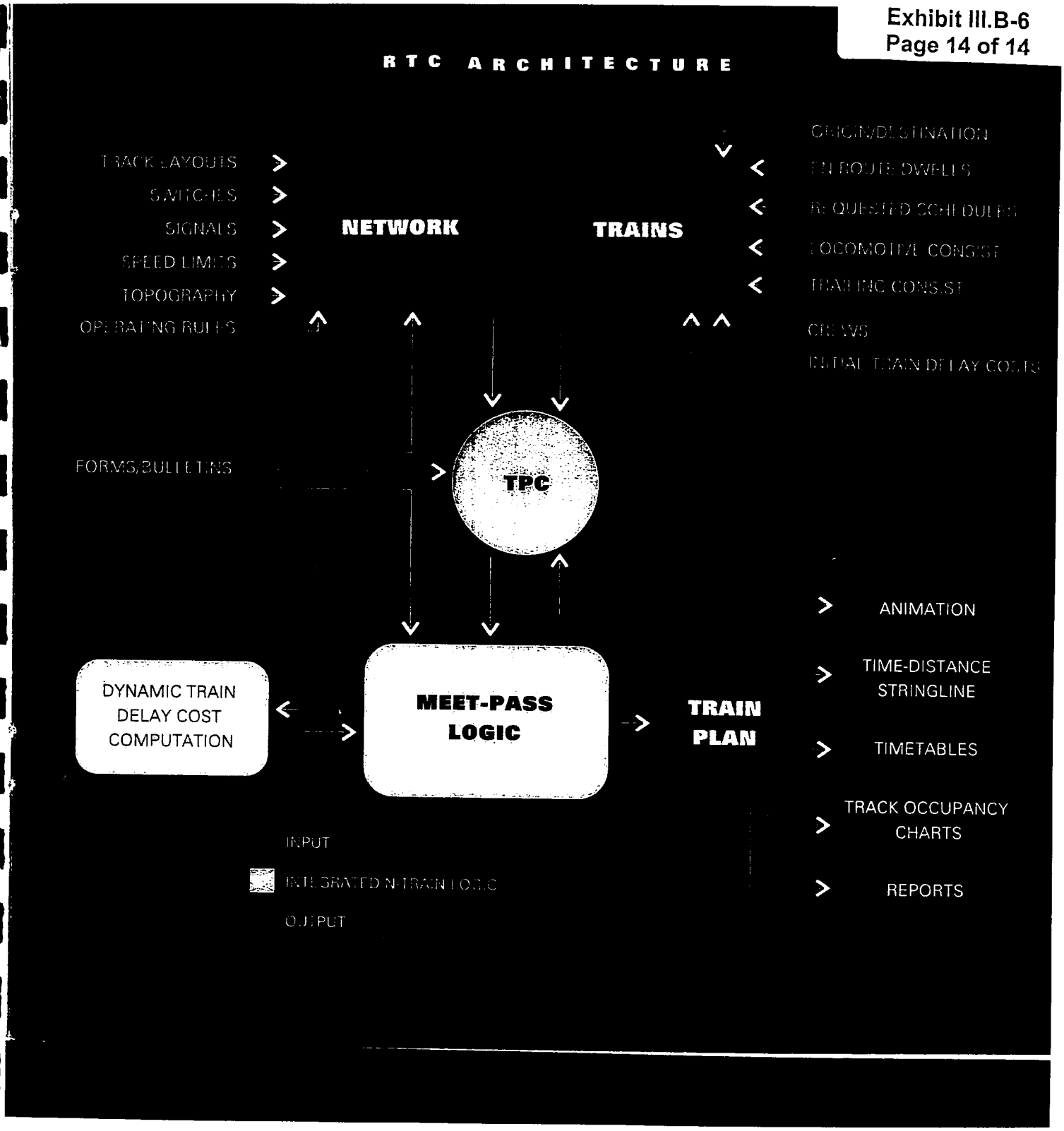
RTC's N-train logic™

RTC's unique meet-pass N-train logic simultaneously encompasses multiple conflicting trains. The logic reroutes and delays trains, as needed, to minimize total delay costs at the system-wide level.

Trains are initially assigned user-defined delay costs. As conflicts are resolved, train delay costs are varied dynamically within bounds that are also set by the user. The delay cost for a train varies as a function of whether it is early or late.

- For example, trains with crews that are approaching their hours-of-service limit and trains running behind schedule are favored by virtue of escalating delay costs. Conversely, trains that are ahead of schedule receive less preference, even if they are traditional "high priority" trains. RTC determines that trains are ahead of schedule either through user-defined arrival times or by internally prorated arrival times.

- Another example of dynamic prioritization would be a situation where an under-powered train moving uphill would not be held in a conflict with a high priority train if RTC's TPC determines that the heavy train will not be able to restart.


RTC ARCHITECTURE
TRACK LAYOUTS
SWITCHES
SIGNALS
SPEED LIMITS
TOPOGRAPHY
OPERATING RULES
NETWORK
TRAINS
ORIGIN/DESTINATION
EN ROUTE DWELLS
REQUESTED SCHEDULES
LOCOMOTIVE CONSIST
TRAILING CONSIST
CREWS
INITIAL TRAIN DELAY COSTS
FORMS/BULLETINS
TPC
DYNAMIC TRAIN DELAY COST COMPUTATION
MEET-PASS LOGIC
TRAIN PLAN
ANIMATION
TIME-DISTANCE STRINGLINE
TIMETABLES
TRACK OCCUPANCY CHARTS
REPORTS
INPUT
INTEGRATED IN-TRAIN LOGIC
OUTPUT

RAIL TRAFFIC CONTROLLER GUIDE

Rail Network
Analytics

Rail Network Analytics

RTC Guide - Outline

A. Opening an RTC case

B. Track structure

C. Train inputs for RTC

D. Train Performance Calculator

E. Dispatching the case

F. Stringline output

G. Animation output

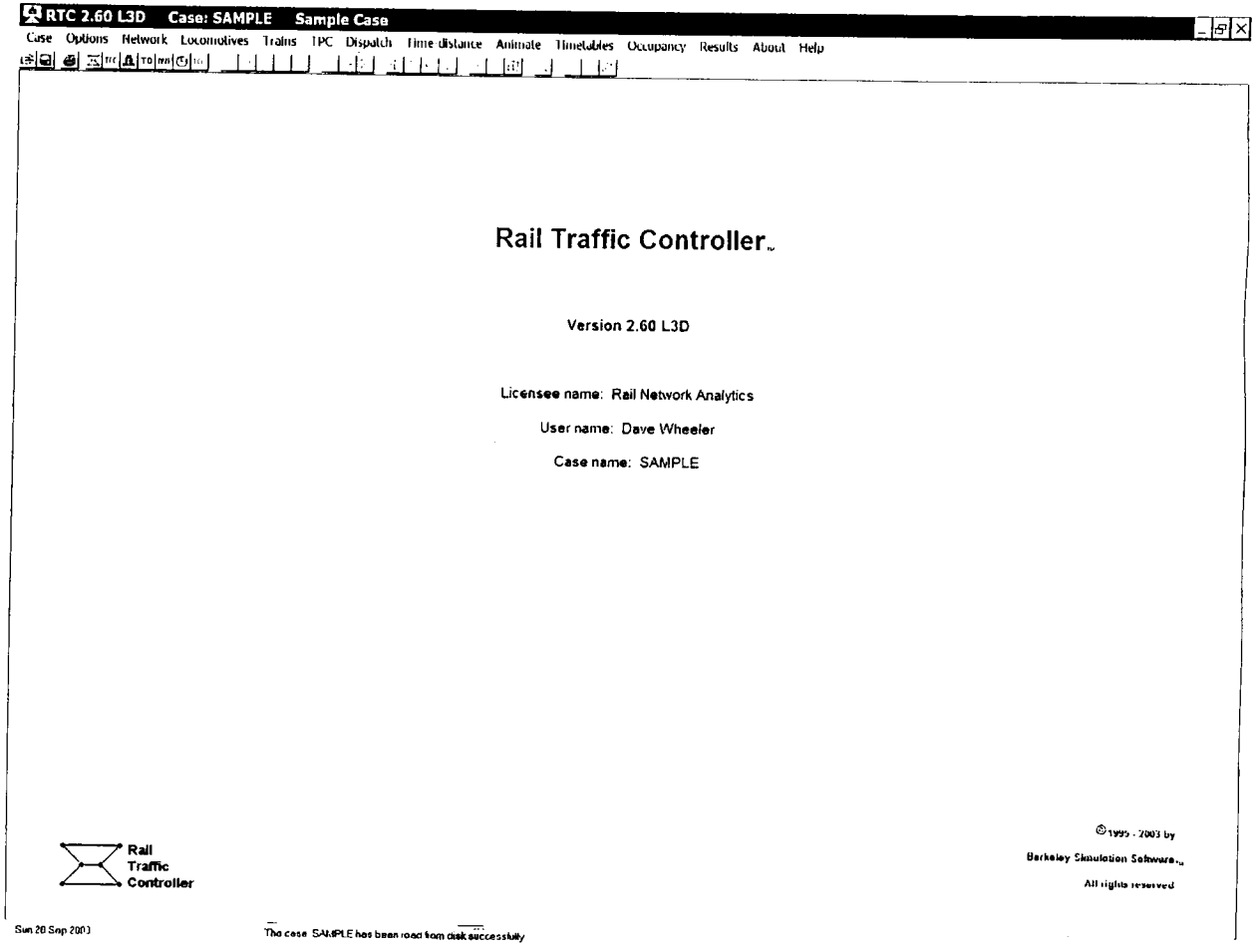
H. Dispatch file output

I. RNA Report Wizard

Rail Network Analytics

A. Opening an RTC case

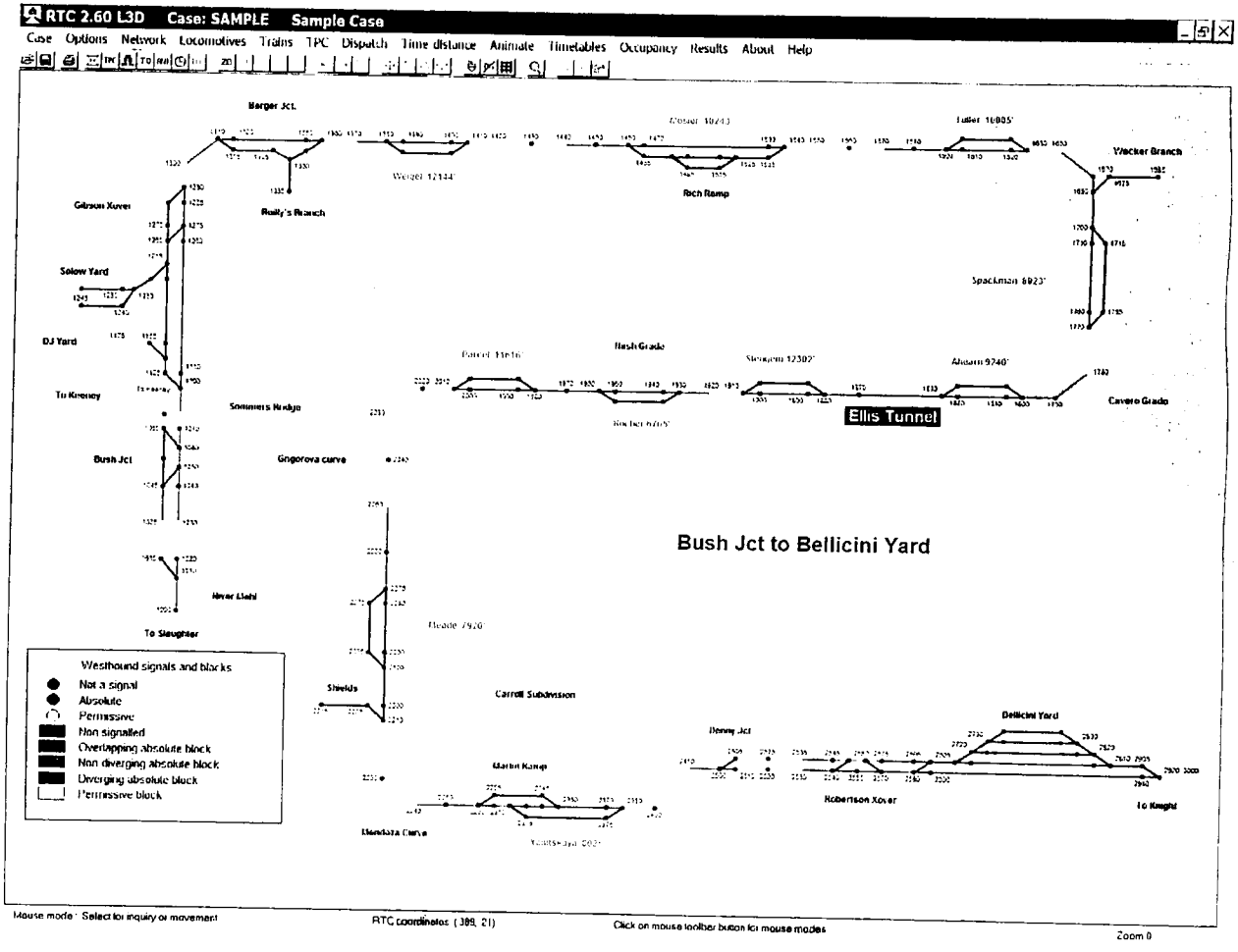
- To open an RTC case, select CASE, OPEN then for this example choose SAMPLE. The case will load, then the screen will appear as shown here.
- To view the network, choose NETWORK, DISPLAY NETWORK.



Rail Network Analytics

B. Viewing the Track Structure

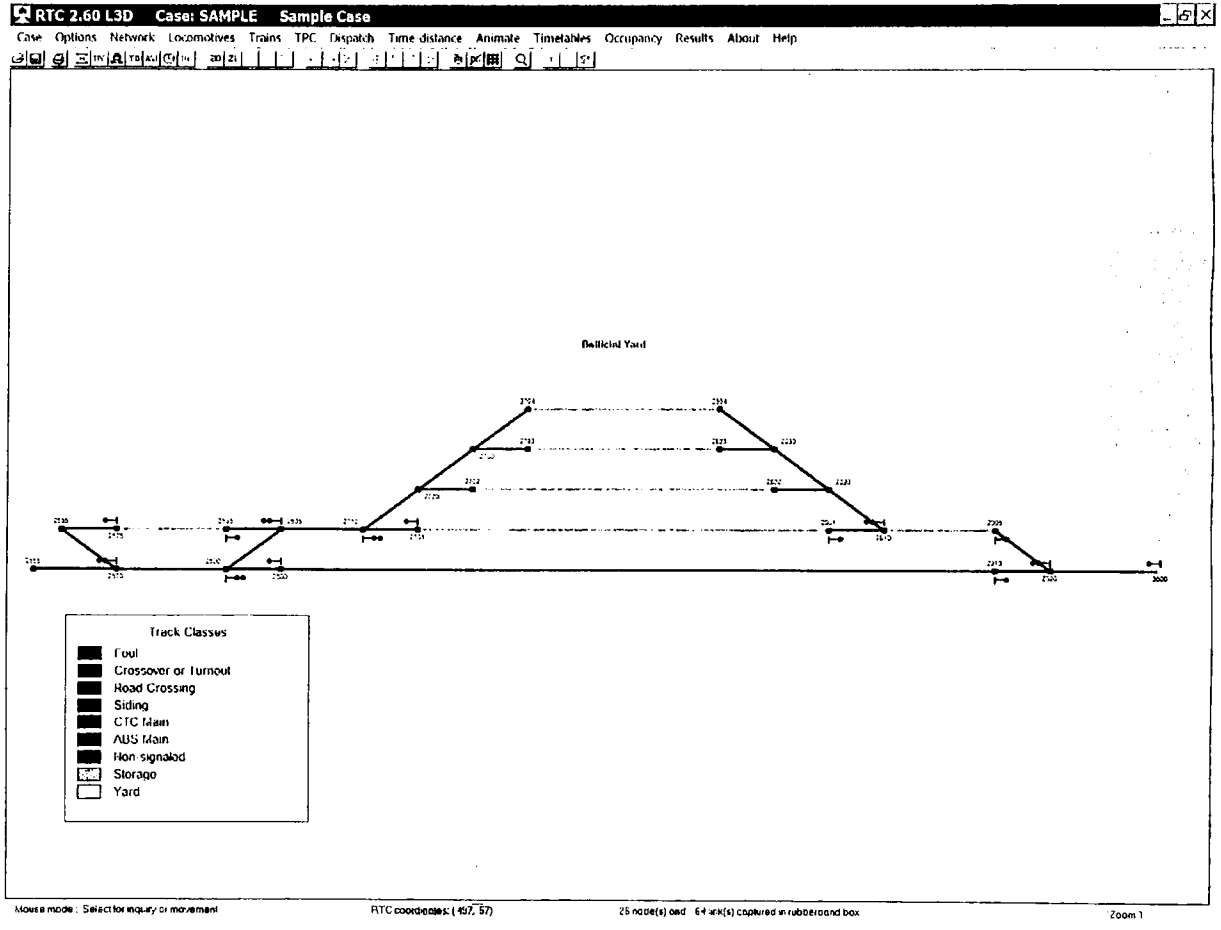
- After choosing NETWORK, DISPLAY NETWORK, the network will appear.
- The user can zoom in on a particular area by drawing a box around the desired area using the right mouse button.



Rail Network Analytics

B. Viewing the Track Structure (cont'd)

This is a zoom-in on Bellicini Yard.



Rail Network Analytics

B. Viewing the Track Structure (cont'd)

Track structure components: Nodes

- Nodes are one of the fundamental building blocks in RTC. They are used to describe locations in the network. They can be switches, signals, track speed change points, clearance points, etc.

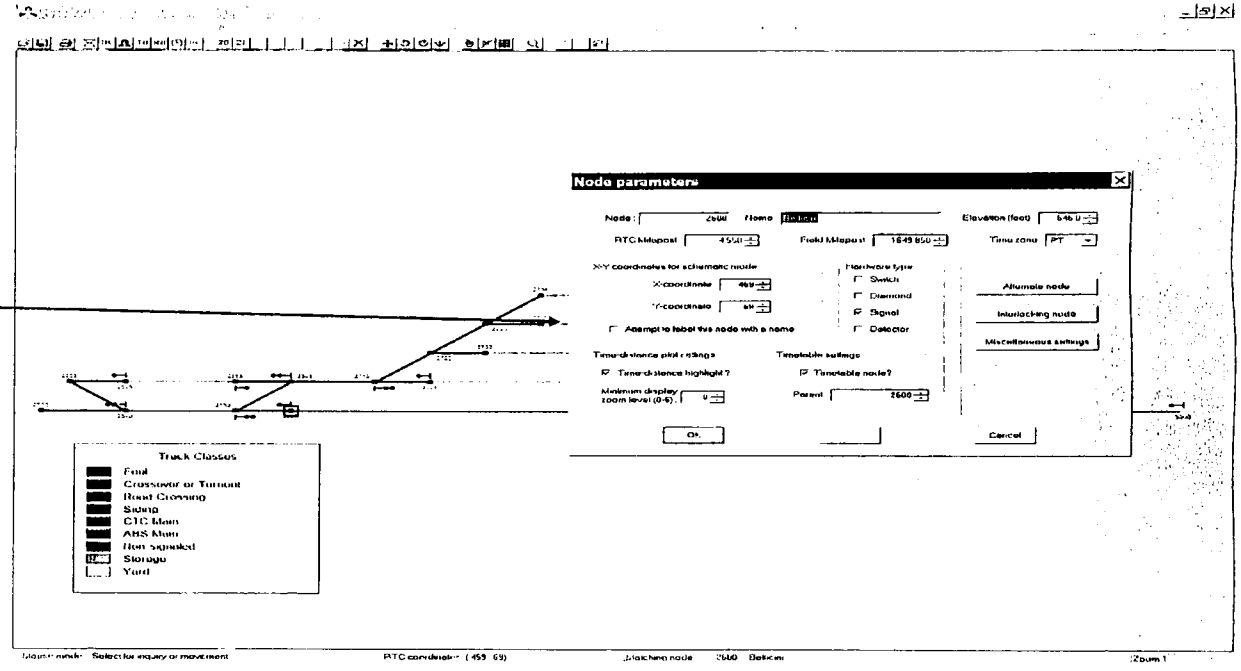
- For each node the user inputs the elevation and two mileposts – one is the field milepost from track charts and the other is the RTC milepost which allows sequentially numbered mileposts for internal model use.

- Depending on what a node represents, the user may select attributes. For example, if node X is the point of a switch, the user would input the next allowable nodes, switch type, switch closure time, etc.

Rail Network Analytics

B. Viewing the Track Structure (cont'd)

- Node characteristics are viewed by left clicking on the node as shown here.



Rail Network Analytics

B. Viewing the Track Structure (cont'd)

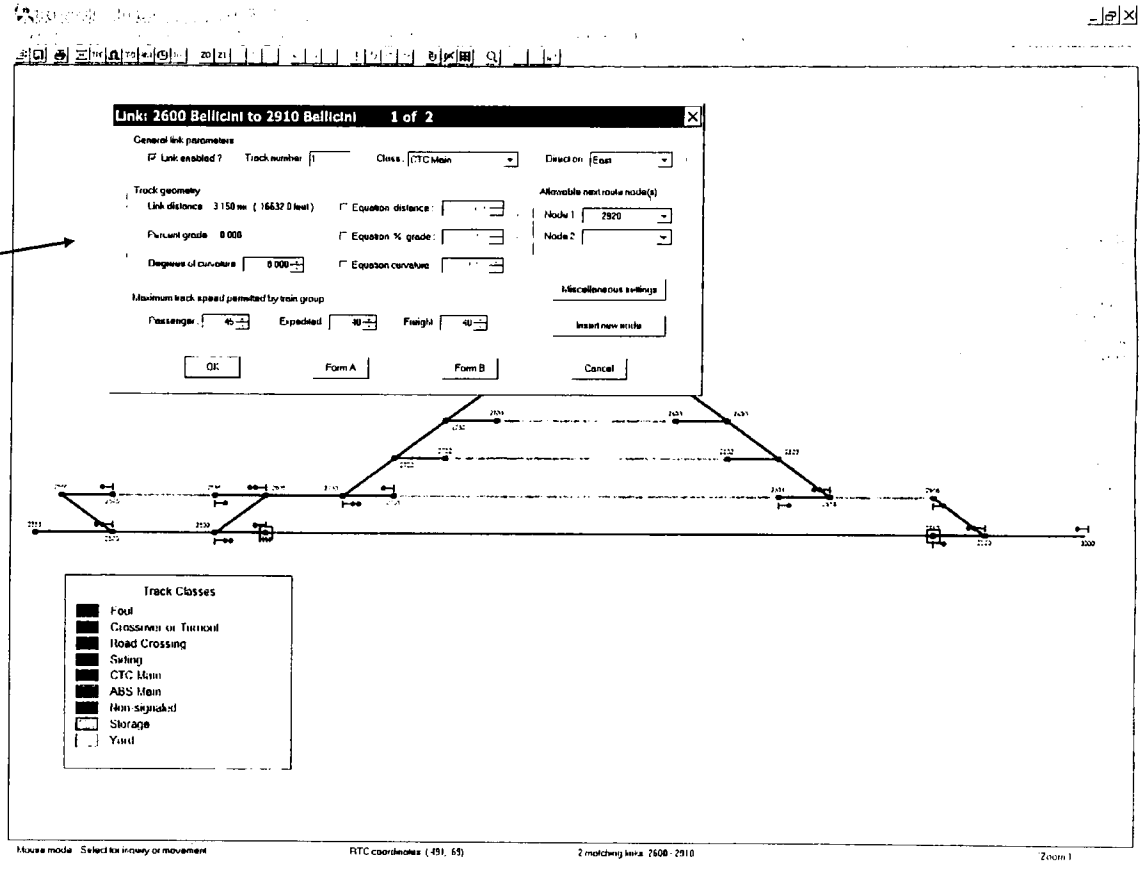
Track structure components: Links

- A link represents the track connecting two nodes.
- For each link, the user inputs distance, grade, curvature, maximum authorized speeds and Form B (track maintenance or outage) information.
- Link distances are computed automatically as the difference between RTC mileposts.

Rail Network Analytics

B. Viewing the Track Structure (cont'd)

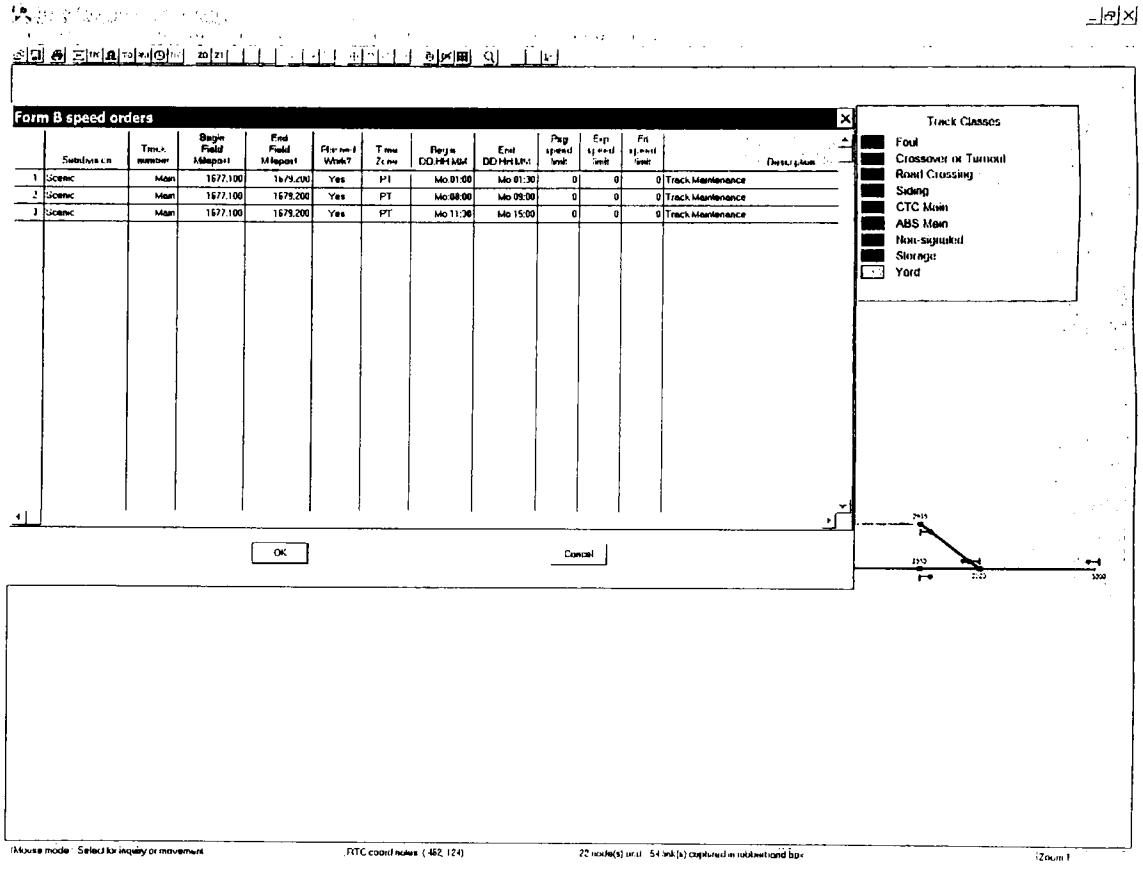
- By clicking on a link with the left mouse button, the user can view the link characteristics.
- Track type, speed limits, distance, grade, curvature, and connecting nodes are the key characteristics of a link.



Rail Network Analytics

B. Viewing the Track Structure (cont'd)

- The track maintenance or outage events are displayed by selecting NETWORK, FORM B.



Rail Network Analytics

C. Train inputs for RTC

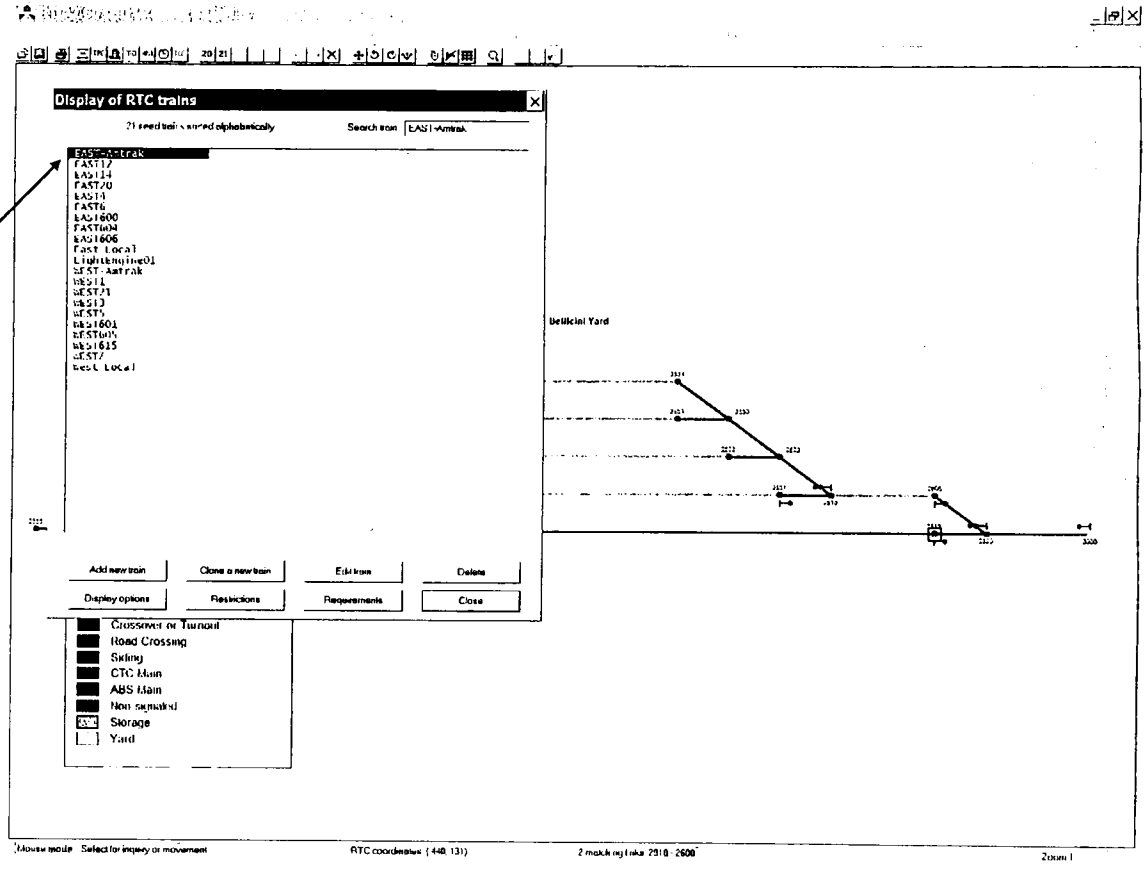
To define a train, the user inputs the following information into RTC:

- Locomotive consists by type, number and position in train
- Trailing consists: loads, empties, tons, feet, special instructions
- Routes and stopping patterns: event locations, minimum dwell times
- Departure times

Rail Network Analytics

C. Train inputs for RTC (cont'd)

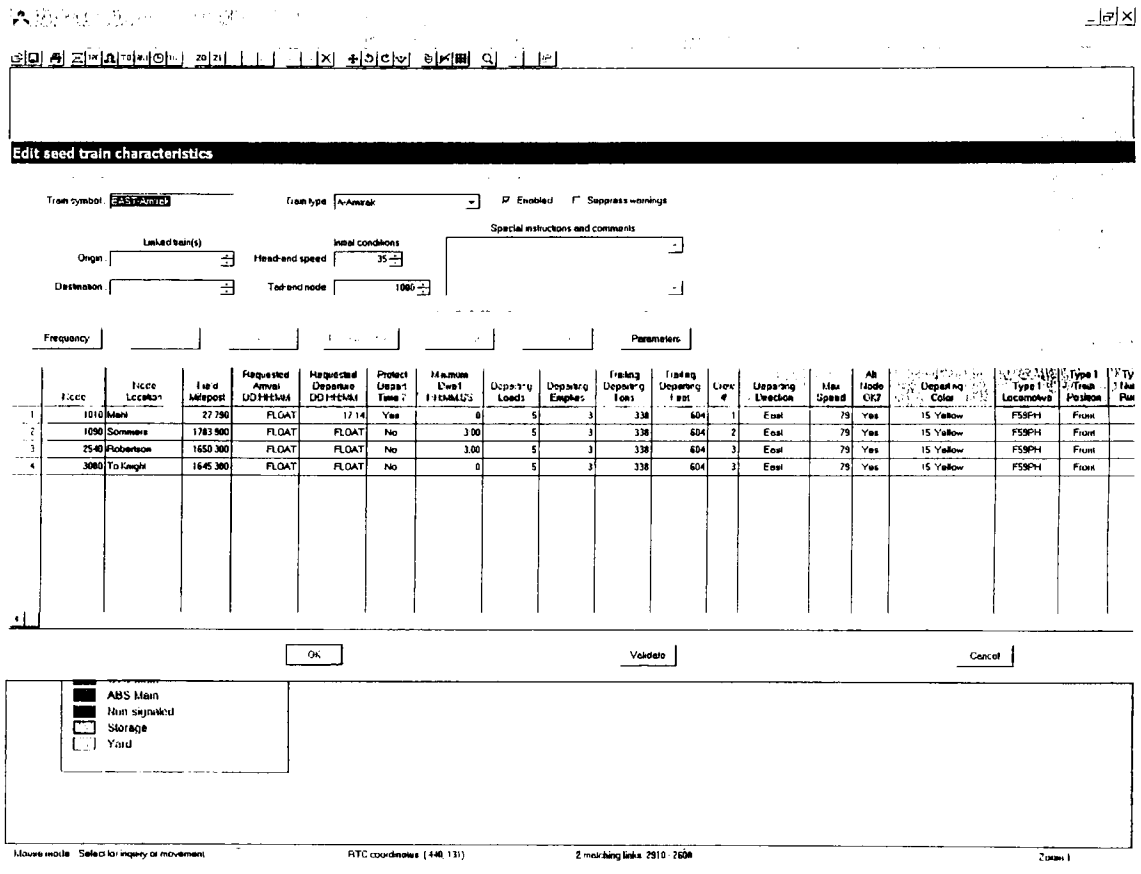
- By clicking on TRAINS, EDIT/VIEW TRAINS, the list of trains will appear.
- To view train characteristics, highlight a train and select EDIT TRAIN.



Rail Network Analytics

C. Train inputs for RTC (cont'd)

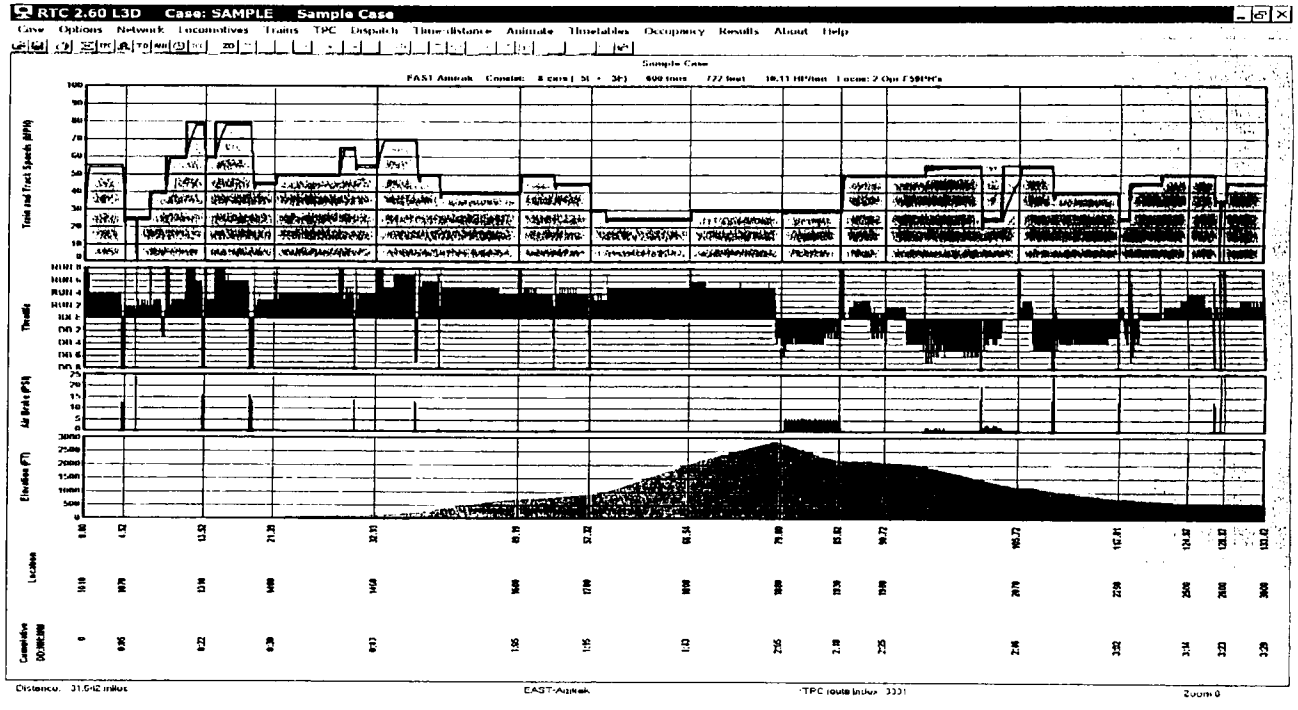
- All train characteristics can be entered, viewed and modified by selecting EDIT TRAIN.
- To add a new train, select cancel on this screen and then select ADD NEW TRAIN.



Rail Network Analytics

D. Train Performance Calculator

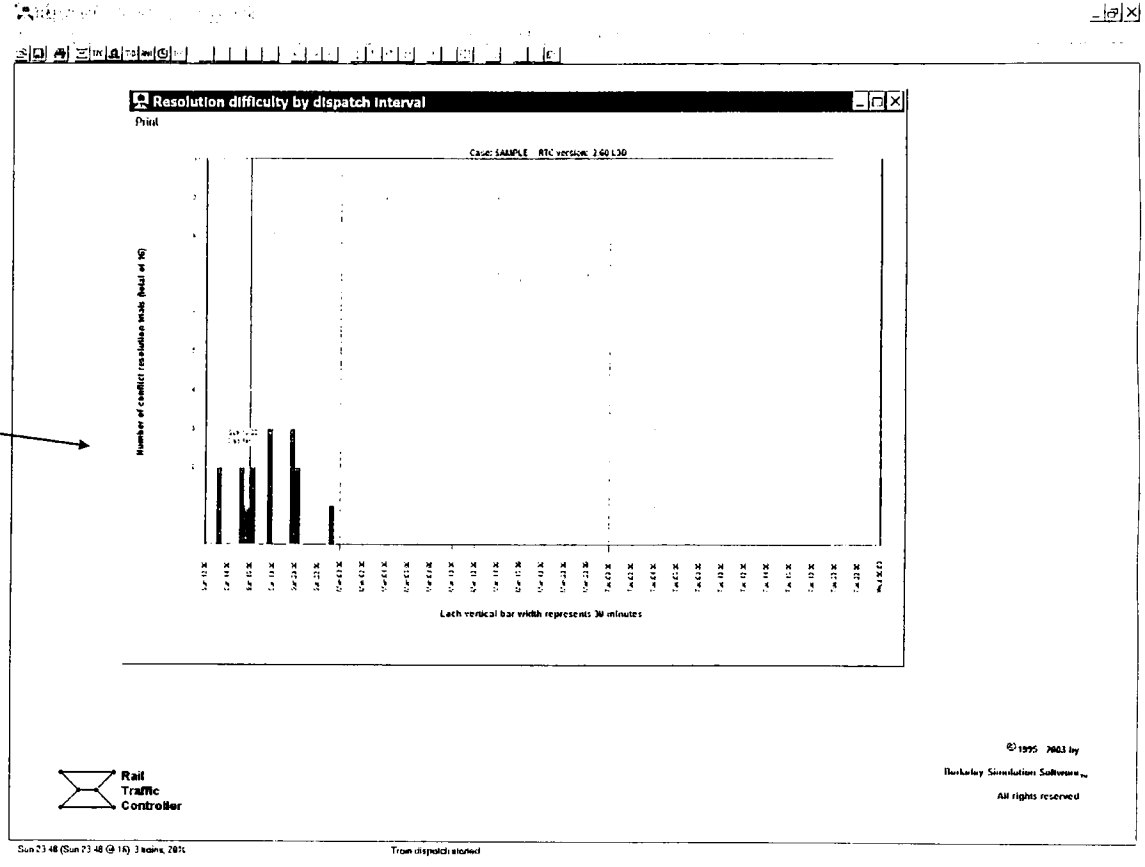
- The Train Performance Calculator (TPC) allows the user to view the detailed performance of a single unopposed train.
- The user can view the TPC graphical output once the track structure and trains are entered by selecting TPC, DISPLAY TPC.
- The TPC graph shows:
  - train characteristics
  - speed limits
  - achieved speed
  - throttle
  - dynamic brake
  - air brake
  - grade
  - elapsed time



Rail Network Analytics

E. Dispatching the case

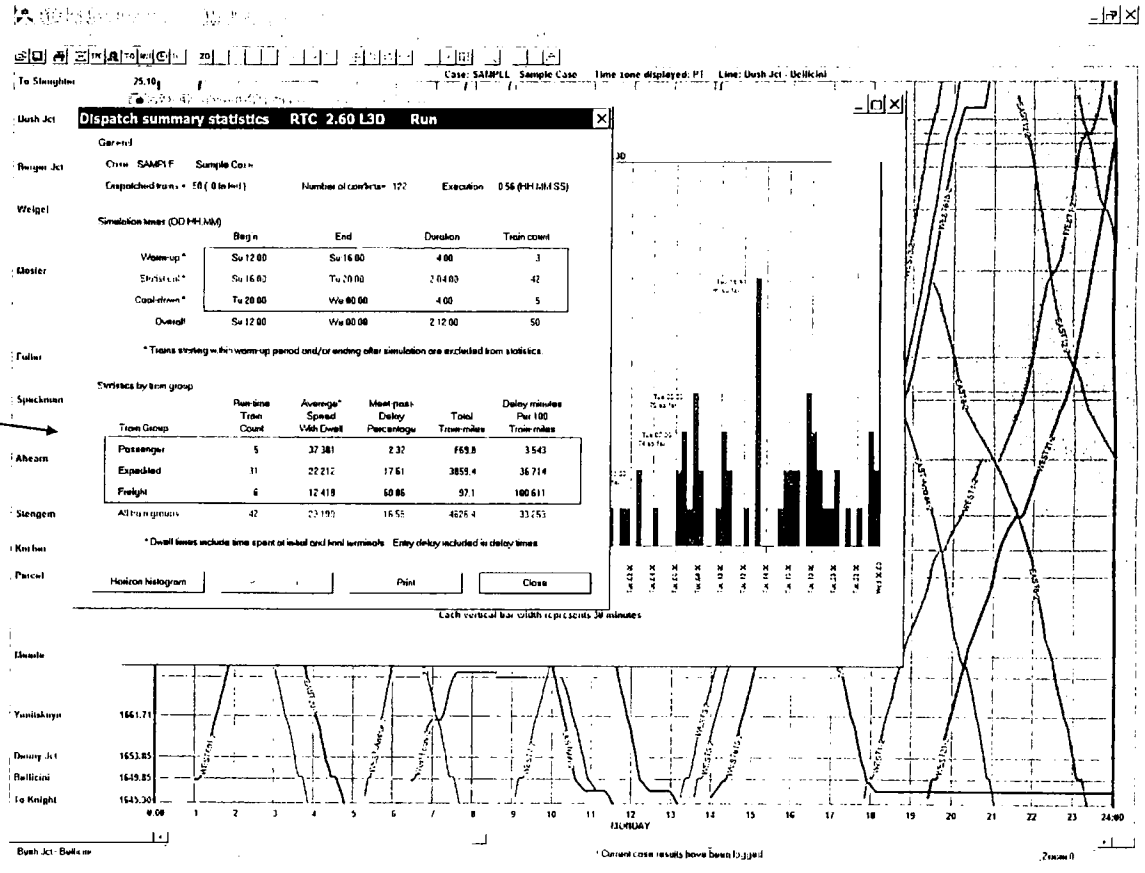
- To begin the simulation, the user selects DISPATCH, RUN.
- The conflict screen will appear as RTC resolves the train meets and passes.



Rail Network Analytics

E. Dispatching the case

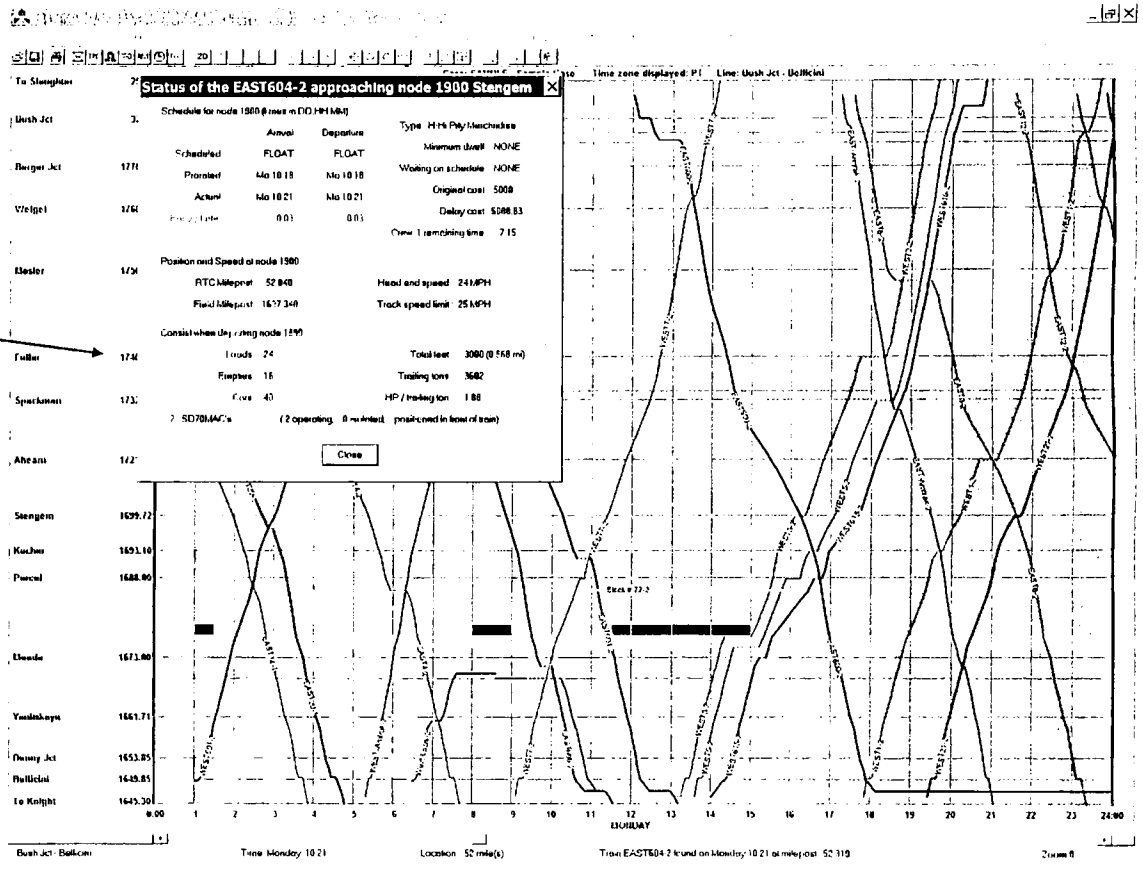
- Once the simulation is complete, the summary statistics will appear.
- The Stringlines (graphical depiction of the dispatch) will also appear.



Rail Network Analytics

F. Stringline output

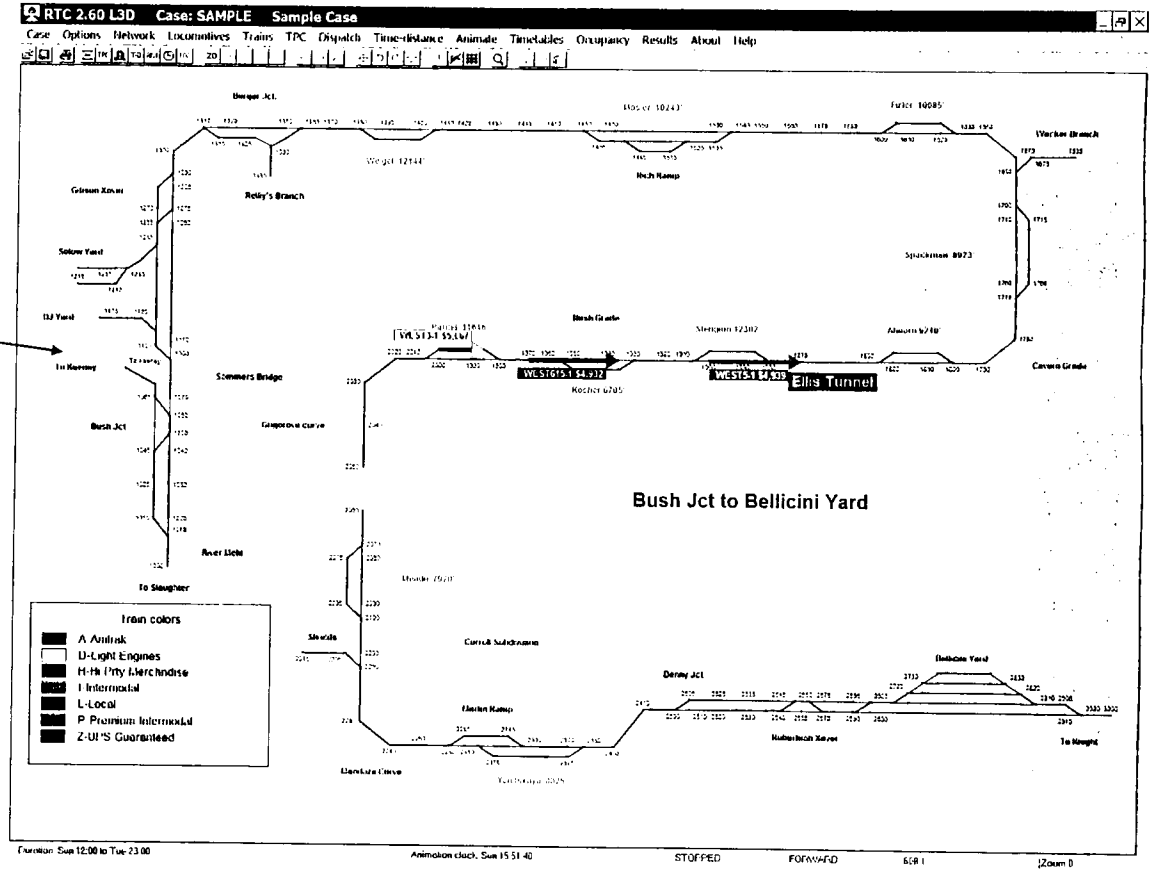
- Clicking on any train's stringline produces the window of information shown here.
- The window contains all of the train's statistics at that point in time.



Rail Network Analytics

G. Animation output

- The user can view the simulation results by selecting ANIMATION, DISPLAY ANIMATION.
- Press the space bar to begin the animation.
- Use the up and down arrow to control the speed of the animation.



Rail Network Analytics

H. Dispatch file output

- Once the simulation is complete, RTC writes the detailed movement of each train into a file named ROUTE. For this example, the output is named SAMPLE.ROUTE.

- The ROUTE file enables the user to analyze the movement of each train.

- The ROUTE file is produced in one of two formats:

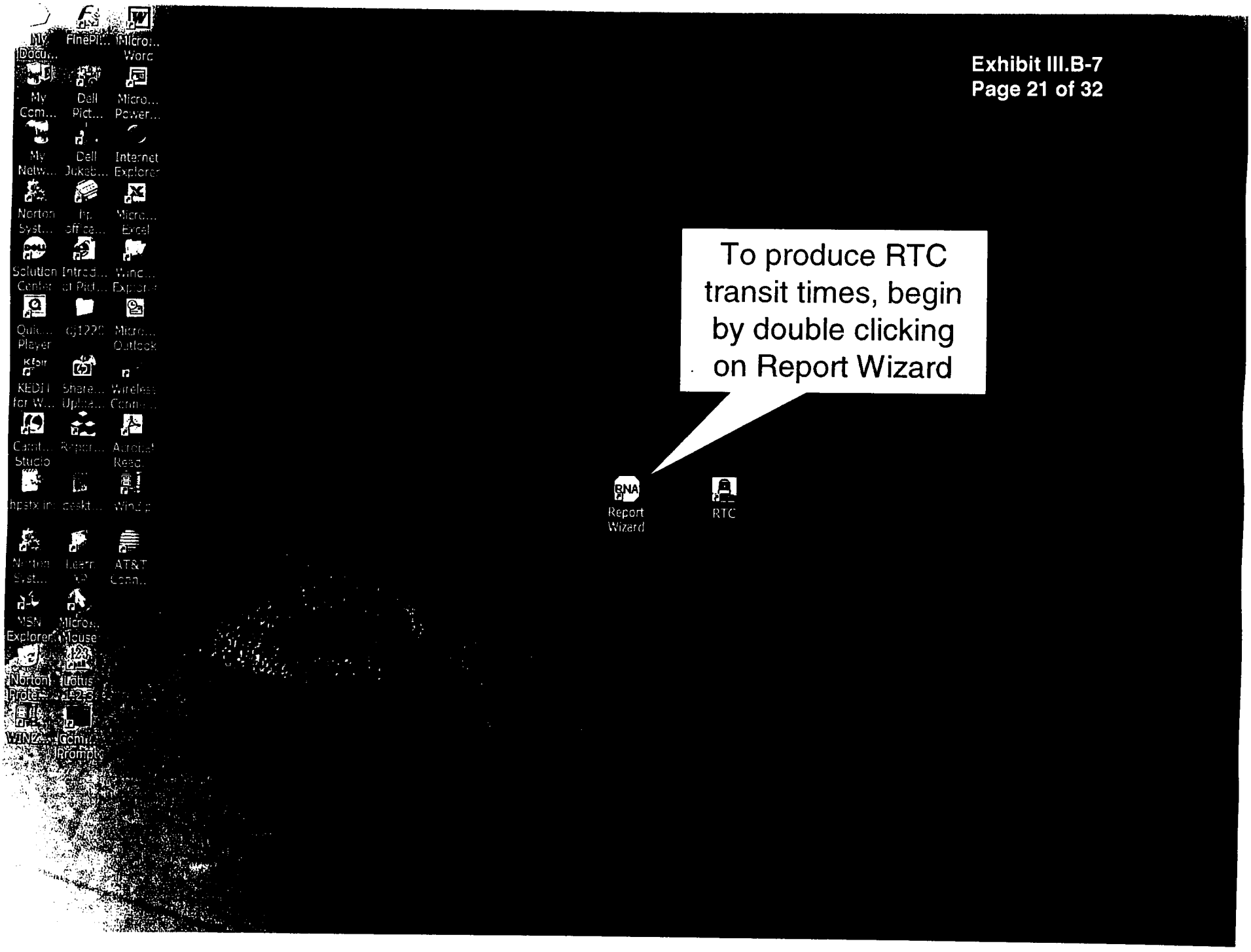
  1) The default is a text file format that can be viewed in any commonly available text file viewer such as KEDIT. This text file is also the format used by the Rail Network Analytics Report Wizard described in detail in the following slides.

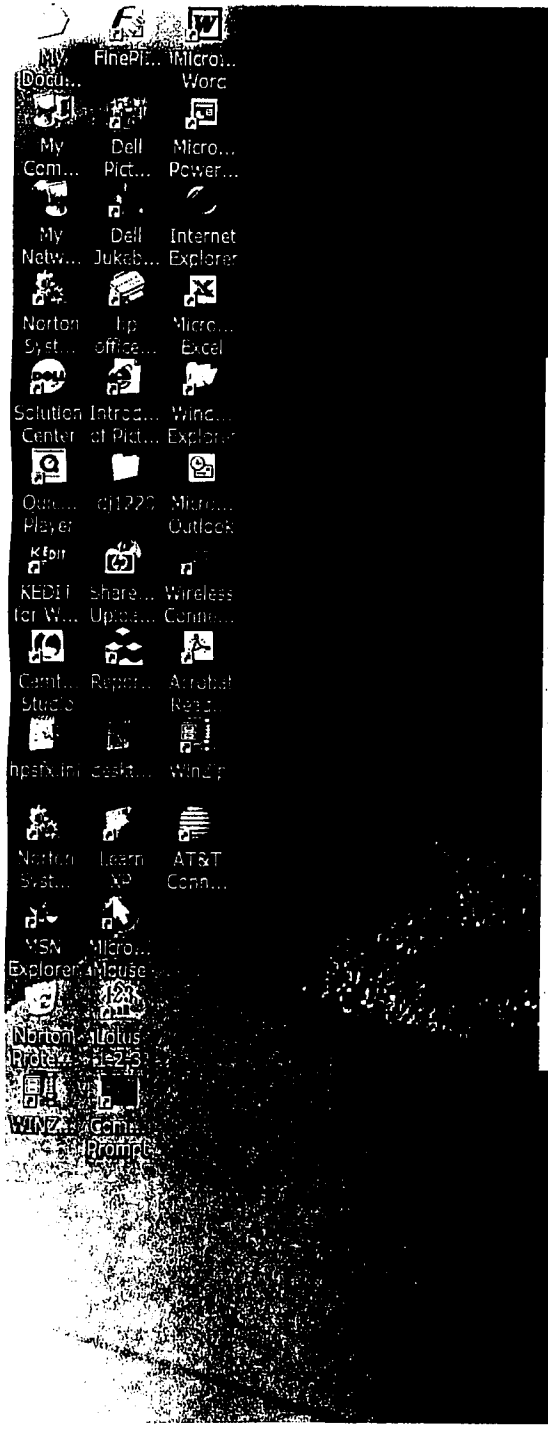
  2) The user can also select a comma separated variable (csv) format – a universal format that can be imported into any database analysis tool (Excel, Access, etc.). To produce this format, the user selects DISPATCH, REPORTS, then selects the box PRODUCE ROUTE FILE IN SPREADSHEET FORMAT before dispatching the case.

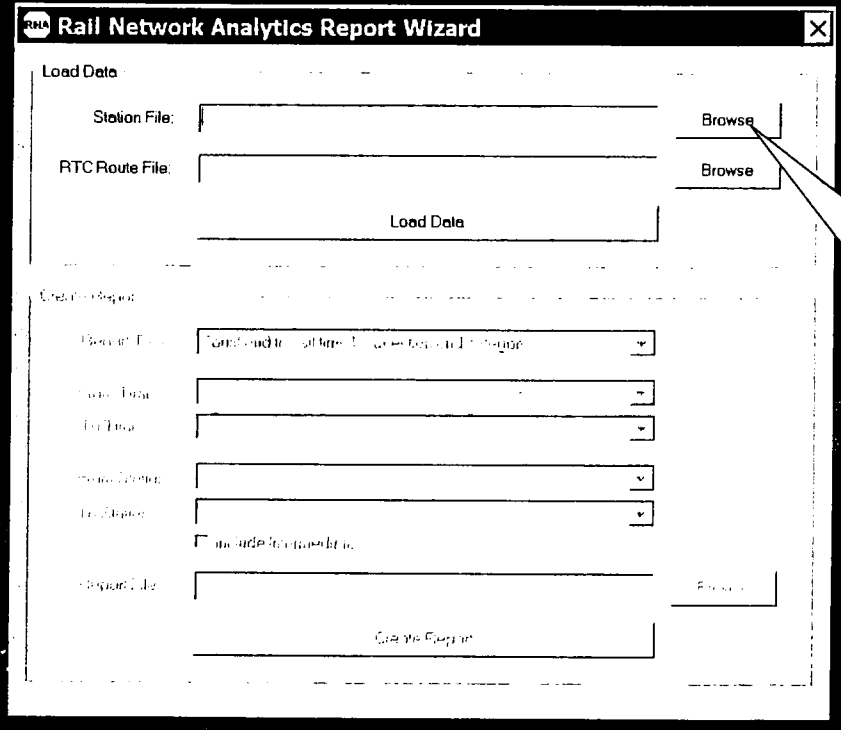
Rail Network Analytics

I. Report Wizard

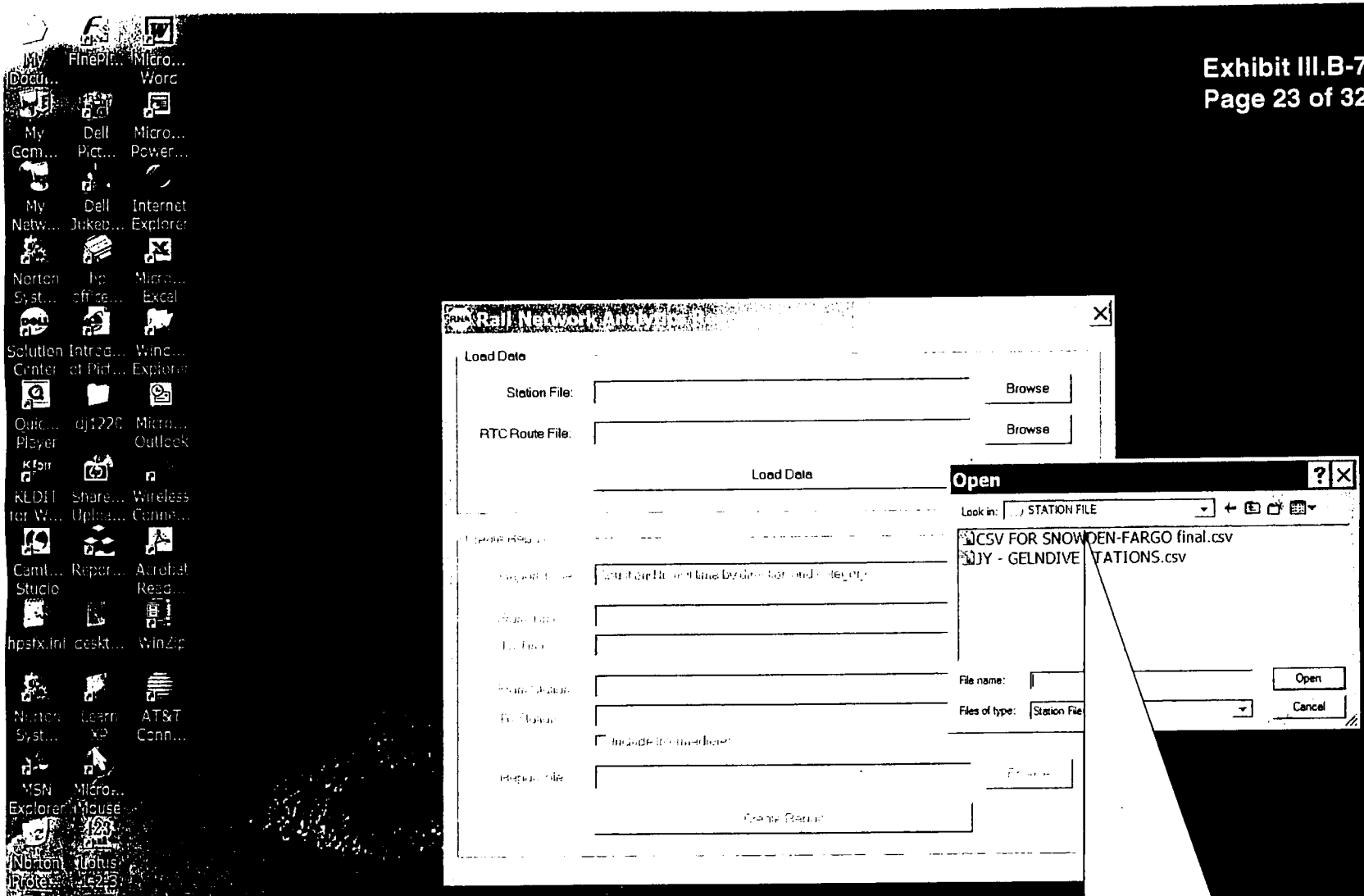
- The following 12 pages contain instructions on the use of the Report Wizard using the Snowden to Fargo network as an example.


To produce RTC transit times, begin by double clicking on Report Wizard
Report Wizard
RTC

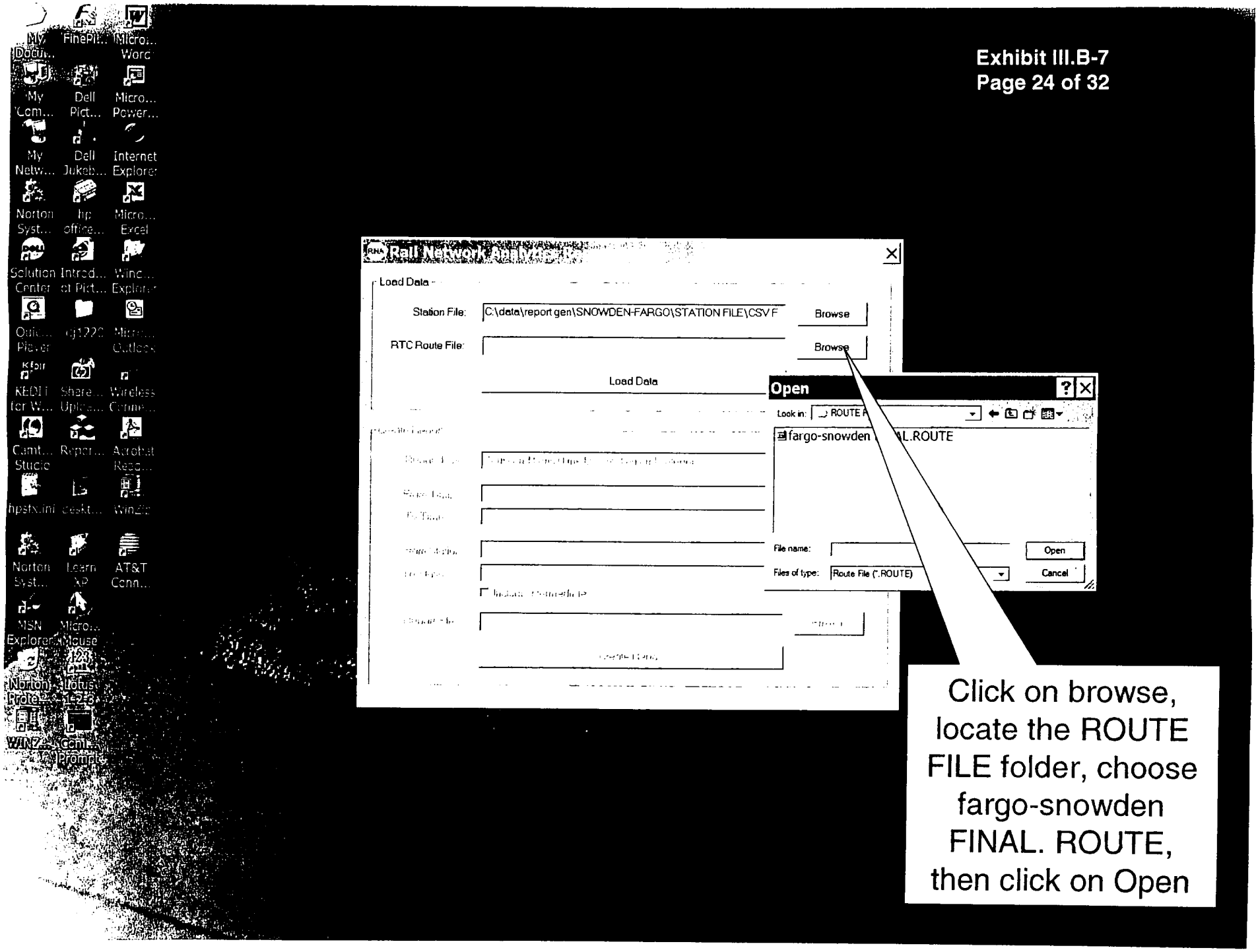


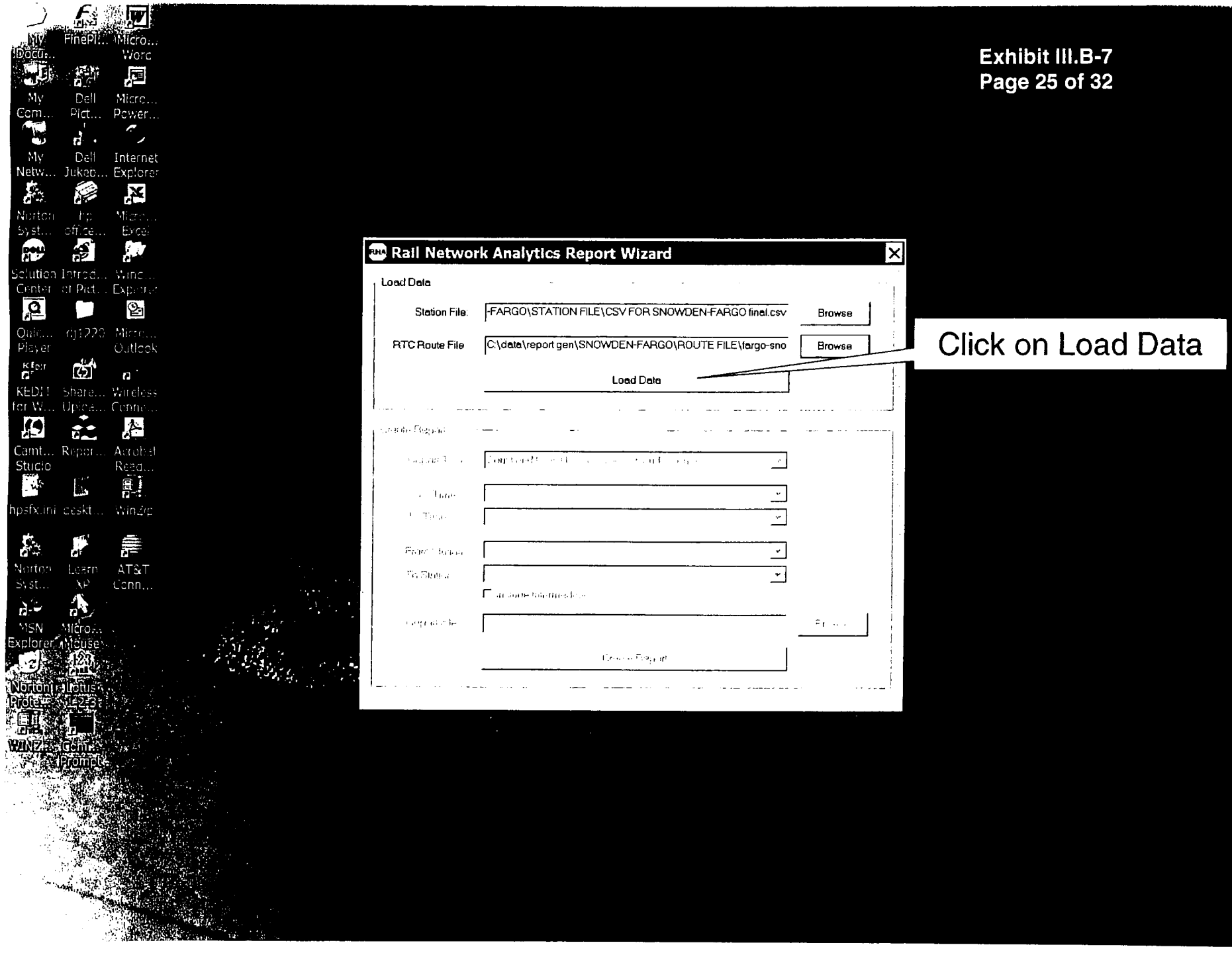


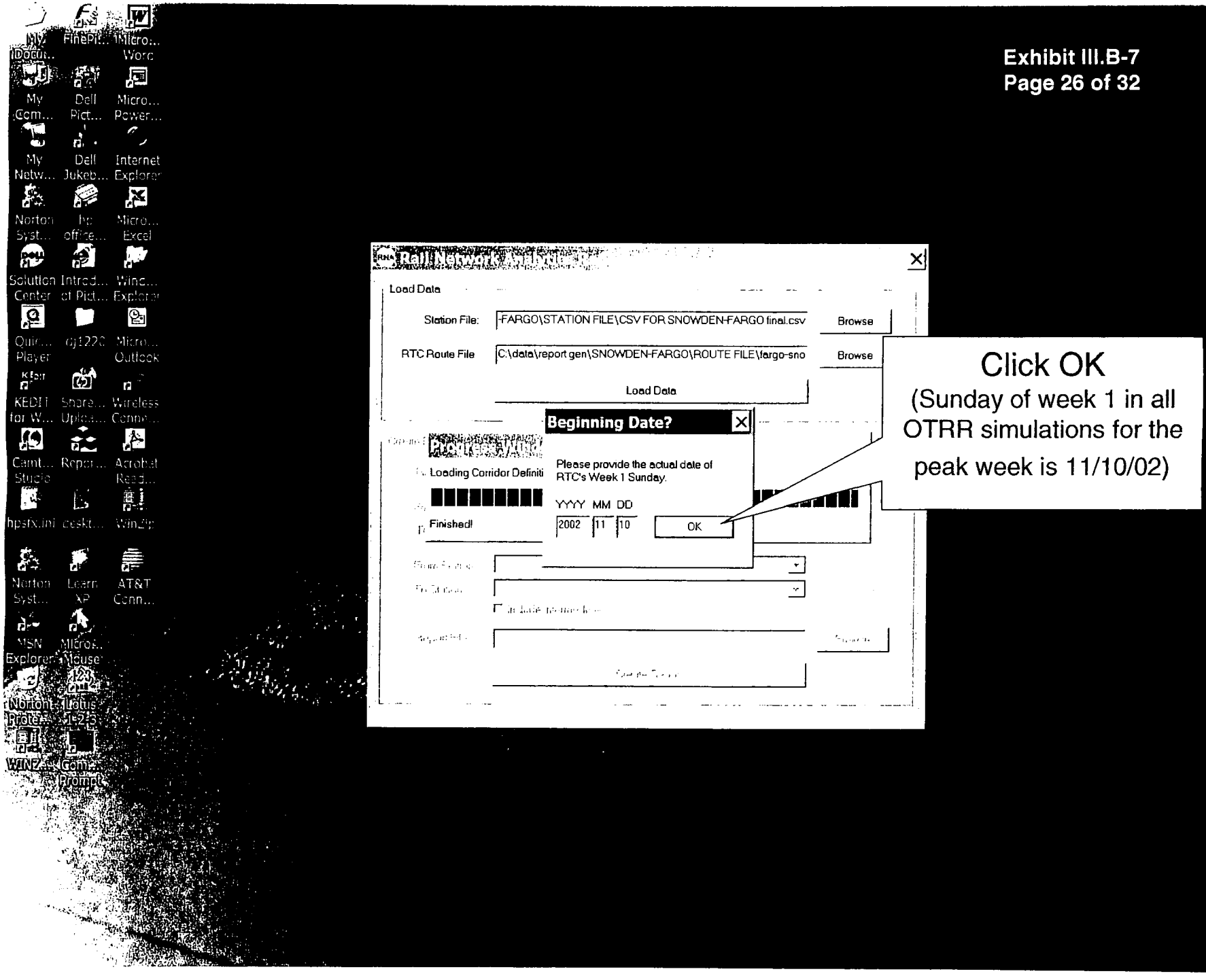
Load the stations by double clicking on browse

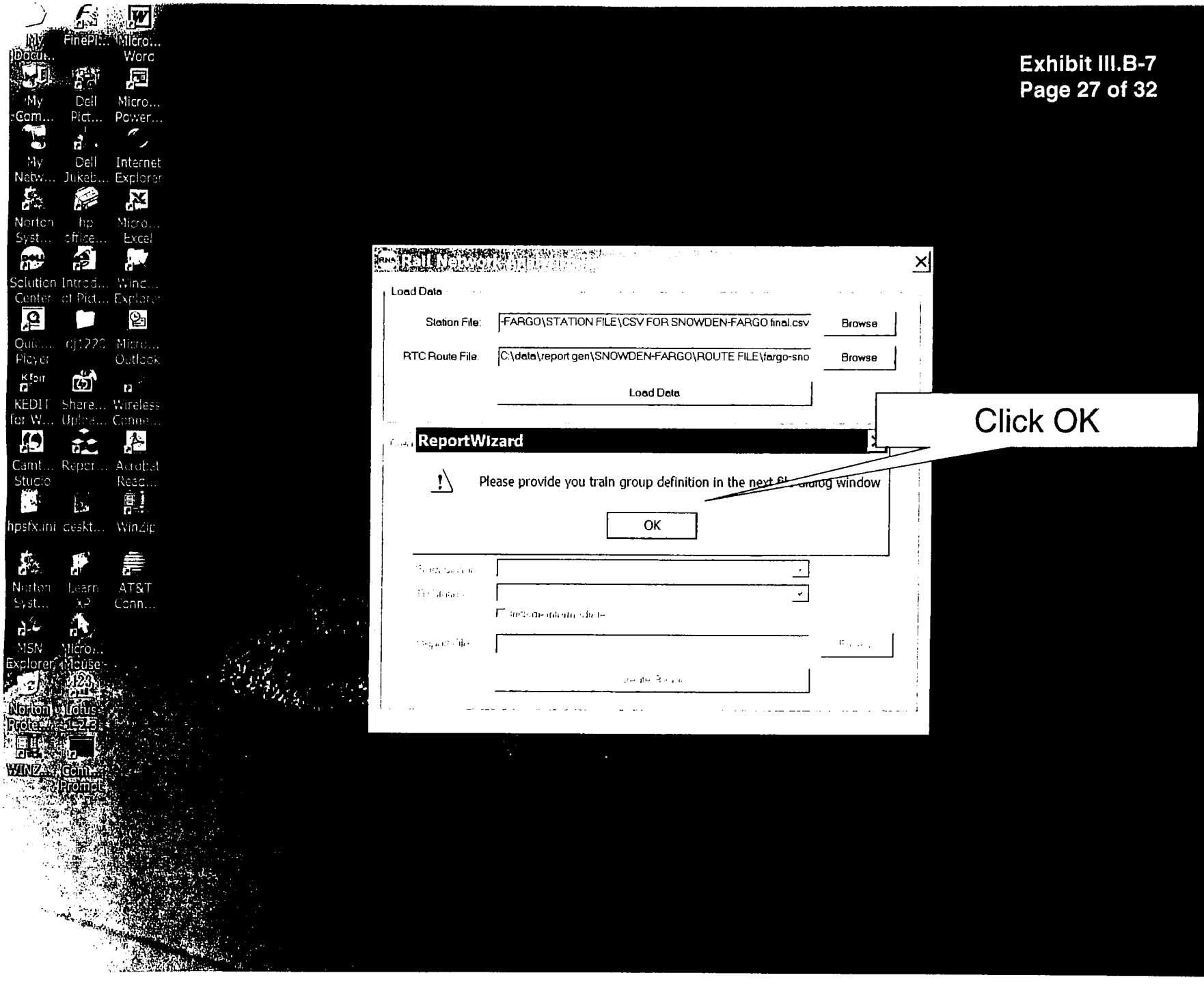


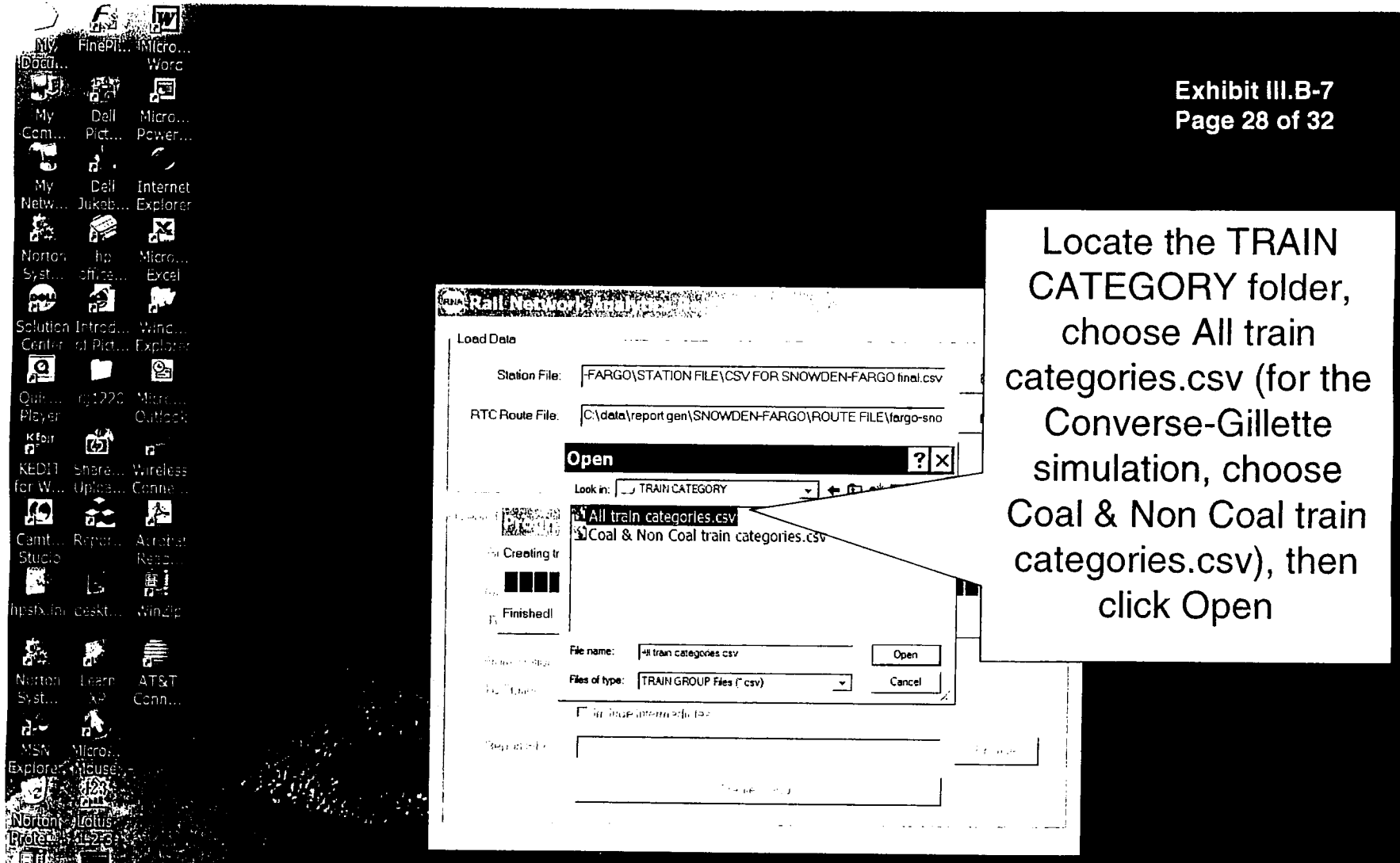
Locate the STATION FILE folder, choose CSV for Snowden-Fargo final.csv, then click on Open


Rail Network Analysis
Load Data
Station File:
C:\data\report gen\SNOWDEN-FARGO\STATION FILE\CSV F
Browse
RTC Route File:
Browse
Load Data
Open
Look in:
ROUTE
fargo-snowden
L.ROUTE
File name:
Open
Files of type:
Route File (*.ROUTE)
Cancel
Click on browse, locate the ROUTE FILE folder, choose fargo-snowden FINAL. ROUTE, then click on Open

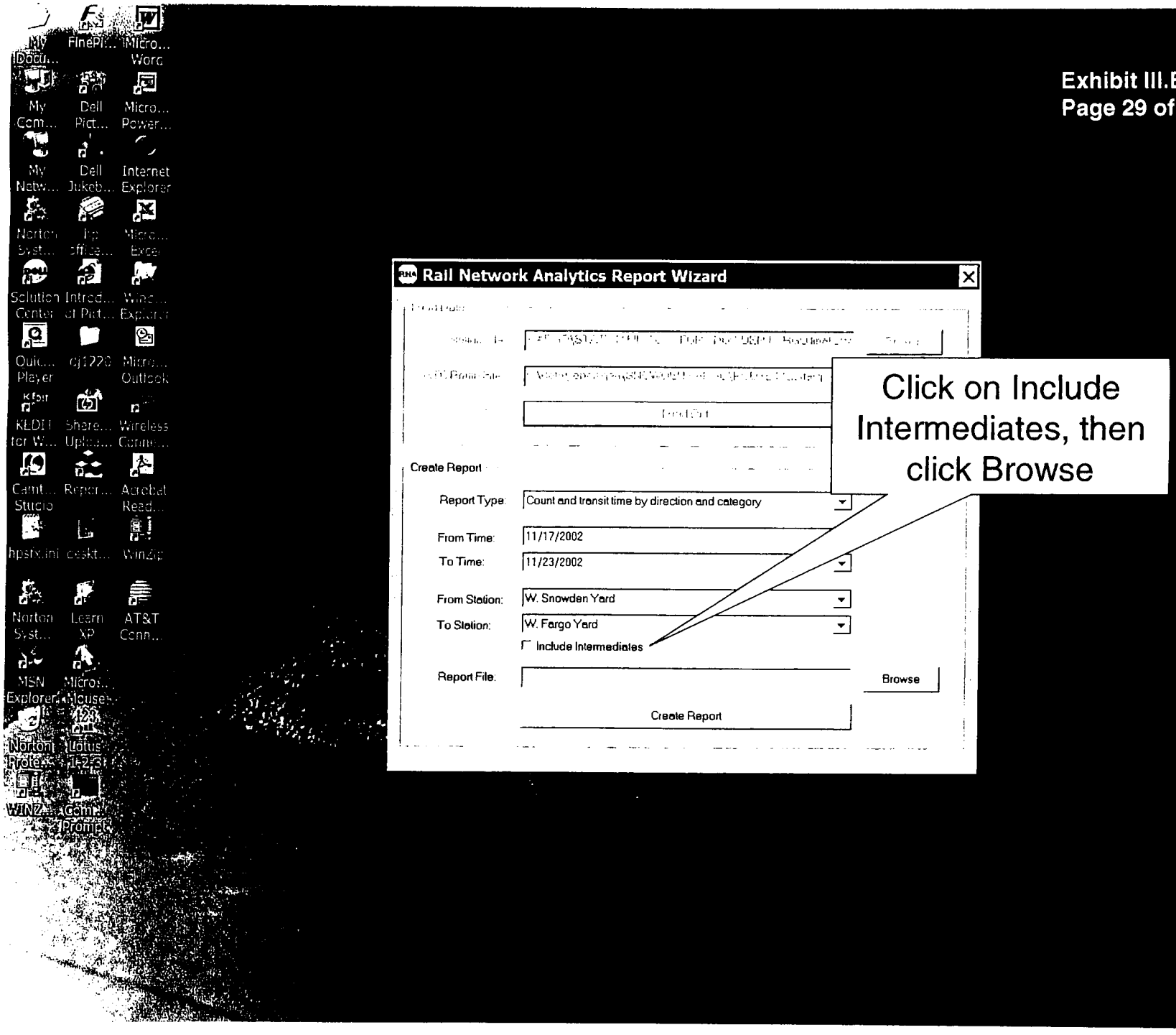

Rail Network Analytics Report Wizard
Load Data
Station File:
-FARGO\STATION FILE\CSV FOR SNOWDEN-FARGO final.csv
Browse
RTC Route File
C:\data\report gen\SNOWDEN-FARGO\ROUTE FILE\fargo-sno
Browse
Load Data
Click on Load Data

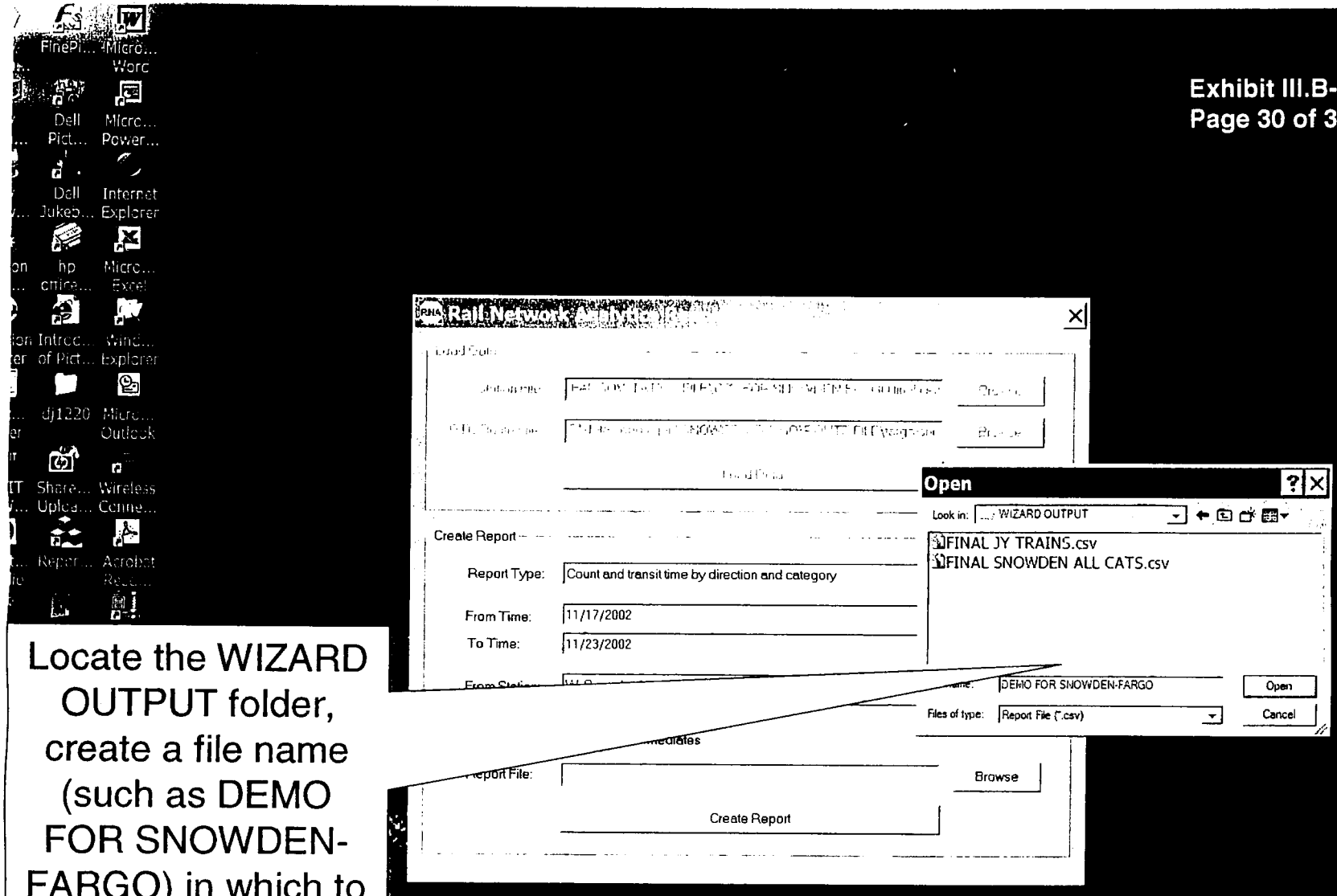

Load Data
Station File:
-FARGO\STATION FILE\CSV FOR SNOWDEN-FARGO final.csv
Browse
RTC Route File
C:\data\report gen\SNOWDEN-FARGO\ROUTE FILE\fargo-sno
Browse
Load Data
Beginning Date?
Please provide the actual date of RTC's Week 1 Sunday.
YYYY MM DD
2002 11 10
OK
Loading Corridor Definiti
Finished!
Click OK
(Sunday of week 1 in all OTRR simulations for the peak week is 11/10/02)


Load Data
Station File:
-FARGO\STATION FILE\CSV FOR SNOWDEN-FARGO final.csv
Browse
RTC Route File.
C:\data\report gen\SNOWDEN-FARGO\ROUTE FILE\fargo-sno
Browse
Load Data
ReportWizard
Please provide you train group definition in the next
dialog window
OK
Click OK

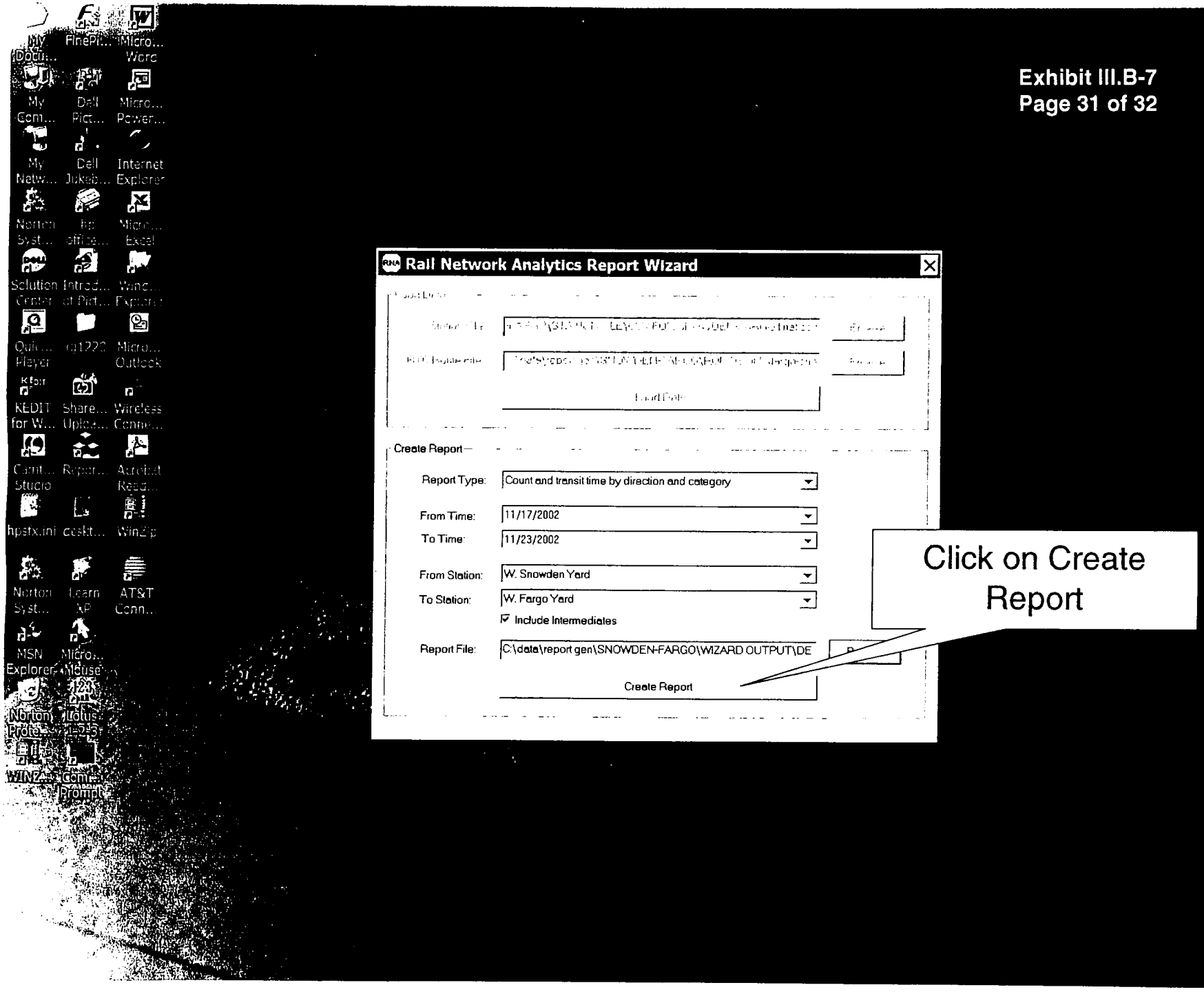


Locate the TRAIN CATEGORY folder, choose All train categories.csv (for the Converse-Gillette simulation, choose Coal & Non Coal train categories.csv), then click Open


Rail Network Analytics Report Wizard
Create Report
Report Type:
Count and transit time by direction and category
From Time:
11/17/2002
To Time:
11/23/2002
From Station:
W. Snowden Yard
To Station:
W. Fargo Yard
Include Intermediates
Report File:
Browse
Create Report
Click on Include Intermediates, then click Browse



Locate the WIZARD OUTPUT folder, create a file name (such as DEMO FOR SNOWDEN-FARGO) in which to save the report, then click Open


Rail Network Analytics Report Wizard
Create Report
Report Type:
Count and transit time by direction and category
From Time:
11/17/2002
To Time:
11/23/2002
From Station:
W. Snowden Yard
To Station:
W. Fargo Yard
Include Intermediates
Report File:
C:\data\report gen\SNOWDEN-FARGO\WIZARD.OUTPUT\DE
Create Report
Click on Create Report

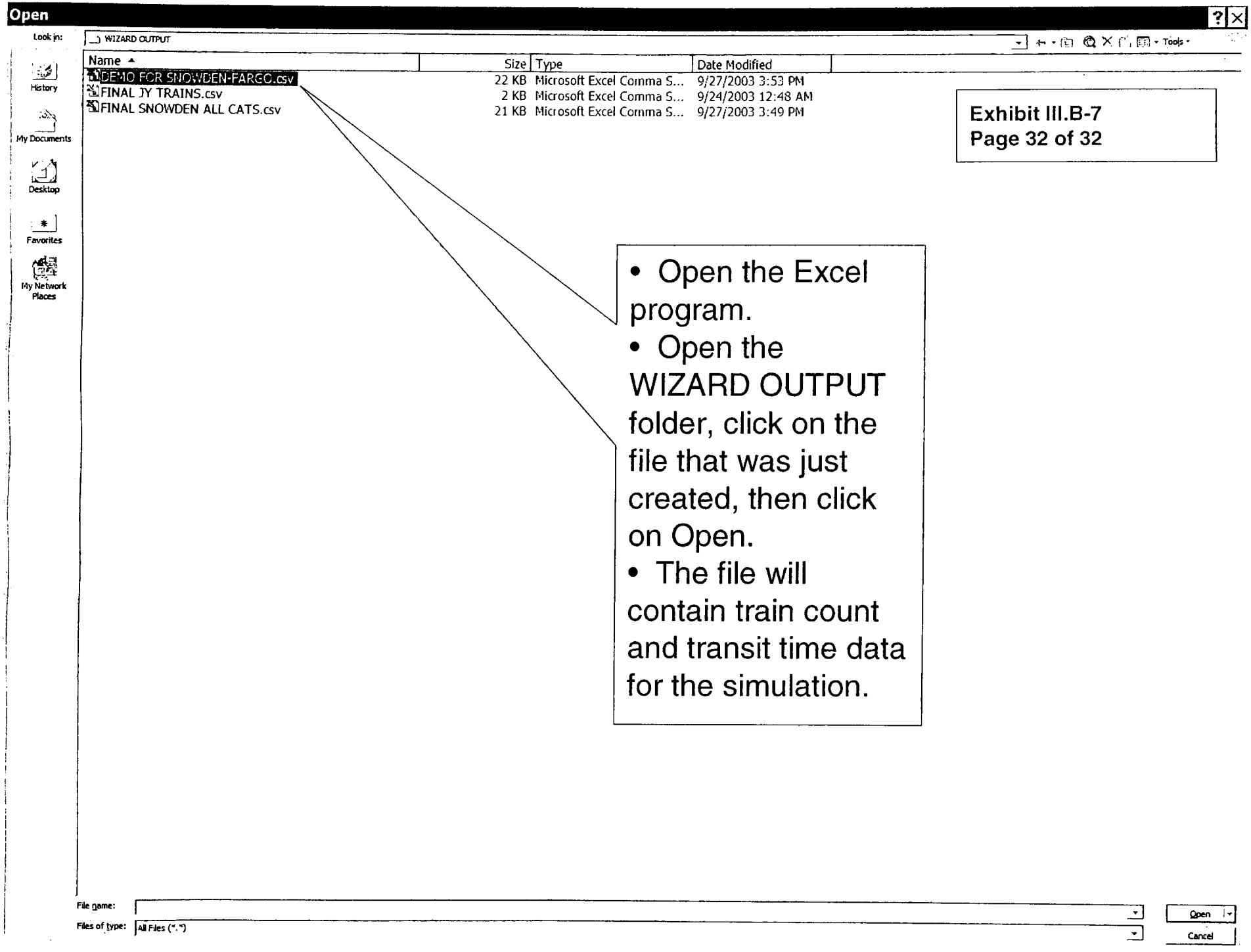


Exhibit III.B-7
Page 32 of 32

- Open the Excel program.
- Open the WIZARD OUTPUT folder, click on the file that was just created, then click on Open.
- The file will contain train count and transit time data for the simulation.

RTC 2.60 L3D Case: Orin Flat

SD70MAC forces by throttle position

Prorate forces from DB 8 and RUN 8

All DB | DB by row | All RUN | RUN by row

Global multipliers

DB factor: 1.000 | Multiply by DB factor

RUN factor: 1.000 | Multiply by RUN factor

Local (row) multipliers

Multiply by DB row factors | Multiply by RUN row factors

	Speed (MPH)	DB 8	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	Prorate DB ?	Prorate RUN ?	DB multiplier
1	0	0	0	0	0	0	0	0	0	15000	35000	55000	75000	100000	125000	150000	175000	No	No	1.000
2	1	2025	2025	2025	2025	2025	2025	1291	270	15000	35000	55000	75000	100000	125000	150000	175500	No	No	1.000
3	2	40500	40500	40500	40500	40500	27000	12913	2700	15000	35000	55000	75000	100000	125000	150000	175500	No	No	1.000
4	3	60750	60750	60750	56348	41087	27000	12913	2700	15000	35000	55000	75000	100000	125000	150000	175500	No	No	1.000
5	4	81000	81000	68087	56348	41087	27000	12913	2700	14020	32345	55000	75000	100000	125000	150000	175500	No	No	1.000
6	5	81000	81000	68087	56348	41087	27000	12913	2700	11619	26657	55000	75000	100000	125000	150000	175500	No	No	1.000
7	6	81000	81000	68087	56348	41087	27000	12913	2700	9944	22394	49065	67704	90927	119641	150000	175500	No	No	1.000
8	7	81000	81000	68087	56348	41087	27000	12913	2700	8747	19349	42578	58752	78904	103821	150000	172157	No	No	1.000
9	8	81000	81000	68087	56348	41087	27000	12913	2700	7809	17016	38532	53238	70706	92949	135596	154125	No	No	1.000
10	9	81000	81000	68087	56348	41087	27000	12913	2700	6995	15199	34454	47616	63365	83341	123020	139000	No	No	1.000
11	10	81000	81000	68087	56348	41087	27000	12913	2700	6343	13662	30999	42905	57121	75249	112201	126900	No	No	1.000
12	11	81000	81000	68087	56348	41087	27000	12913	2700	5784	12468	28306	39154	52222	68794	102312	117000	No	No	1.000
13	12	81000	81000	68087	56348	41087	27000	12913	2700	5317	11473	26062	36028	48139	63415	94072	107830	No	No	1.000
14	13	81000	81000	68087	56348	41087	27000	12913	2700	4923	10631	24162	33383	44684	58863	87098	100072	No	No	1.000
15	14	81000	81000	68087	56348	41087	27000	12913	2700	4583	9965	22610	31294	41718	55016	81590	93811	No	No	1.000
16	15	81000	81000	68087	56348	41087	27000	12913	2700	4272	9326	21187	29314	39130	51603	76401	87843	No	No	1.000
17	16	81000	81000	68087	56348	41087	27000	12913	2700	4000	8766	19941	27581	36866	48618	71861	82621	No	No	1.000
18	17	81000	81000	68087	56348	41087	27000	12913	2700	3760	8272	18842	26052	34867	45983	67853	78012	No	No	1.000
19	18	81000	81000	68087	56348	41087	27000	12913	2700	3550	7832	17844	24678	33054	43581	64263	73883	No	No	1.000
20	19	81000	81000	68087	56348	41087	27000	12913	2700	3365	7436	16942	23440	31416	41408	61038	70176	No	No	1.000
21	20	81000	81000	68087	56348	41087	27000	12913	2700	3199	7081	16130	22326	29942	39452	58135	66838	No	No	1.000
22	25	77777	77777	68087	56348	41087	27000	12913	2700	2549	5695	13015	17997	24208	31888	46913	53899	No	No	1.000
23	30	64814	64814	64814	56348	41087	27000	12913	2700	2110	4749	10889	15053	20318	26728	39272	45100	No	No	1.000
24	35	55555	55555	55555	55555	41087	27000	12913	2700	1795	4054	9318	12902	17481	22926	33658	38652	No	No	1.000
25	40	48610	48610	48610	48610	41087	27000	12913	2700	1546	3521	8117	11253	15229	20012	29369	33713	No	No	1.000

OK | Plot | Cancel

Mouse mode: Select for inquiry or movement | RTC coordinates: (218, 915) | Click on mouse toolbar button for mouse modes | Zoom 0

Start | 6 M... | 4 Mi... | KEDI... | Helpe... | C:\rtc... | 1-2-3 ... | 2 RTC | 2 In... | Acrob... | 3 Mi... | AT&T ... | Desktop » data » | 10:46 PM

RTC 2.60 L3D Case: fargo-sno

Track Status
OTRR Opening Evidence

DASH-9 forces by throttle position

Prorate forces from DB 8 and RUN 8

All DB | DB by row

All RUN | RUN by row

Global multipliers

DB factor: 1.000 | Multiply by DB factor

RUN factor: 1.000 | Multiply by RUN factor

Local (row) multipliers

Multiply by DB row factors

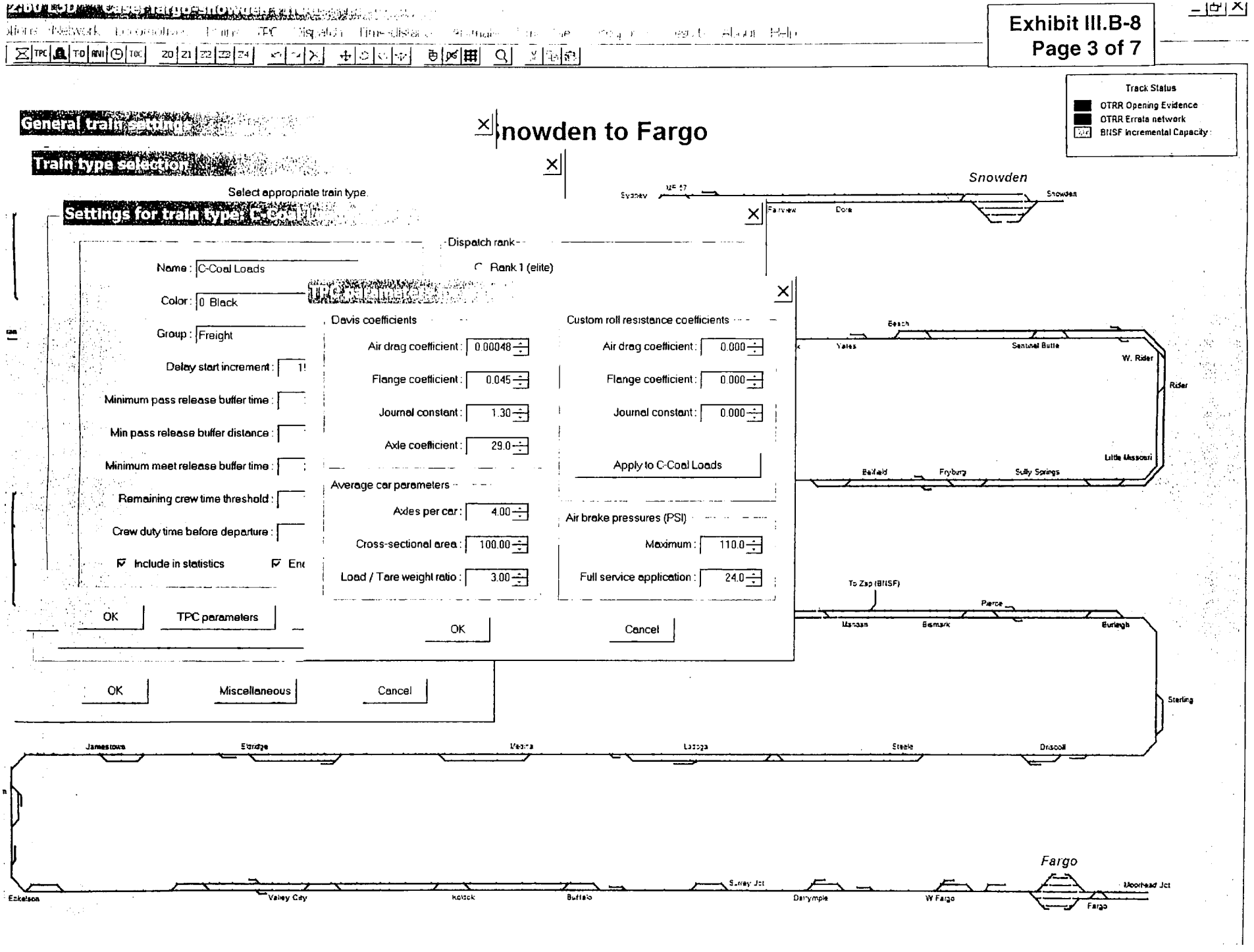
Multiply by RUN row factors

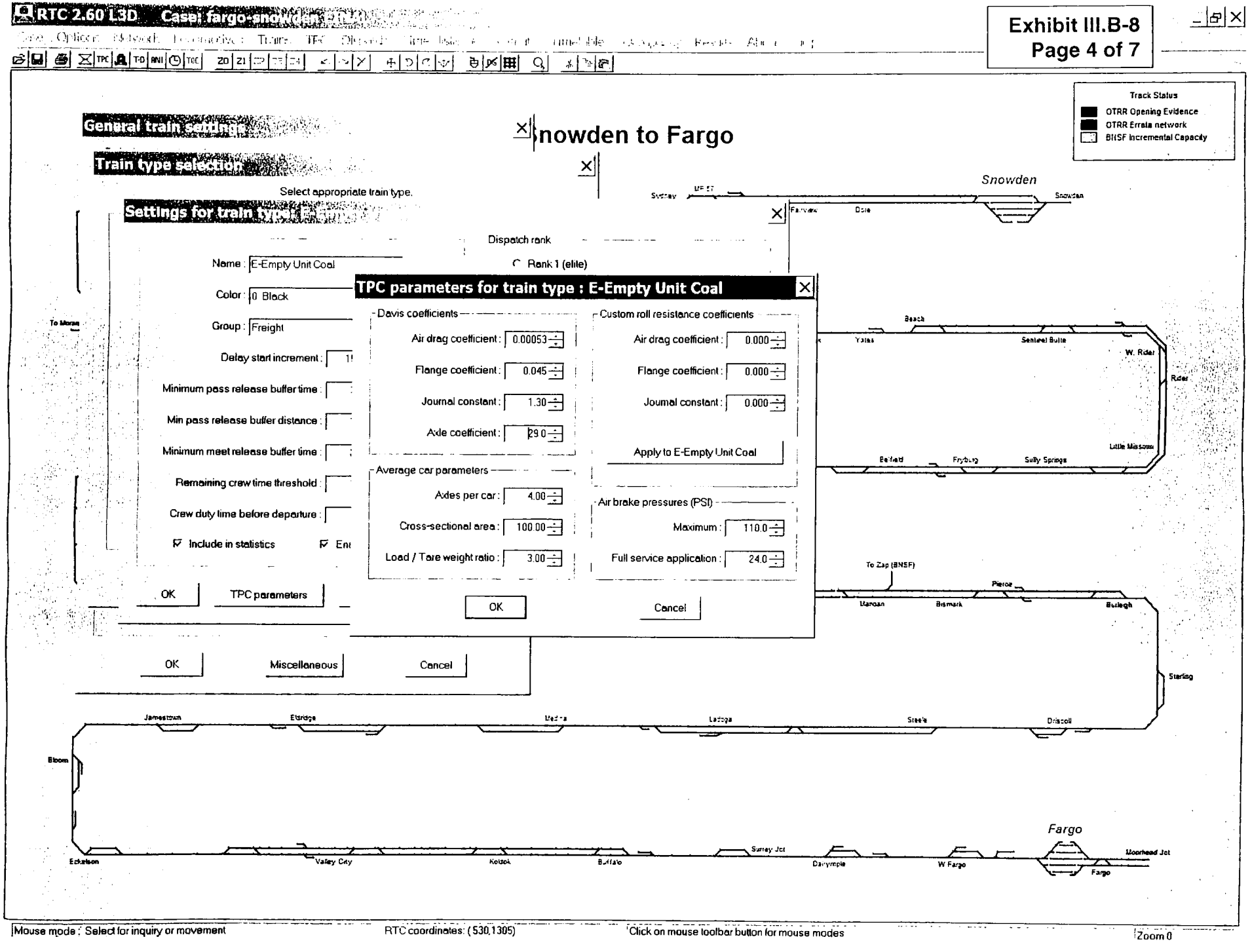
	Speed (MPH)	DB 8	DB 7	DB 6	DB 5	DB 4	DB 3	DB 2	DB 1	RUN 1	RUN 2	RUN 3	RUN 4	RUN 5	RUN 6	RUN 7	RUN 8	Prorate DB ?	Prorate RUN ?	DB multiplier
1	0	0	0	0	0	0	0	0	0	14421	42859	71260	88609	106956	120789	129499	142040	No	No	1.000
2	1	8769	7673	6577	5481	4385	3288	2192	1096	14421	42859	71260	88609	106956	120789	129499	142040	No	No	1.000
3	2	17538	15346	13154	10961	8769	6577	4385	2192	14421	42859	71260	88609	106956	120789	129499	142040	No	No	1.000
4	3	26308	23019	19731	16442	13154	9865	6577	3288	14421	40585	71260	88609	106956	120789	129499	142040	No	No	1.000
5	4	35077	30692	26308	21923	17538	13154	8769	4385	13619	33426	63511	88609	106956	120789	129499	142040	No	No	1.000
6	5	43846	38365	32884	27404	21923	16442	10961	5481	11350	28270	54831	79583	106956	120789	129499	142040	No	No	1.000
7	6	52615	46038	39461	32884	26308	19731	13154	6577	9704	24421	48049	70453	96494	120789	129499	142040	No	No	1.000
8	7	61384	53711	46038	38365	30692	23019	15346	7673	8458	21454	42662	62956	86954	112321	129499	142040	No	No	1.000
9	8	63286	55375	47464	39554	31643	23732	15821	7911	7488	19109	38291	56485	79003	102514	124927	142040	No	No	1.000
10	9	56262	49229	42196	35164	28131	21098	14065	7033	6710	17204	34685	51723	72273	94183	115108	137916	No	No	1.000
11	10	54712	47873	41034	34195	27356	20517	13678	6839	6073	15638	31676	47394	66448	86950	106599	128179	No	No	1.000
12	11	60183	52661	45138	37615	30092	22569	15046	7523	5541	14326	29122	43705	61477	80672	99165	119542	No	No	1.000
13	12	65655	57448	49241	41034	32827	24621	16414	8207	5092	13209	26937	40515	57153	75196	92611	111924	No	No	1.000
14	13	71126	62235	53344	44454	35563	26672	17781	8891	4707	12246	25042	37741	53355	70357	86792	105099	No	No	1.000
15	14	71179	62281	53384	44487	35589	26692	17795	8897	4372	11414	23398	35312	50004	66062	81612	99007	No	No	1.000
16	15	66395	58096	49796	41497	33198	24898	16599	8299	4080	10680	21934	33167	47046	62220	76995	93552	No	No	1.000
17	16	63769	55798	47827	39856	31885	23913	15942	7971	3823	10033	20653	31256	44400	58773	72875	88619	No	No	1.000
18	17	67755	59285	50816	42347	33877	25408	16939	8469	3595	9453	19492	29538	42014	55692	69094	84132	No	No	1.000
19	18	71740	62773	53805	44838	35870	26903	17935	8968	3389	8935	18463	27997	39872	52888	65686	80041	No	No	1.000
20	19	72536	63469	54402	45335	36268	27201	18134	9067	3206	8469	17528	26609	37917	50353	62566	76335	No	No	1.000
21	20	68859	60251	51644	43037	34429	25822	17215	8607	3039	8048	16681	25337	36143	48050	59730	72936	No	No	1.000
22	25	71250	62344	53438	44531	35625	26719	17813	8906	2399	6424	13403	20424	29228	38952	48560	59473	No	No	1.000
23	30	65117	56978	48838	40698	32559	24419	16279	8140	1961	5319	11170	17053	24467	32684	40789	50043	No	No	1.000
24	35	56021	49018	42016	35013	28010	21008	14005	7003	1640	4518	9550	14607	20996	28076	35084	43100	No	No	1.000
25	40	49372	43201	37029	30858	24686	18515	12343	6172	1393	3909	8318	12747	18357	24569	30722	37784	No	No	1.000

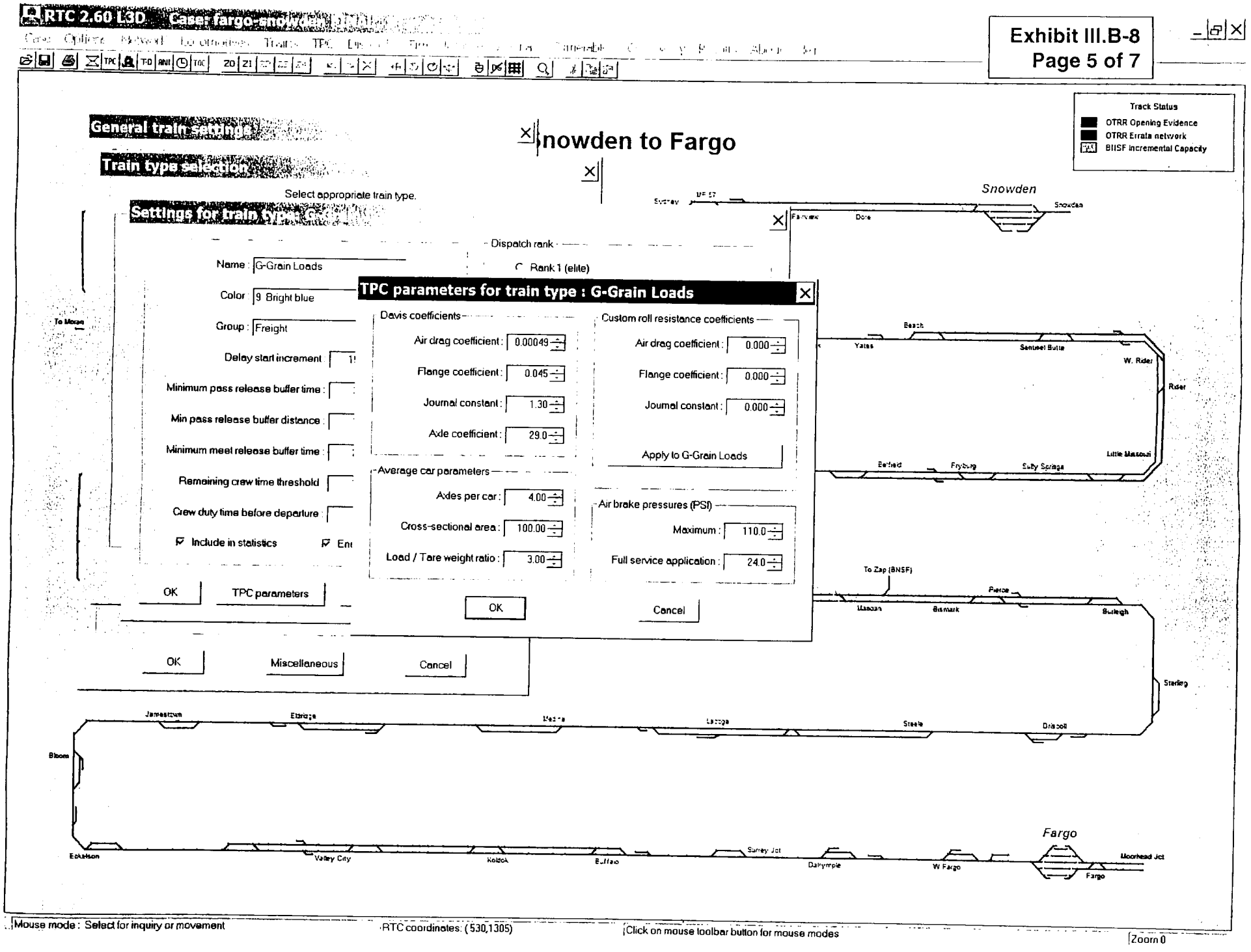
OK | Plot | Cancel

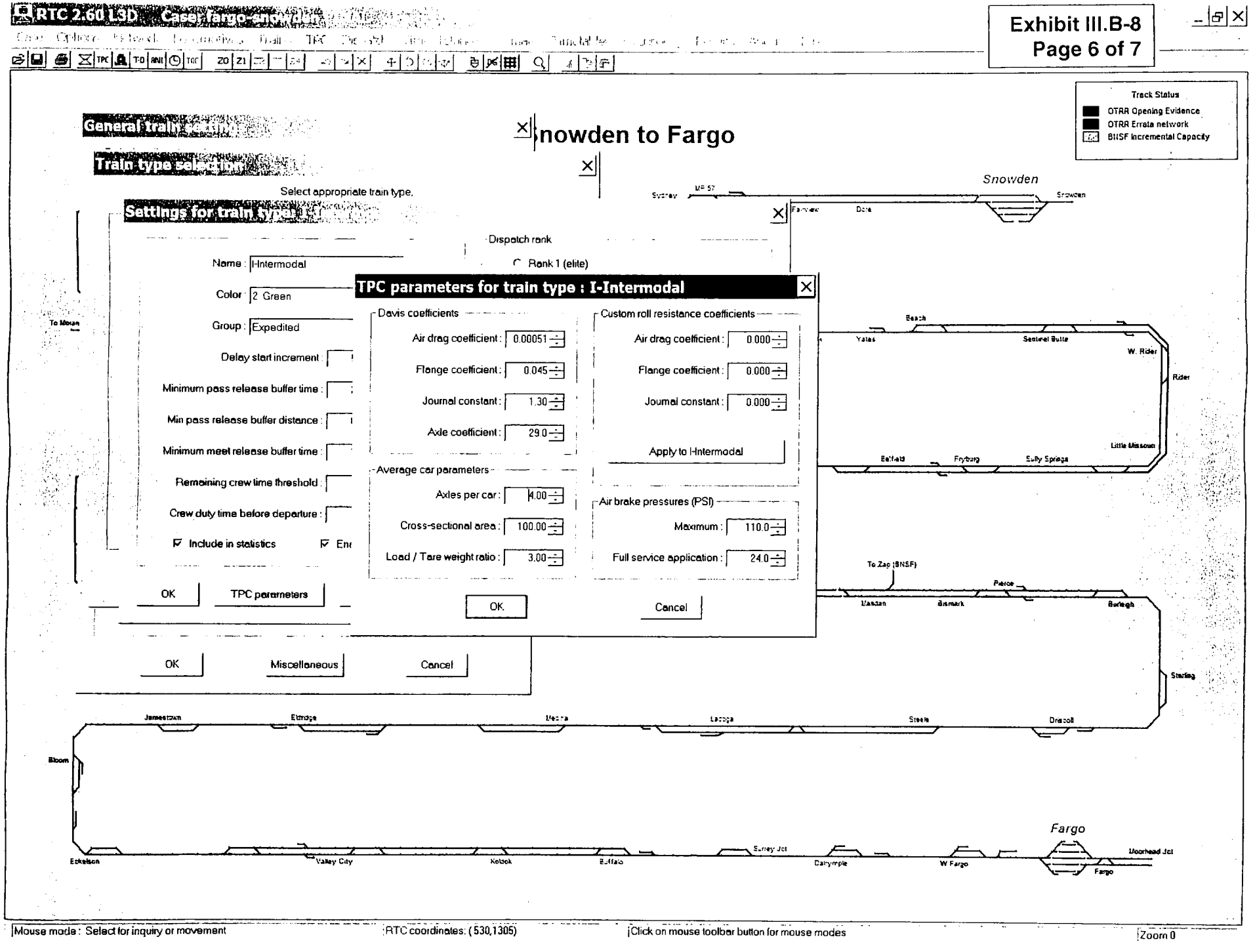
Mouse mode : Select for inquiry or movement | RTC coordinates: (390,1301) | Zoom level changed | Zoom 0

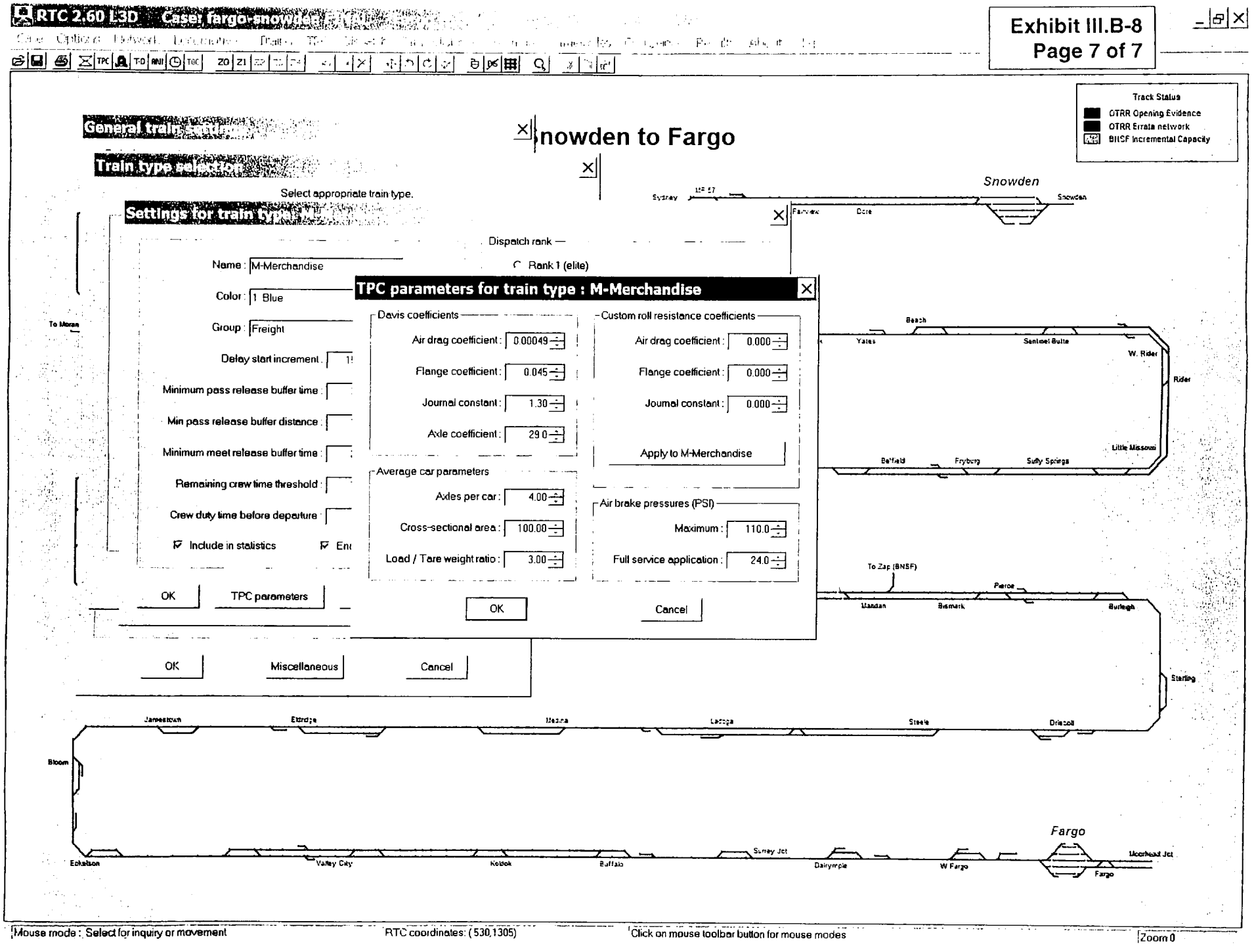
Start | 6 Mi... | 4 Mi... | KEDIT... | Heloer... | C:\rtc\... | 1-2-3 -... | 2 RTC | 2 Int... | Acroba... | 3 Mi... | Desktop » data » | 11:30 PM


Track Status
OTRR Opening Evidence
OTRR Errata network
BNSF Incremental Capacity
Snowden to Fargo
General train settings
Train type selection
Select appropriate train type.
Settings for train type: C-Coal
Name : C-Coal Loads
Color : 0 Black
Group : Freight
Delay start increment :
Minimum pass release buffer time :
Min pass release buffer distance :
Minimum meet release buffer time :
Remaining crew time threshold :
Crew duty time before departure :
Include in statistics
Dispatch rank
Rank 1 (elite)
TPC parameters
Davis coefficients
Air drag coefficient : 0.00048
Flange coefficient : 0.045
Journel constant : 1.30
Axle coefficient : 29.0
Average car parameters
Axles per car : 4.00
Cross-sectional area : 100.00
Load / Tare weight ratio : 3.00
Custom roll resistance coefficients
Air drag coefficient : 0.000
Flange coefficient : 0.000
Journel constant : 0.000
Apply to C-Coal Loads
Air brake pressures (PSI)
Maximum : 110.0
Full service application : 24.0
OK
TPC parameters
OK
Cancel
OK
Miscellaneous
Cancel
Snowden
Sydney
Fairview
Dore
Beach
Yates
Sentinel Butte
W. Rider
Rider
Little Missouri
Baifield
Fryburg
Sully Springs
To Zap (BNSF)
Pierce
Mandan
Bismark
Burleigh
Sterling
Jamestown
Eldridge
Medina
Leeds
Steele
Driscoll
Fargo
Ezkelson
Valley City
Kolack
Buffalo
Surrey Jct
Dairymple
W Fargo
Moorhead Jct
Fargo


RTC 2.60 L3D
General train settings
Train type selection
Select appropriate train type.
Settings for train type
Name : E-Empty Unit Coal
Color : 0 Black
Group : Freight
Delay start increment :
Minimum pass release buffer time :
Min pass release buffer distance :
Minimum meet release buffer time :
Remaining crew time threshold :
Crew duty time before departure :
Include in statistics
OK
TPC parameters
OK
Miscellaneous
Cancel
Dispatch rank
Rank 1 (elite)
TPC parameters for train type : E-Empty Unit Coal
Davis coefficients
Air drag coefficient : 0.00053
Flange coefficient : 0.045
Journal constant : 1.30
Axle coefficient : 29.0
Average car parameters
Axles per car : 4.00
Cross-sectional area : 100.00
Load / Tare weight ratio : 3.00
Custom roll resistance coefficients
Air drag coefficient : 0.000
Flange coefficient : 0.000
Journal constant : 0.000
Apply to E-Empty Unit Coal
Air brake pressures (PSI)
Maximum : 110.0
Full service application : 24.0
OK
Cancel
Snowden to Fargo
Track Status
OTRR Opening Evidence
OTRR Errata network
BNSF Incremental Capacity
Snowden
Fargo
Mouse mode : Select for inquiry or movement
RTC coordinates: (530,1305)
Click on mouse toolbar button for mouse modes
Zoom 0

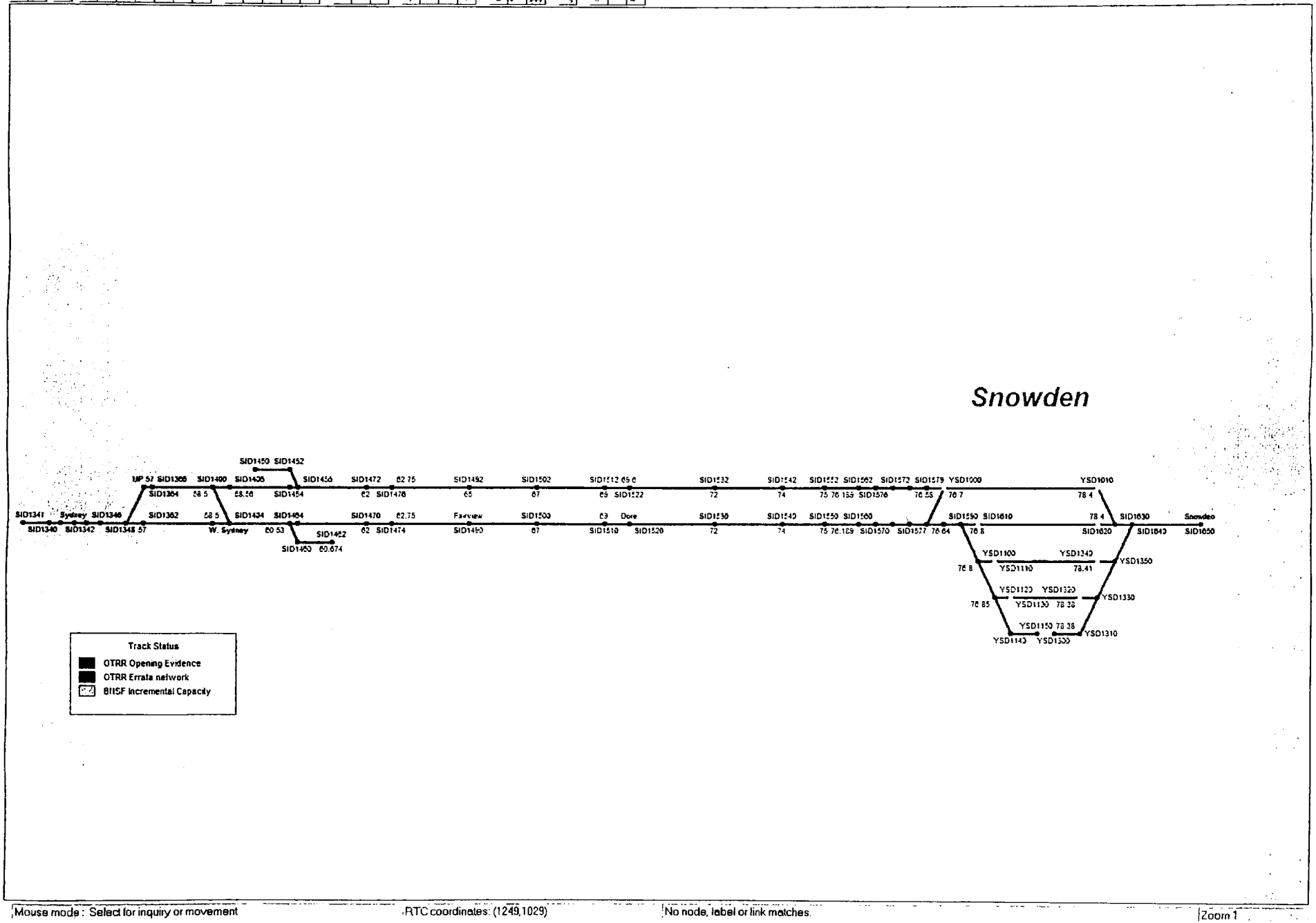

RTC 2.60 L3D
Case: fargo-snowden
General train settings
Train type selection
Select appropriate train type.
Settings for train type
Name : G-Grain Loads
Color : 9 Bright blue
Group : Freight
Delay start increment
Minimum pass release buffer time :
Min pass release buffer distance :
Minimum meet release buffer time :
Remaining crew time threshold
Crew duty time before departure :
Include in statistics
OK
TPC parameters
Dispatch rank
Rank 1 (elite)
TPC parameters for train type : G-Grain Loads
Davis coefficients
Air drag coefficient : 0.00049
Flange coefficient : 0.045
Journal constant : 1.30
Axle coefficient : 29.0
Average car parameters
Axles per car : 4.00
Cross-sectional area : 100.00
Load / Tare weight ratio : 3.00
Custom roll resistance coefficients
Air drag coefficient : 0.000
Flange coefficient : 0.000
Journal constant : 0.000
Apply to G-Grain Loads
Air brake pressures (PSI)
Maximum : 110.0
Full service application : 24.0
OK
Cancel
OK
Miscellaneous
Cancel
Snowden to Fargo
Track Status
OTRR Opening Evidence
OTRR Errata network
BNSF Incremental Capacity
Snowden
Fargo
Mouse mode : Select for inquiry or movement
RTC coordinates: (530,1305)
Click on mouse toolbar button for mouse modes
Zoom 0


RTC 2.60 L3D Case: fargo-snowden
Track Status
OTRR Opening Evidence
OTRR Errata network
BNSF Incremental Capacity
Snowden to Fargo
General train settings
Train type selection
Select appropriate train type.
Settings for train type: I-Intermodal
Name : I-Intermodal
Color : 2 Green
Group : Expedited
Delay start increment :
Minimum pass release buffer time :
Min pass release buffer distance :
Minimum meet release buffer time :
Remaining crew time threshold :
Crew duty time before departure :
Include in statistics
OK
TPC parameters
Dispatch rank
Rank 1 (elite)
TPC parameters for train type : I-Intermodal
Davis coefficients
Air drag coefficient : 0.00051
Flange coefficient : 0.045
Journal constant : 1.30
Axle coefficient : 29.0
Custom roll resistance coefficients
Air drag coefficient : 0.000
Flange coefficient : 0.000
Journal constant : 0.000
Apply to I-Intermodal
Average car parameters
Axles per car : 4.00
Cross-sectional area : 100.00
Load / Tare weight ratio : 3.00
Air brake pressures (PSI)
Maximum : 110.0
Full service application : 24.0
OK
Cancel
OK
Miscellaneous
Cancel
Snowden
Sydney
MP 57
Fairview
Dore
Snowden
To Moran
Beach
Yates
Sentinel Butte
W. Rider
Rider
Little Missouri
Belfield
Fryburg
Sully Springs
To Zap (BNSF)
Pierce
Mandan
Bismark
Burleigh
Sterling
Jamestown
Eldridge
Medina
Ladoga
Steele
Driscoll
Bloom
Fargo
Eckelson
Valley City
Kolbok
Buffalo
Surrey Jct
Dalrymple
W Fargo
Moorhead Jct
Fargo
Mouse mode : Select for inquiry or movement
RTC coordinates: (530,1305)
Click on mouse toolbar button for mouse modes
Zoom 0


RTC 2.60 L3D
Case: fargo-snowden
Track Status
OTRR Opening Evidence
OTRR Errata network
BNSF Incremental Capacity
Snowden to Fargo
General train settings
Train type selection
Select appropriate train type.
Settings for train type
Name : M-Merchandise
Color : 1 Blue
Group : Freight
Delay start increment :
Minimum pass release buffer time :
Min pass release buffer distance :
Minimum meet release buffer time :
Remaining crew time threshold :
Crew duty time before departure :
Include in statistics
Dispatch rank
Rank 1 (elite)
TPC parameters for train type : M-Merchandise
Davis coefficients
Air drag coefficient : 0.00049
Flange coefficient : 0.045
Journal constant : 1.30
Axle coefficient : 29.0
Custom roll resistance coefficients
Air drag coefficient : 0.000
Flange coefficient : 0.000
Journal constant : 0.000
Apply to M-Merchandise
Average car parameters
Axles per car : 4.00
Cross-sectional area : 100.00
Load / Tare weight ratio : 3.00
Air brake pressures (PSI)
Maximum : 110.0
Full service application : 24.0
OK
Cancel
OK
TPC parameters
OK
Miscellaneous
Cancel
Snowden
Sydney
Fairview
Dore
Beach
Yates
Sentinel Butte
W. Rider
Rider
Little Missouri
Belfield
Fryburg
Sully Springs
To Zap (BNSF)
Petroe
Mandan
Bismark
Burleigh
Starling
Driscoll
Steele
Ladoga
Medina
Ettrick
Jamestown
Bloom
Edgeley
Valley City
Kelso
Buffalo
Surrey Jct
Dairymple
W Fargo
Moorhead Jct
Fargo
Mouse mode : Select for inquiry or movement
RTC coordinates: (530,1305)
Click on mouse toolbar button for mouse modes
Zoom 0

RTC 2.60 L3D Case: fargo-snowden FINAL Fargo to Snowden

Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help

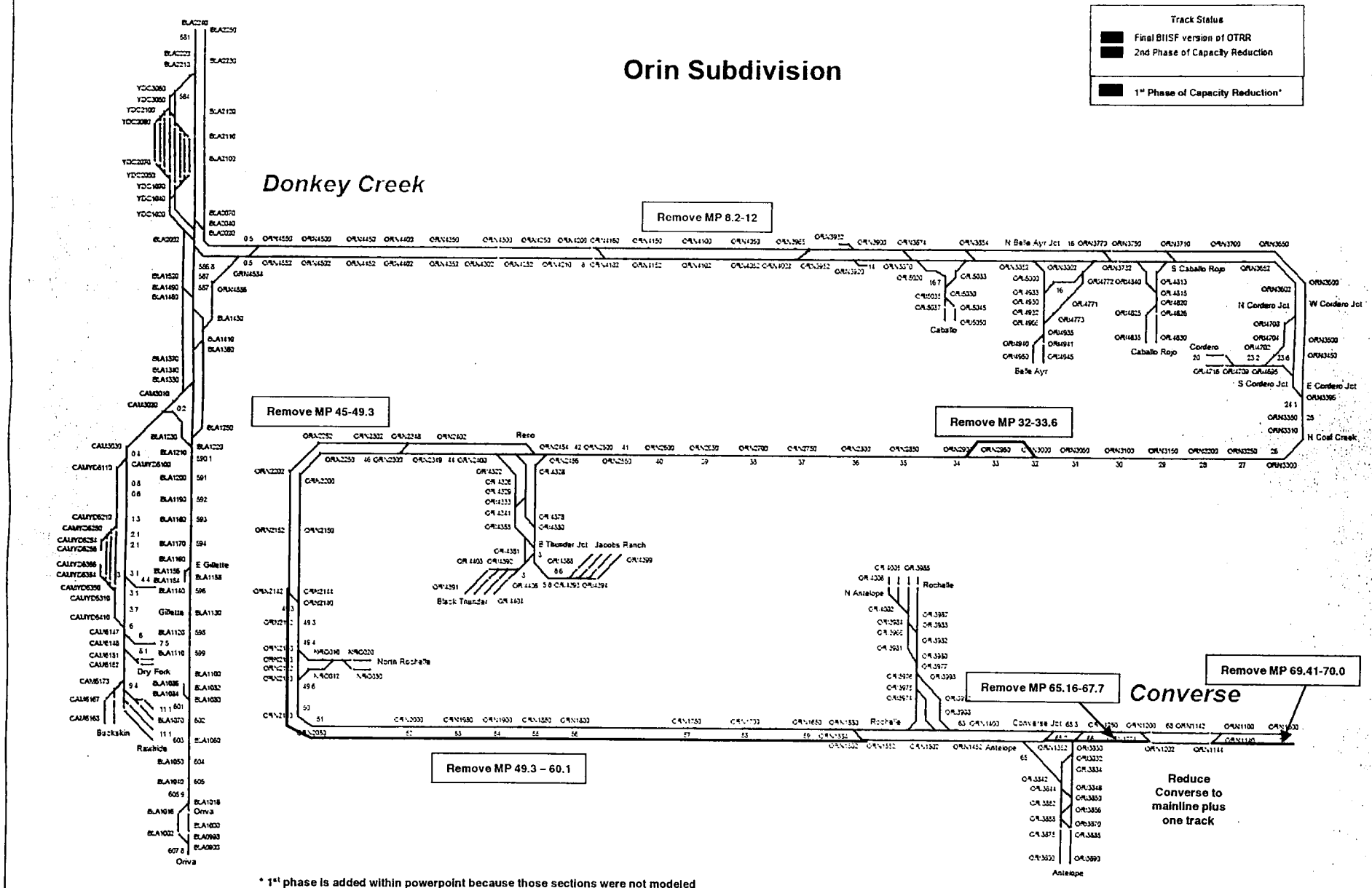


Mouse mode : Select for inquiry or movement | RTC coordinates: (1249,1029) | No node, label or link matches. | Zoom 1

RTC 2.60 L3D Case: Orin Final Orin route including Donkey Crk & Gillette

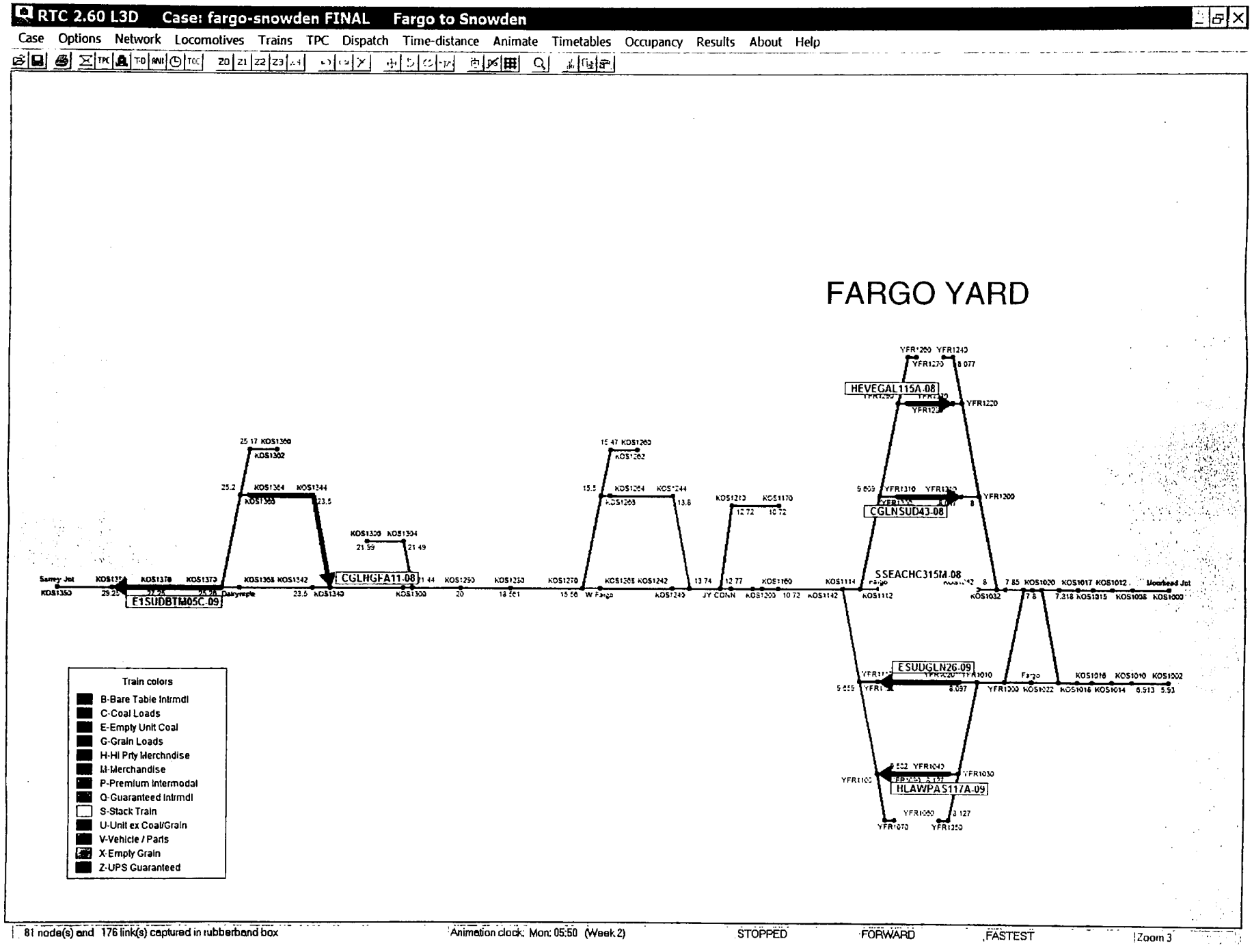
Exhibit III.B-10
Page 1 of 1

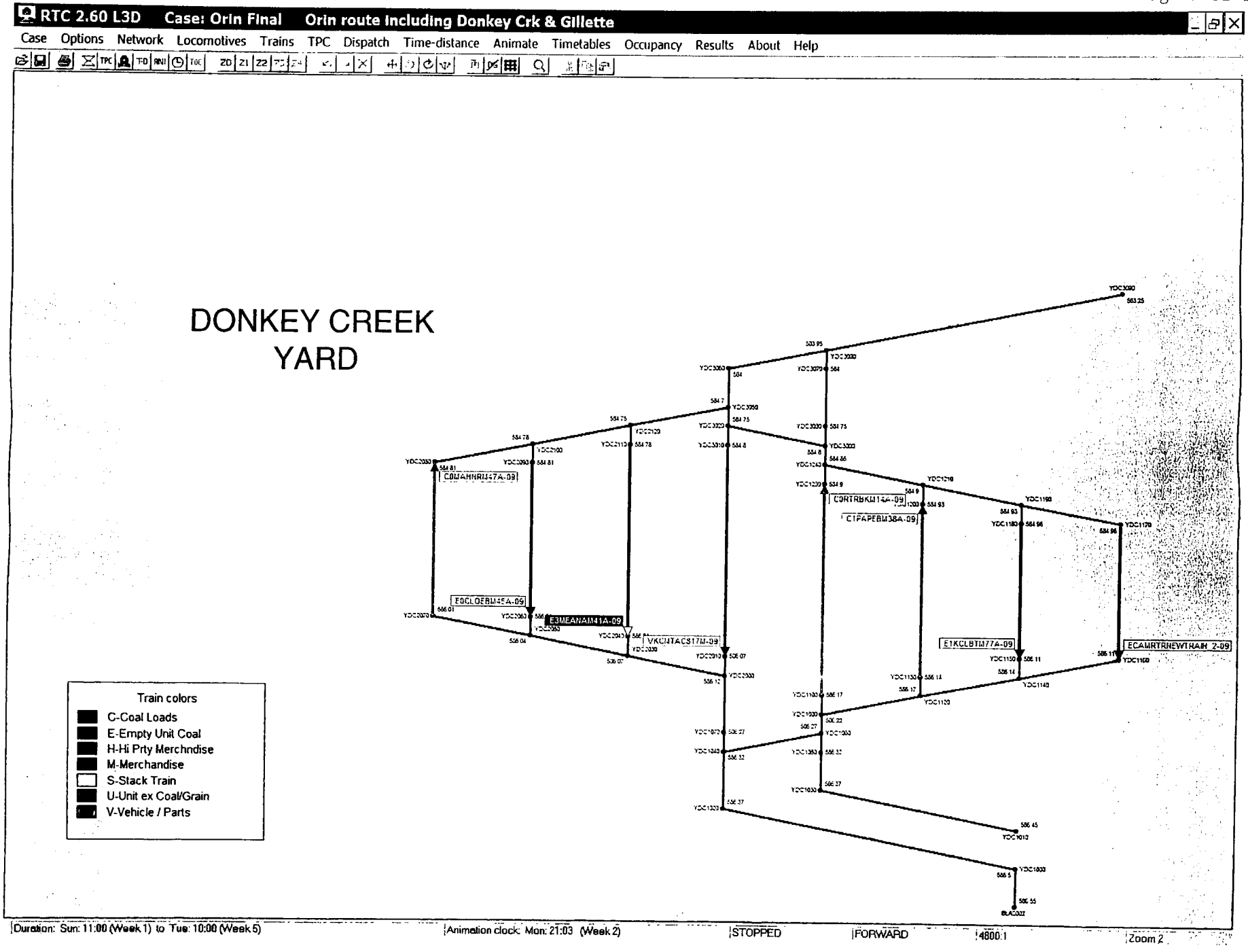
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help



* 1st phase is added within powerpoint because those sections were not modeled

Mouse mode : Select for inquiry or movement | RTC coordinates: (377, 307) | 1 node(s) marked. Track length= 0.0 feet (0.000 mi) | Zoom 0


RTC 2.60 L3D Case: fargo-snowden FINAL Fargo to Snowden
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help
FARGO YARD
HEVEGAL115A-08
CGLNSUD43-08
CGLHGFA11-08
E1SUIDBTM05C-09
SSEACHC315M-08
ESUDGLN26-09
HLAWPAS117A-09
Train colors
B-Bare Table Intrmdl
C-Coal Loads
E-Empty Unit Coal
G-Grain Loads
H-Hi Prty Merchndise
M-Merchandise
P-Premium Intermodal
Q-Guaranteed Intrmdl
S-Stack Train
U-Unit ex Coal/Grain
V-Vehicle / Parts
X-Empty Grain
Z-UPS Guaranteed
81 node(s) and 176 link(s) captured in rubberband box
Animation clock: Mon: 05:50 (Week 2)
STOPPED
FORWARD
FASTEST
Zoom 3


RTC 2.60 L3D Case: Orin Final Orin route including Donkey Crk & Gillette
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help
DONKEY CREEK
YARD
Train colors
C-Coal Loads
E-Empty Unit Coal
H-Hi Prty Merchndise
M-Merchandise
S-Stack Train
U-Unit ex Coal/Grain
V-Vehicle / Parts
Duration: Sun 11:00 (Week 1) to Tue 10:00 (Week 5)
Animation clock: Mon 21:03 (Week 2)
STOPPED
FORWARD
4800:1
Zoom 2

Summary of Overloadings in Glendive Yard
Under Otter Tail's String Analysis for the OTRR[1]

October 12 to 18

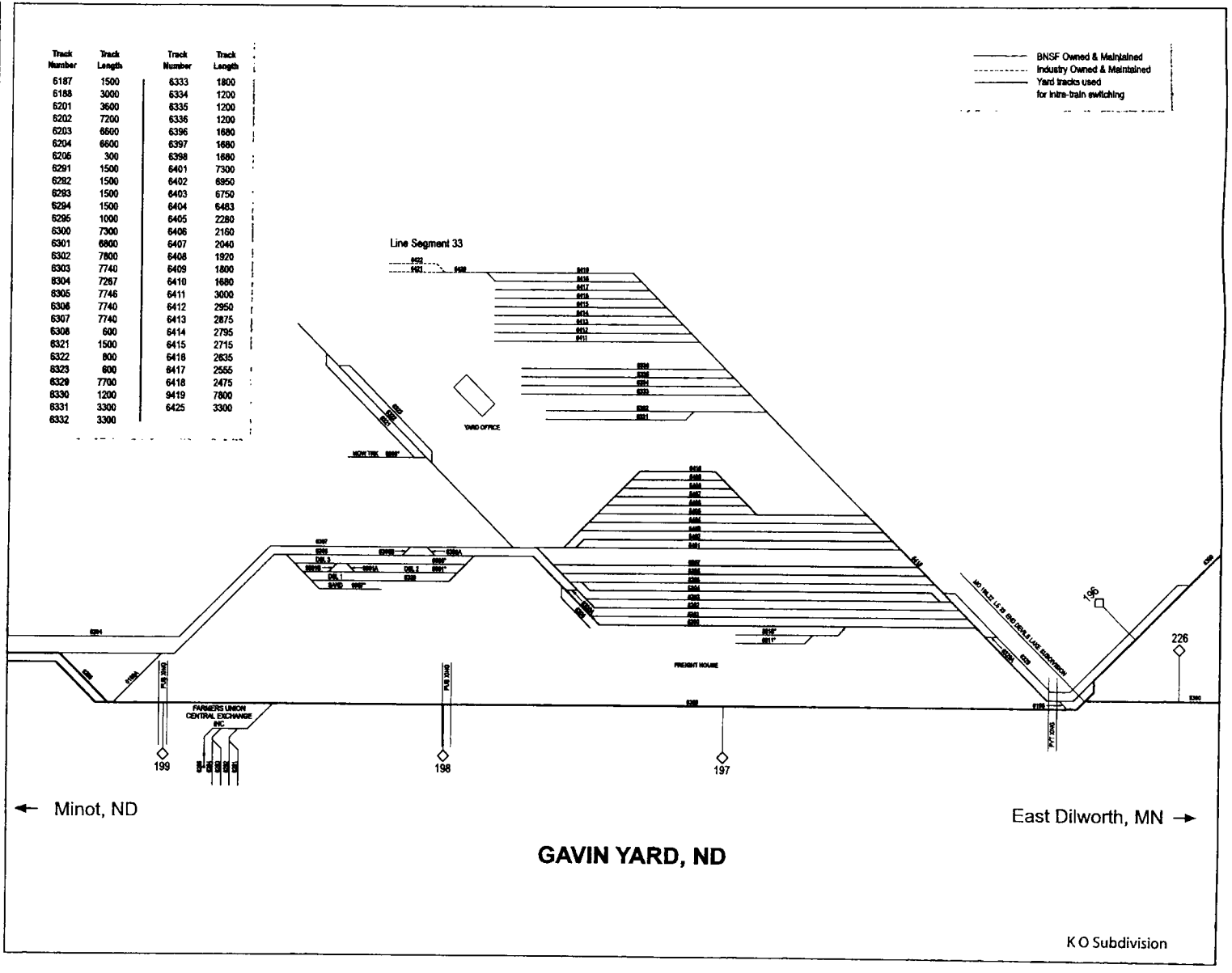
Summary	Intervals	Minutes	Hours
Full Data Set	2016	10,080	168
Overloadings	136	680	11
Percent of Time	6.75%	6.75%	6.75%

Maximum Number of Trains in Yard	Total Occurrences
18	95
17	30
16	4
15	7

[1] Source: BNSF Reply electronic workpaper "Trains at Glendive (Errata).xls."

GAVIN YARD
Minot, ND

Track Number	Track Length	Track Number	Track Length
6187	1500	6333	1800
6188	3000	6334	1200
6201	3600	6335	1200
6202	7200	6336	1200
6203	6600	6396	1680
6204	6600	6397	1680
6206	300	6398	1680
6291	1500	6401	7300
6292	1500	6402	6950
6293	1500	6403	6750
6294	1500	6404	6483
6295	1000	6405	2280
6300	7300	6406	2160
6301	6800	6407	2040
6302	7800	6408	1920
6303	7740	6409	1800
6304	7287	6410	1680
6305	7746	6411	3000
6306	7740	6412	2950
6307	7740	6413	2875
6308	600	6414	2795
6321	1500	6415	2715
6322	800	6416	2635
6323	600	6417	2555
6329	7700	6418	2475
6330	1200	9419	7800
6331	3300	6425	3300
6332	3300		



BNSF

Exhibit III. B-14, Page 1 of 1

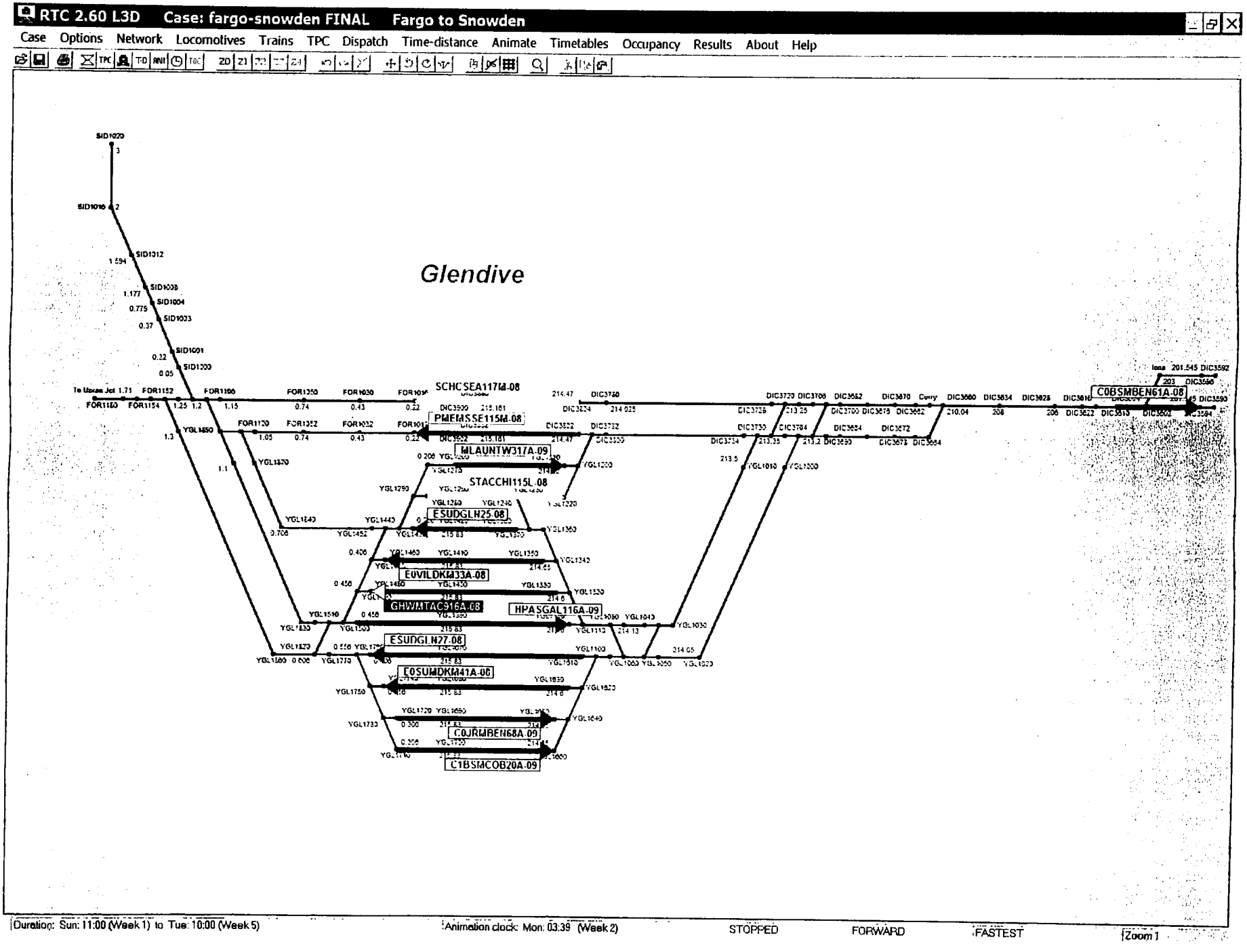
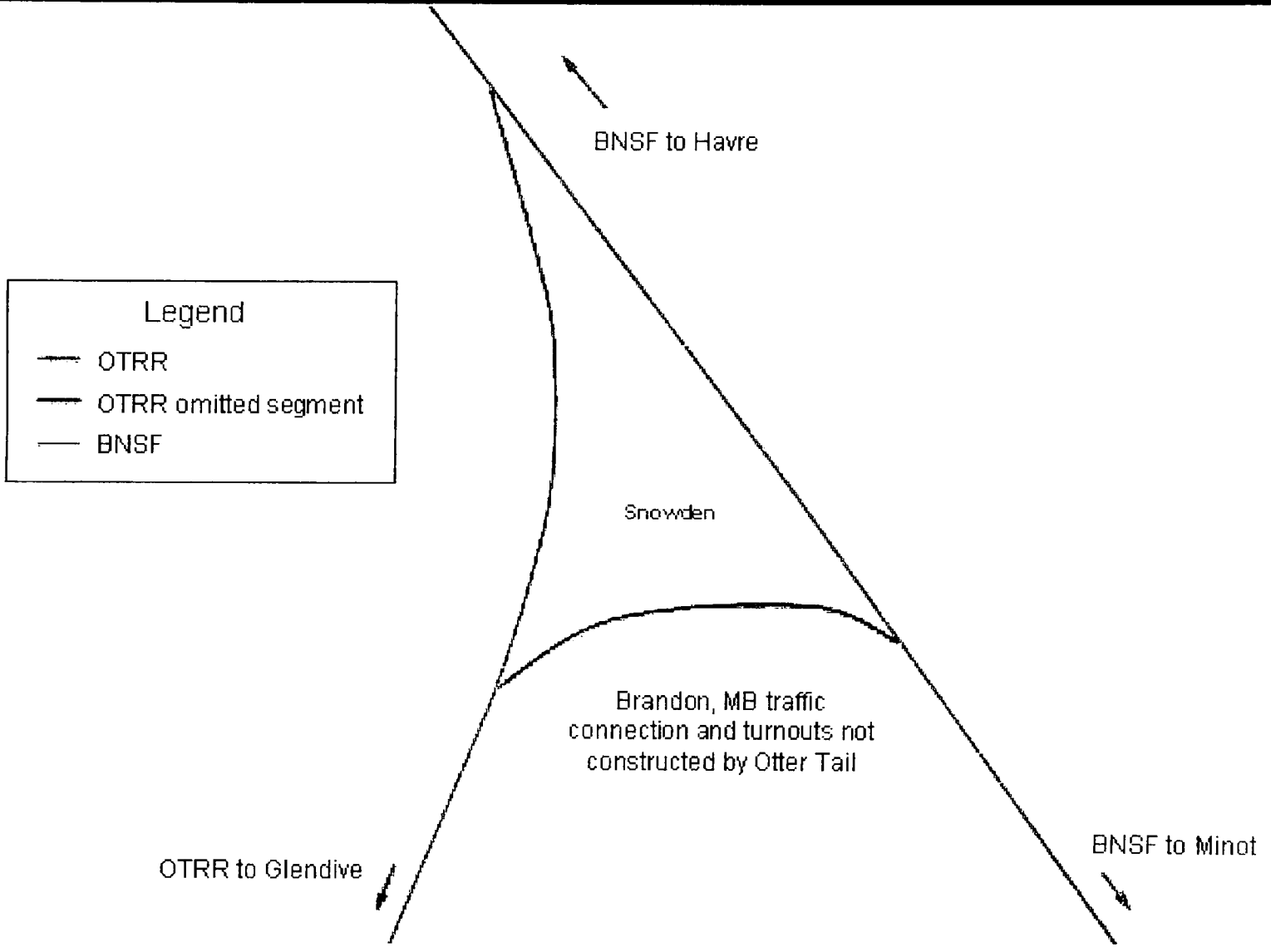
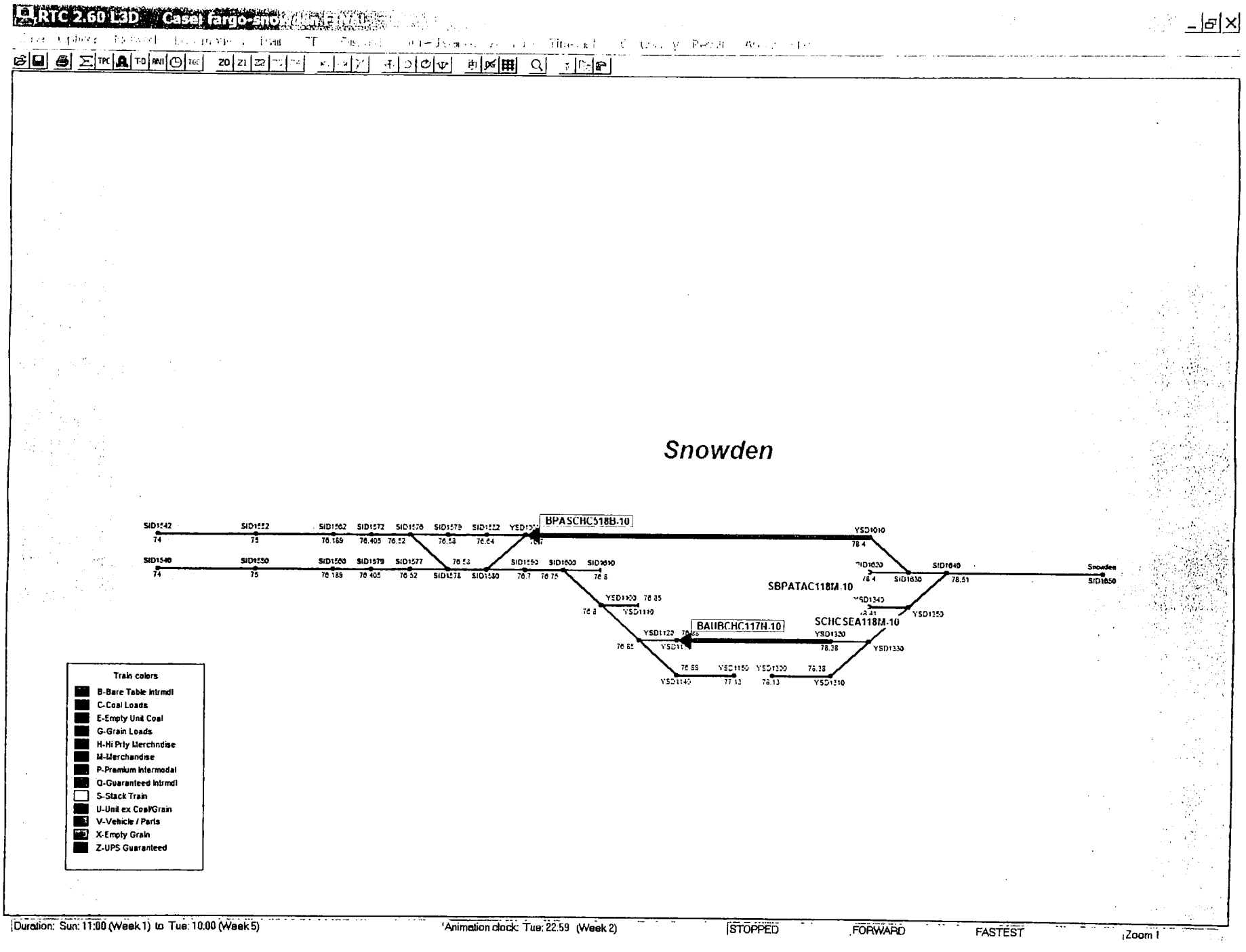

RTC 2.60 L3D Case: fargo-snowden FINAL Fargo to Snowden
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help
Glendive
SCHCSEA117M-08
PMEMSSE115M-08
MLAUNTW317A-09
STACCHI115L-08
ESUDGLN25-08
E0VILDKM33A-08
GHWMTAC916A-08
HPASGAL116A-09
ESUDGLN77-08
E0SUMDKM41A-08
C0JRMBEN68A-09
C1BSMCOB20A-09
C0BSMBEN61A-08
Duration: Sun 11:00 (Week 1) to Tue 10:00 (Week 5)
Animation clock: Mon 03:39 (Week 2)
STOPPED
FORWARD
FASTEST
Zoom

Exhibit III.B – 16
Page 1 of 1
Snowden, MT




RTC 2.60 L3D
Snowden
BPASCHC518B-10
SBPATAC118M-10
BAIIBCHC117N-10
SCHCSEA118M-10
Train colors
B-Bare Table Intrmdl
C-Coal Loads
E-Empty Unit Coal
G-Grain Loads
H-Hi Prty Merchndise
M-Merchandise
P-Premium Intermodal
Q-Guaranteed Intrmdl
S-Stack Train
U-Unit ex Coal/Grain
V-Vehicle / Parts
X-Empty Grain
Z-UPS Guaranteed
Duration: Sun 11:00 (Week 1) to Tue 10:00 (Week 5)
Animation clock: Tue 22:59 (Week 2)
STOPPED
FORWARD
FASTEST
Zoom 1

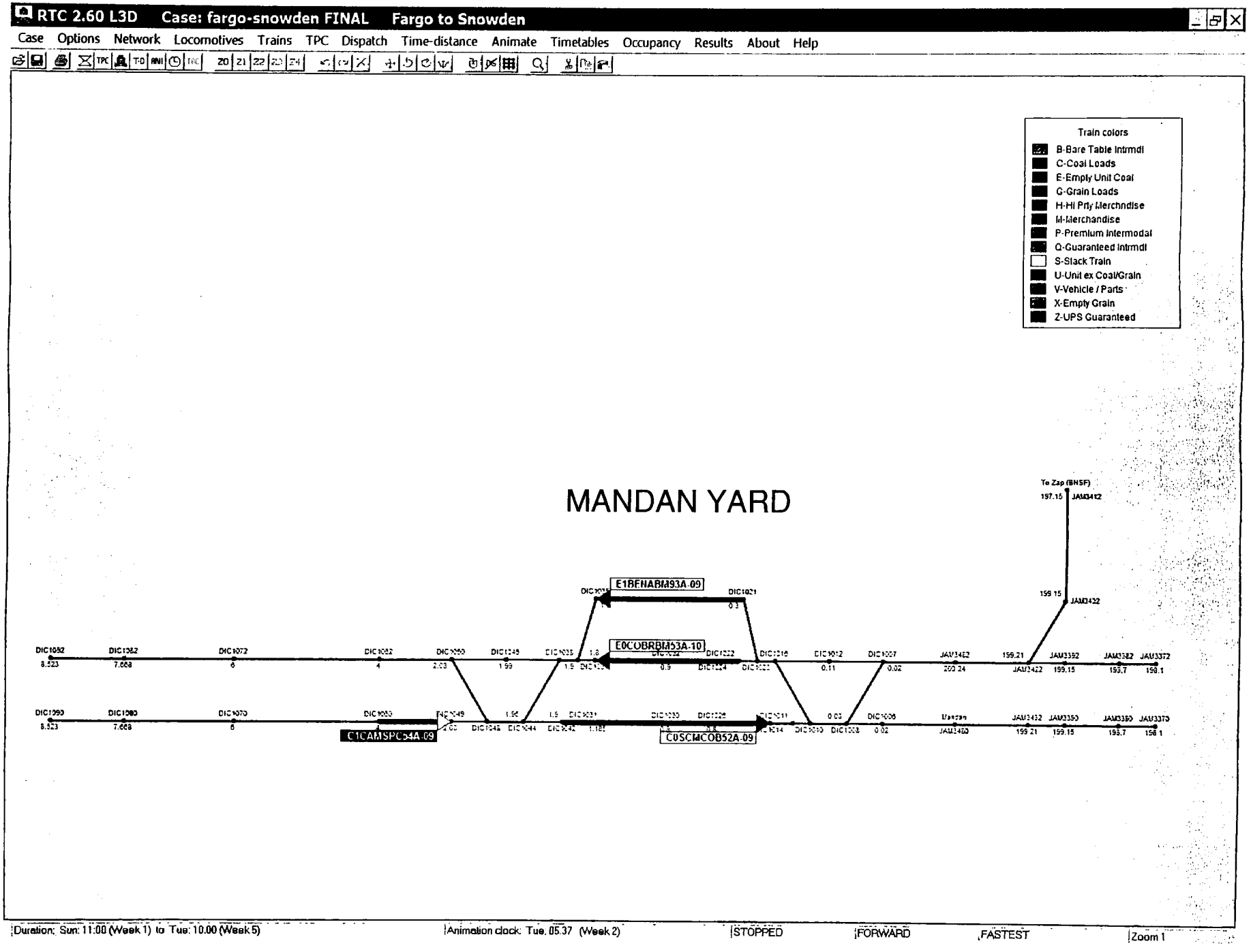
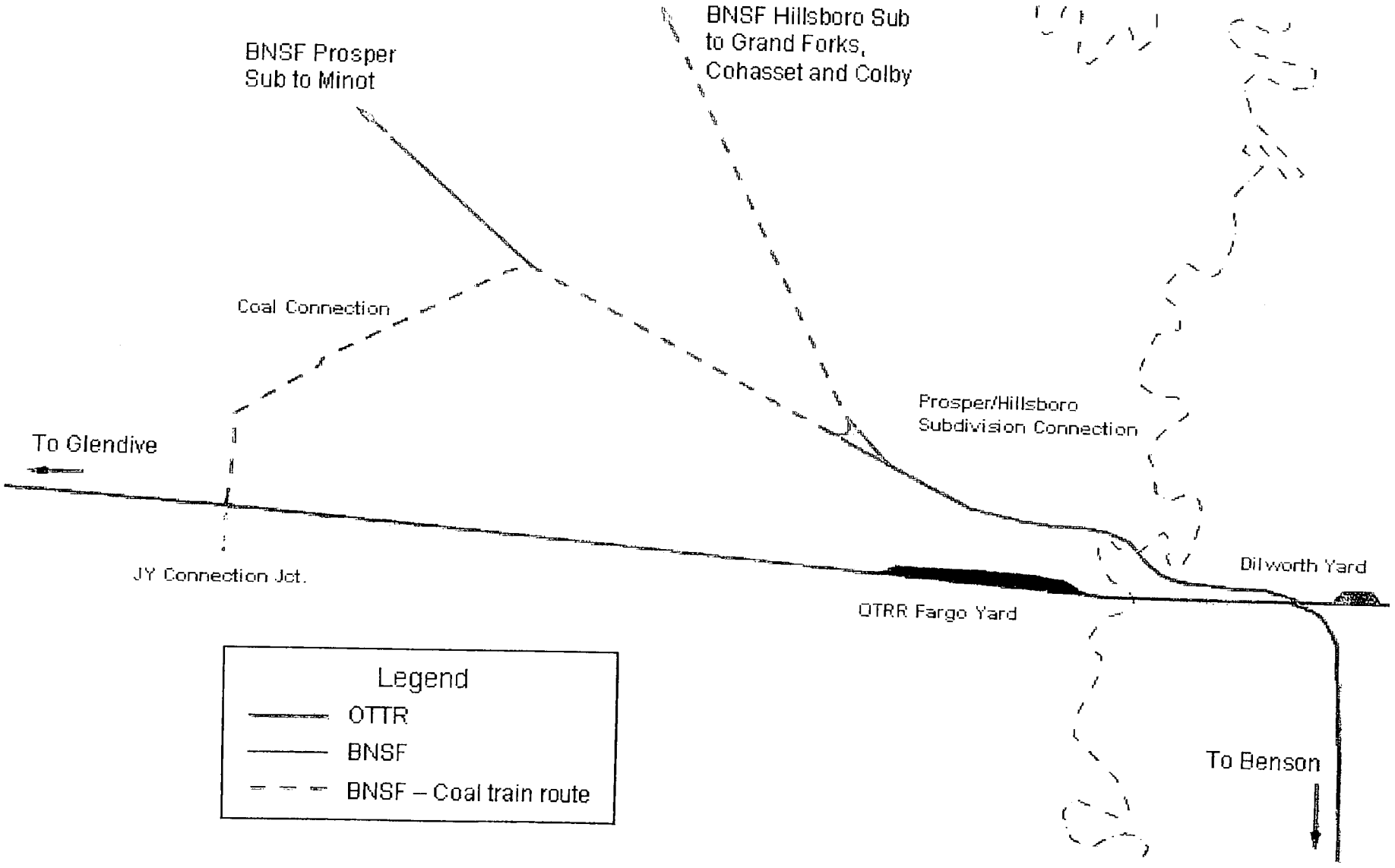
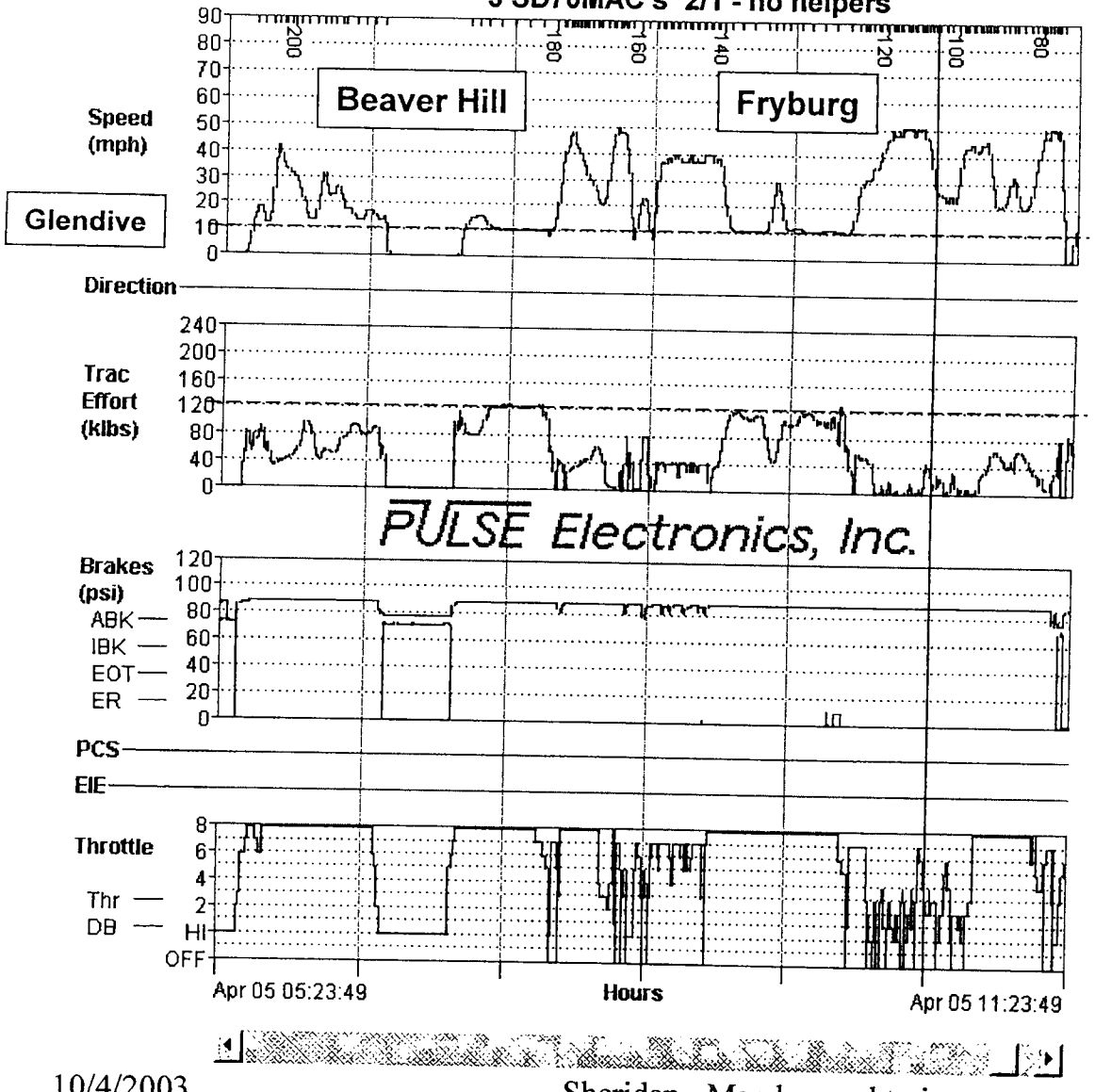

RTC 2.60 L3D Case: fargo-snowden FINAL Fargo to Snowden
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help
Train colors
B-Bare Table Intrmdl
C-Coal Loads
E-Empty Unit Coal
G-Grain Loads
H-Hi Prty Merchndise
M-Merchandise
P-Premium Intermodal
Q-Guaranteed Intrmdl
S-Slack Train
U-Unit ex Coal/Grain
V-Vehicle / Parts
X-Empty Grain
Z-UPS Guaranteed
MANDAN YARD
To Zap (BNSF)
E1BFNABM93A-09
E0COBRBM93A-10
C1CAMSPC54A-09
C0SCMCOB52A-09
Duration: Sun 11:00 (Week 1) to Tue 10:00 (Week 5)
Animation clock: Tue. 05:37 (Week 2)
STOPPED
FORWARD
FASTEST
Zoom 1

Exhibit III.C – 1
Page 1 of 1
JY/Coal Connection Schematic



(Compressed Mode)

C-WDMSUD-54A (DP test train)
123-0-16,810 tons, 6751 ft
3 SD70MAC's 2/1 - no helpers

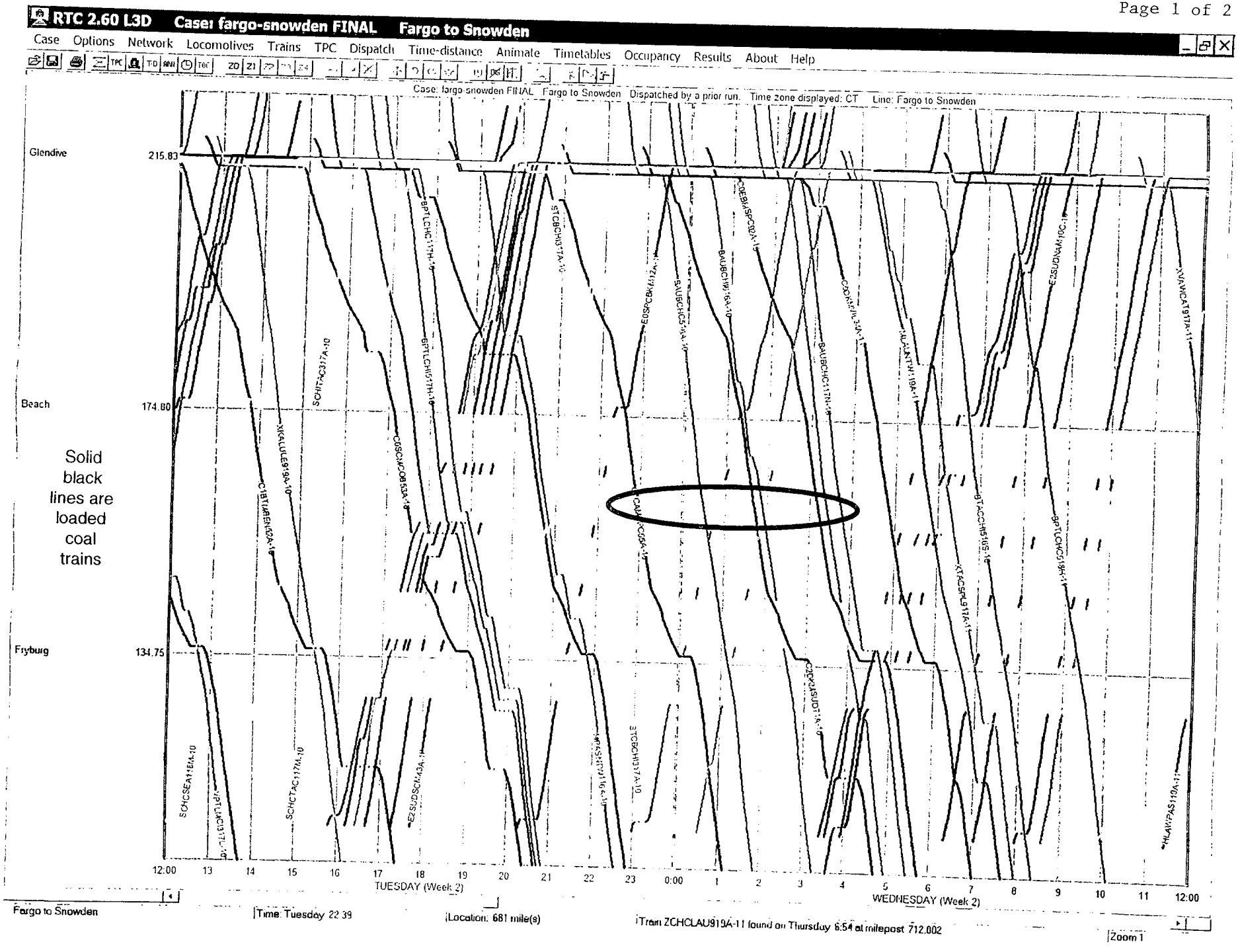


Railroad	BN
Loco Num	9809
Cursorline values:	
Date	04/05/00
Time	10:23:49
Milepost	103.80
POR Dist	103mi 4256ft
For Dist	103mi 4256ft
Rev Dist	0mi 0ft
Dist to Mark	N/A
Speed	29
Direction	Forward
Trac Effort	29
Horn	Off
Auto Brake	89
Ind Brake	0
EOT	0
ER	---
PCS	Closed
BELL	Off
Throttle	DB: 4
EIE	Off
Cab Sig	---

Time	Distance
Compress	Normal
Expanded	Super exp
All	ABK IBK EOT ER
<<	>>
Table	Select
Print	Dist Mark

10/4/2003

Sheridan - Mandan coal trains


RTC 2.60 L3D Case: fargo-snowden FINAL Fargo to Snowden
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help
Case: fargo-snowden FINAL Fargo to Snowden Dispatched by a prior run. Time zone displayed: CT Line: Fargo to Snowden
Glendive
215.83
Beach
174.80
Fryburg
134.75
Solid black lines are loaded coal trains
12:00 13 14 15 16 17 18 19 20 21 22 23 0:00 1 2 3 4 5 6 7 8 9 10 11 12:00
TUESDAY (Week 2)
WEDNESDAY (Week 2)
Fargo to Snowden
Time: Tuesday 22:39
Location: 681 mile(s)
Train ZCHCLAU919A-11 found on Thursday 6:54 at milepost 712.002
Zoom 1

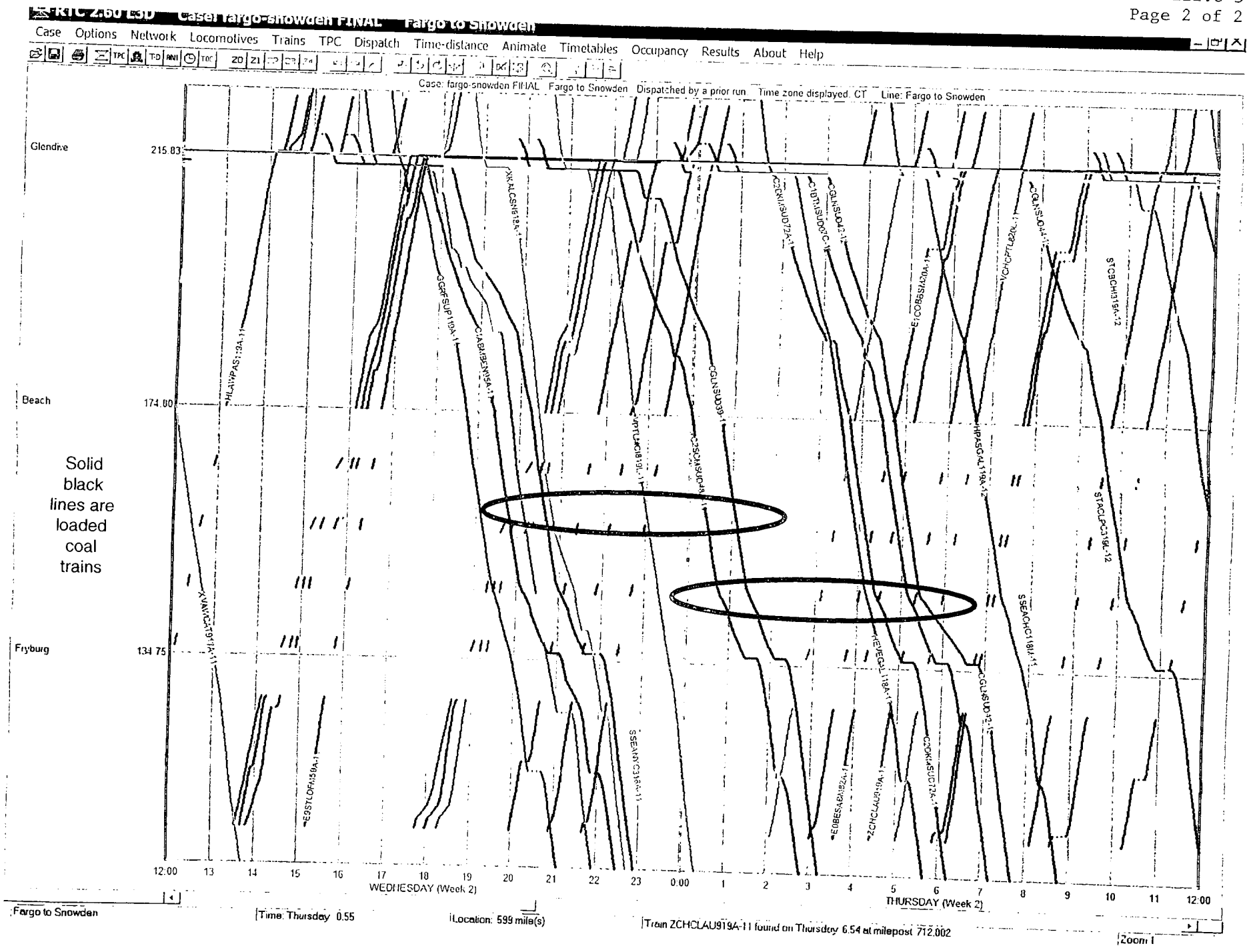
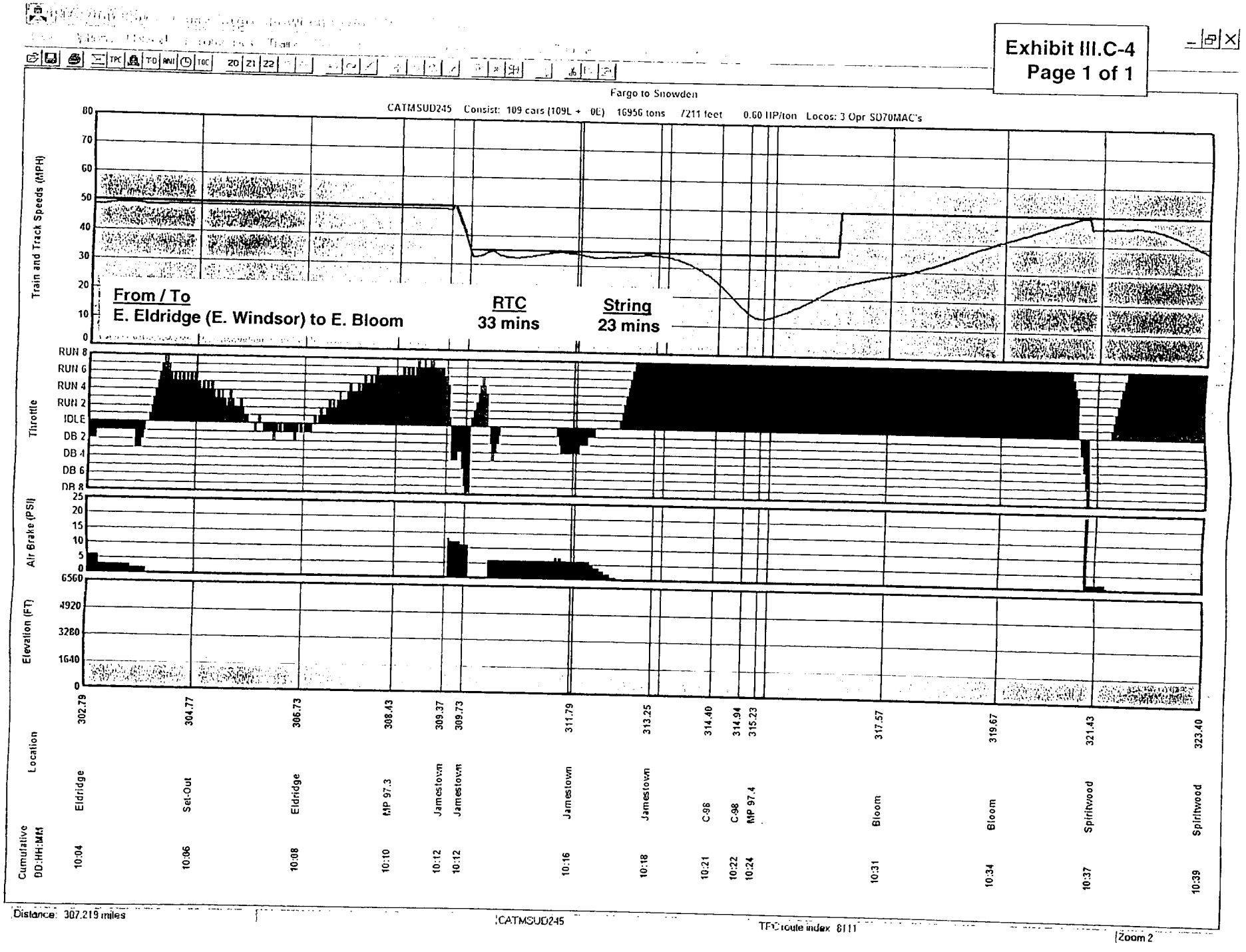
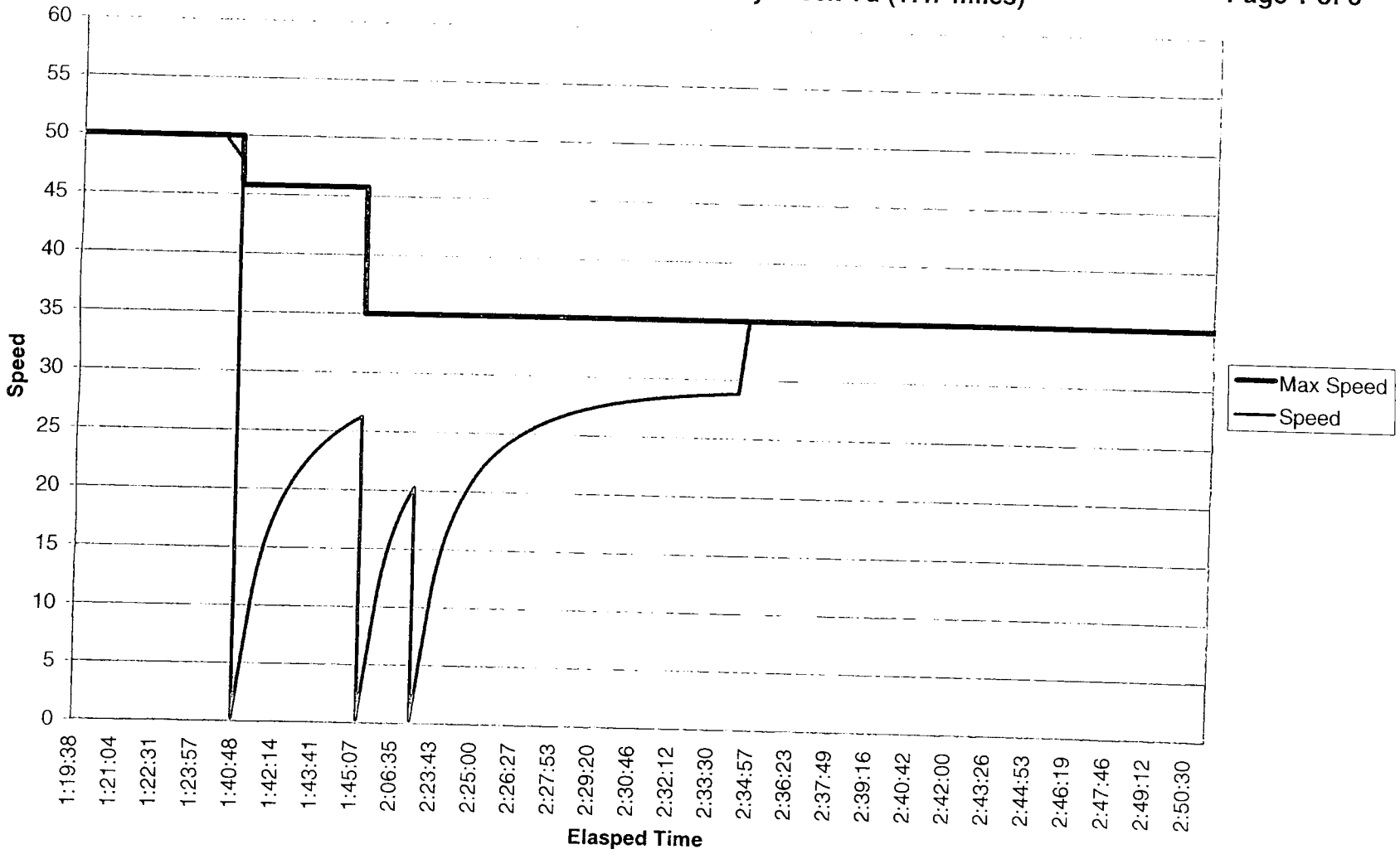

RTC 2.50 E3D Case: Fargo-Snowden FINAL Fargo to Snowden
Case Options Network Locomotives Trains TPC Dispatch Time-distance Animate Timetables Occupancy Results About Help
Case: fargo-snowden FINAL Fargo to Snowden Dispatched by a prior run Time zone displayed: CT Line: Fargo to Snowden
Glendive
215.83
Beach
174.00
Fryburg
134.75
Solid black lines are loaded coal trains
12:00 13 14 15 16 17 18 19 20 21 22 23 0:00 1 2 3 4 5 6 7 8 9 10 11 12:00
WEDNESDAY (Week 2)
THURSDAY (Week 2)
Fargo to Snowden
Time: Thursday 0:55
Location: 599 mile(s)
Train ZCHCLAU919A-11 found on Thursday 6:54 at milepost 712.002
Zoom I

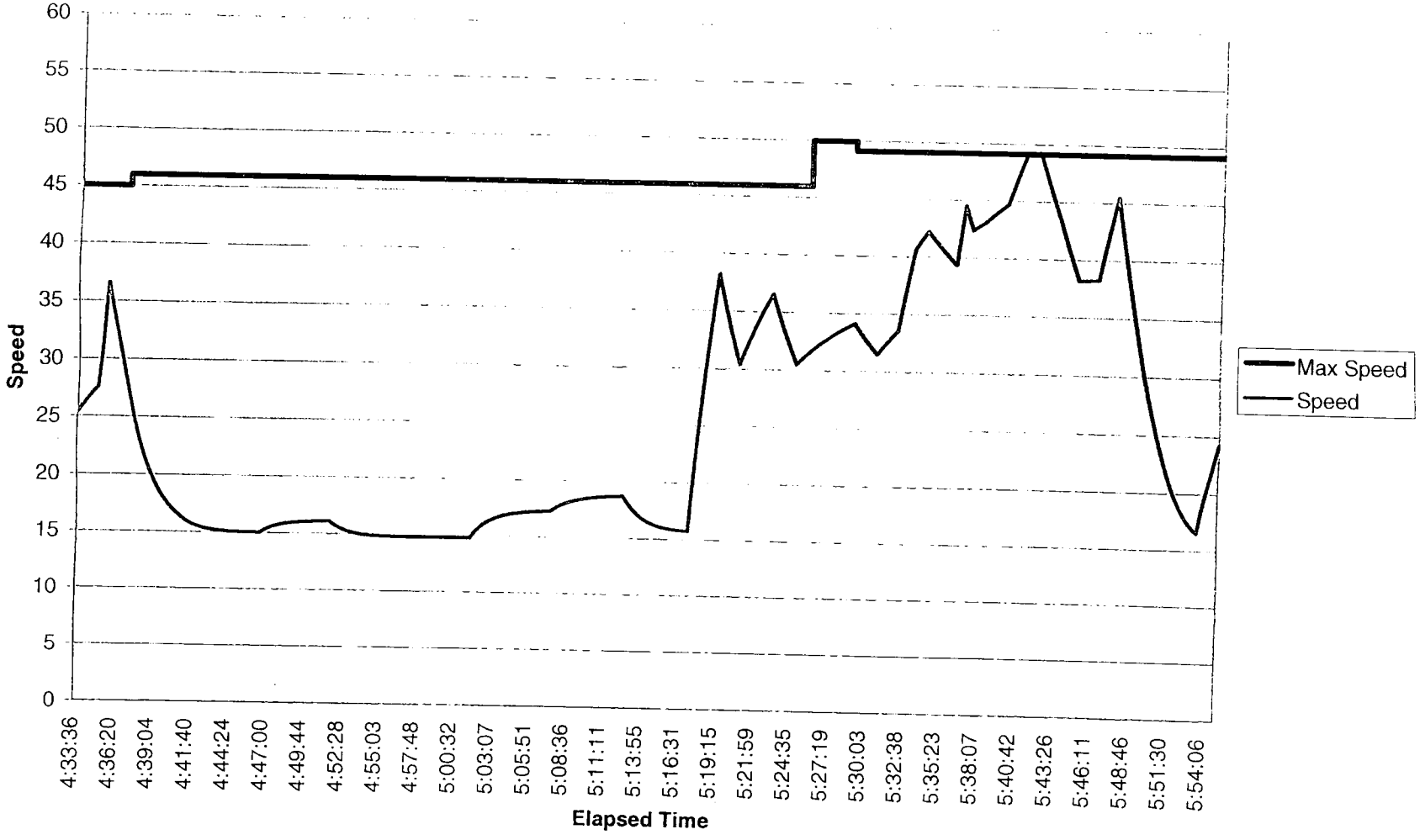
Exhibit III.C-4
Page 1 of 1



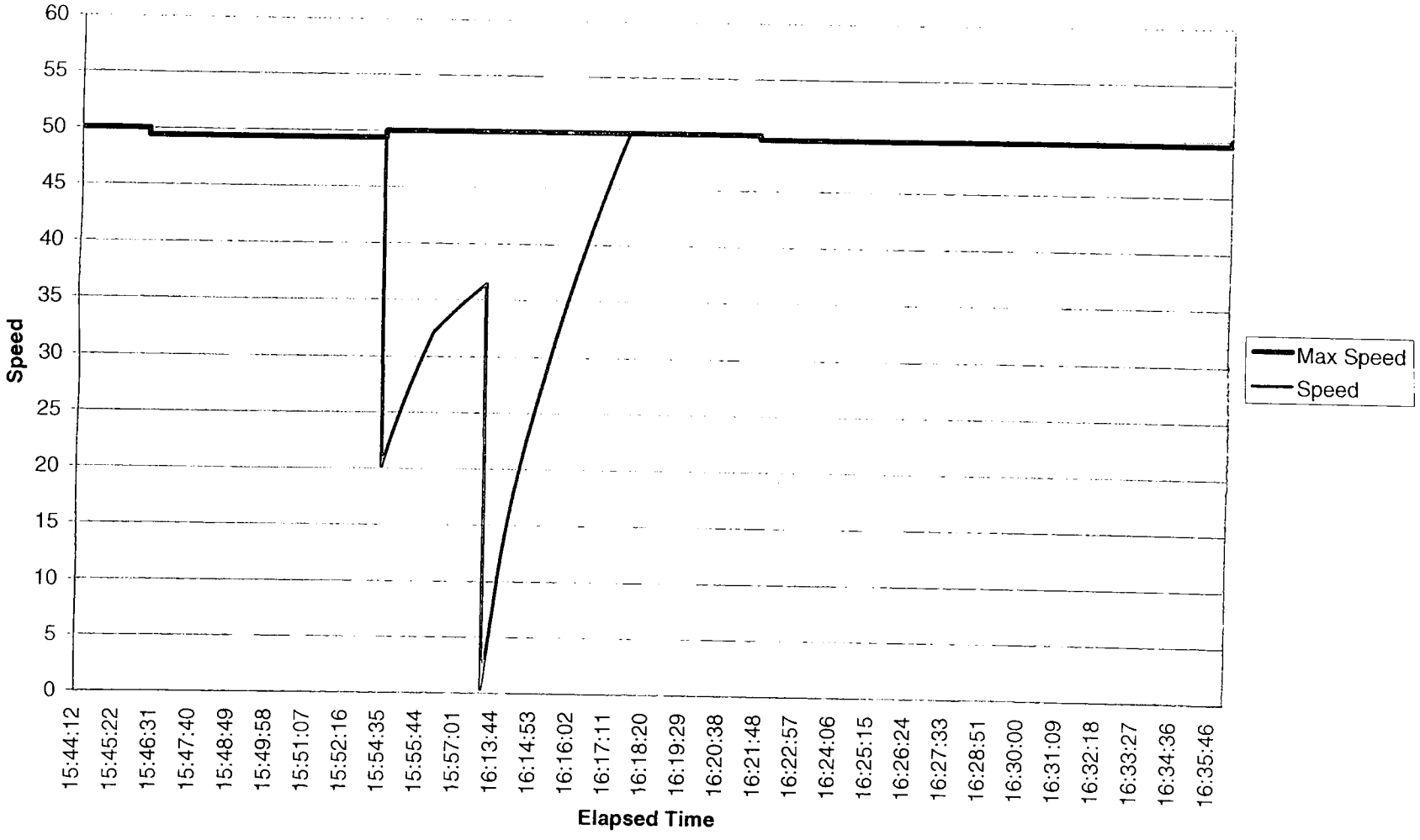
Speed Of Loaded Train CATMALM133 Traveling From
S. Caballo Rojo Jct To E. Donkey Creek Yd (17.7 miles)



Speed Of Loaded Train CATMALM133 Traveling From W. Oriva To E. Kendrick (38.3 miles)



Speed Of Loaded Train CATMALM133 Traveling From E. Blatchford To W. Marsh (25.7 miles)

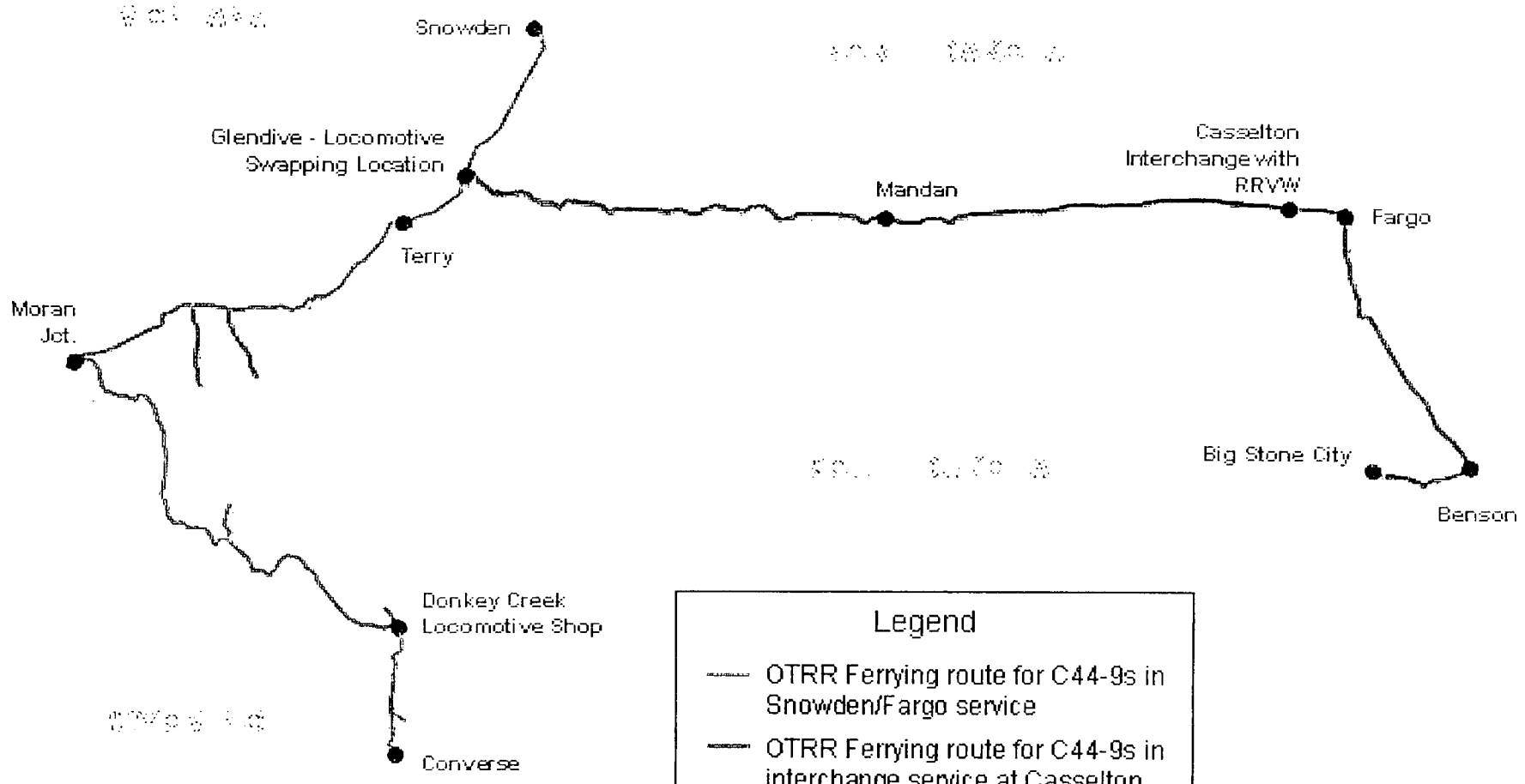


YARD DWELL TIMES

	OTRR	BNSF
DONKEY CREEK		
Empty coal trains, Initial terminal insp	2 Hr	6 Hr
Loaded coal trains, I/C to BNSF	15 Min	1 Hr
Westbound non-coal overhead trains w/ insp	1 Hr	1 Hr w/o insp
Eastbound non-coal overhead trains	15 Min	1 Hr
CONVERSE		
Empty coal trains, w/ insp	45 Min	3 Hr w/insp
Loaded coal trains I/C to BNSF	15 Min	1 Hr
DUTCH		
Crew change on all trains	15 Min	15 Min
MORAN JCT.		
Crew change on thru trains	15 Min	15 Min
I/C with BNSF all trains	15 Min	1 Hr
GLENDIVE		
Empty coal trains, Initial terminal insp	2 Hr	6 Hr
Loaded coal trains, exchange power and crew	30 Min	2 Hr, helper
Loaded coal trains to BNSF at Benson, 1500 Mile insp	1 Hr	2 Hr, helper
Loaded coal trains to BNSF at Fargo, loaded South of Donkey Creek, 1500 Mi insp	1 Hr	2 Hr, helper
Westbound non-coal, insp	1 Hr	30 Min no insp
Eastbound non-coal	15 Min	30 Min
Eastbound and Westbound trains, requiring Intra-/inter-train switching	None	6 Hr
SNOWDEN		
All trains I/C to and from BNSF	15 Min	1 Hr
TERRY		
Westbound I/C from BNSF, insp	45 Min	1 Hr, no insp
Eastbound I/C to BNSF	15 Min	1 Hr

MANDAN		
Loaded and empty coal I/C to/from BNSF	15 Min	1 Hr
All loaded and empty thru coal trains - fuel	15 Min	1 Hr
All thru trains, crew change	15 Min	15 Min
CASSELTON		
Loaded and empty grain trains	None	1 Hr
JY CONNECTION, FARGO		
All trains I/C to/from Cohasset	None	1 Hr
FARGO		
All trains I/C to/from BNSF	15 Min	1 Hr
Crew change on trains to Benson	15 Min	15 Min
BENSON		
All trains I/C to/from BNSF	15 Min	1 Hr
Crew change on trains to Big Stone	15 Min	15 Min

Exhibit III.C – 7
Page 1 of 1
Maintenance Ferry Routes for C44-9s



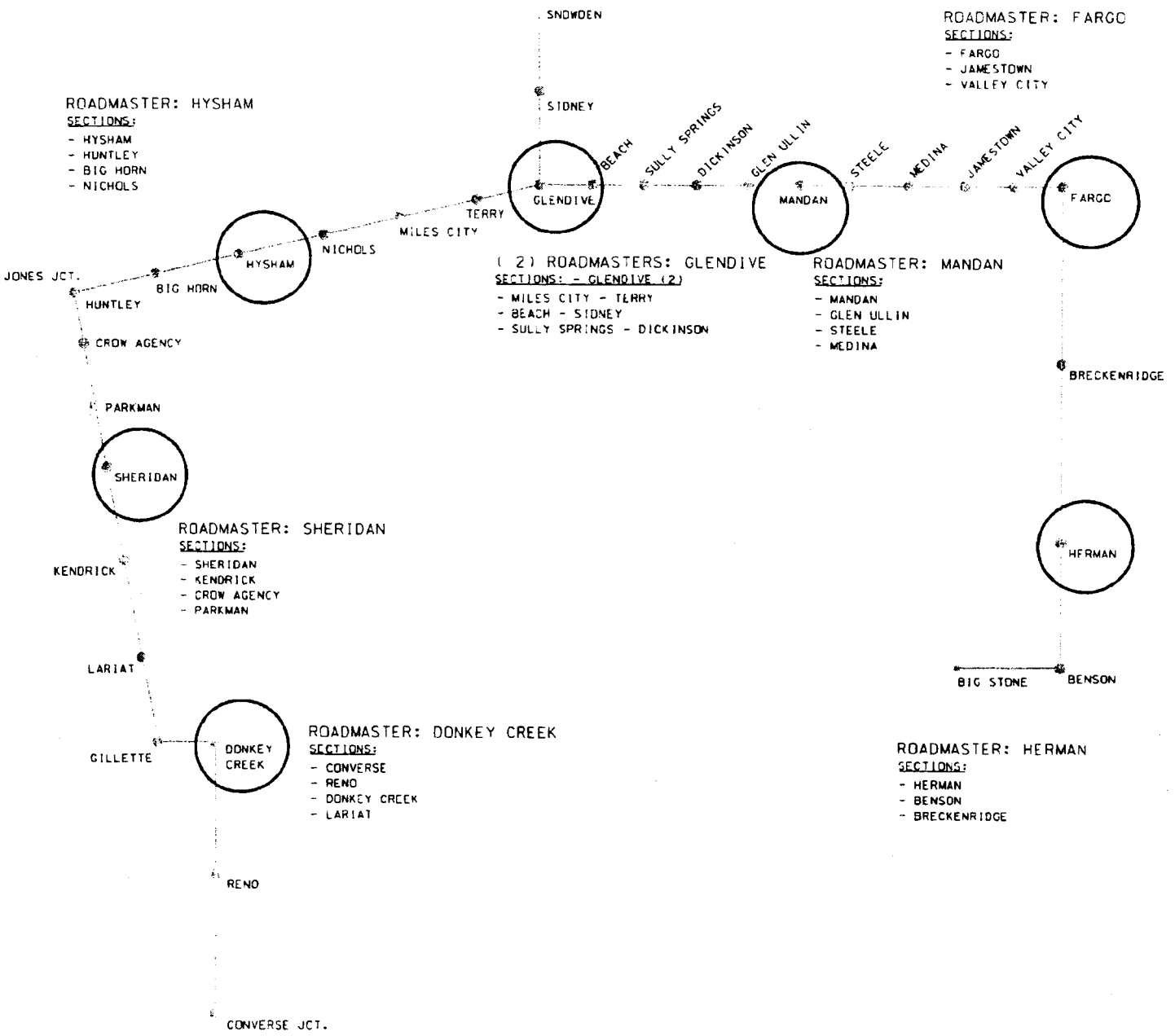
REDACTED

BNSF Random Failure Occurrences on OTRR Line Segments During Peak Period November 2002

Sub- Division	Random Failures November 2002			Duration of Delays (Minutes)		
	Signal	Mechanical	Track	Signal	Mechanical	Track
Forsyth	27	3	10	3459	615	1985
Orin	22	6	51	2892	590	8000
Dickinson	31	6	15	6600	900	3200
Big Horn	17	8	7	2198	1801	1436
Jamestown	19	2	8	3137	362	1460
Totals						
Total Outages	116	25	91			
Total Duration				18286	4268	16081
Average Minutes per Outage				158	171	177
Average Hours per Outage				2.63	2.85	2.94

OTPRR MAINTENANCE FORCES - HEADQUARTERS

BNSF Exhibit III.D.4-3



NOTE:

SIGNAL SUPERVISORS AT GLENDIVE, DONKEY CREEK AND FARGO WITH CREWS ALSO AT SHERIDAN, HYSHAM AND MANDAN

B & B SUPERVISORS AT GLENDIVE AND DONKEY CREEK WITH CREWS ALSO AT SHERIDAN AND FARGO

TELECOM SUPERVISORS AT GLENDIVE AND DONKEY CREEK WITH CREWS ALSO AT SHERIDAN, HYSHAM AND FARGO AND ALSO 2 ADDITIONAL SECTION MEN AT GLENDIVE AND DONKEY CREEK FOR NIGHT EMERGENCIES.

REDACTED

Exhibit III.F.1-1

October 6, 2003

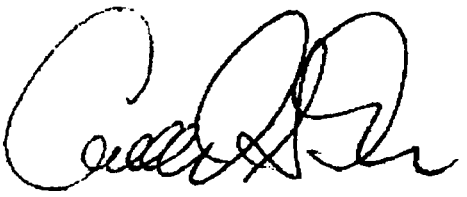
The Burlington Northern and
Santa Fe Railway Company

Re: Retrospective Market Value to Acquire Certain Portions of Land Required for the Hypothetical OTRR

Pursuant to your request, I have formulated an Aggregate Market Value conclusion for acquiring certain portions of that land required for a hypothetical railroad, known as the Otter Tail Railroad, (OTRR), which Otter Trail Power Co. proposed in a rate reasonableness proceeding before the Surface Transportation Board ("STB"). The processes I used and my conclusions are fully described herein.

This Restricted Use Report of a Complete Retrospective Appraisal conforms to the Uniform Standards of Professional Appraisal Practice. I am enclosing the data, reasoning and analysis from my work files for use by the STB. I have retained additional supporting information in my files. Subject to the assumptions and limiting conditions herein, as of January 1, 2001, the Aggregate Market Value to acquire those lands described herein was $36,139,000.

Sincerely,



Arnold S. Tesh CRE, GAA
Certified General Appraiser

State of Wyoming
Certified Real Estate Appraiser
Permit No. 06988

State of Nebraska
Certified General Real Estate Appraiser
No. CG200064

State of North Dakota
Certified General Appraiser
Pending

State of Colorado
Certified General Appraiser
No. CG000040032101

State of Minnesota
Certified Real Property Appraiser
No. AP 20409206

State of Maryland
Certified General Appraiser
Certificate No. 10189

Commonwealth of Virginia
Certified General Appraiser
Certificate No. 4001001397

State of Montana, pending

Restricted Use Report
Of a Complete Retrospective Appraisal
Of:

CERTAIN LAND ACQUISITIONS IN THE STATES OF WYOMING, MONTANA, MINNESOTA and NORTH DAKOTA, COMPRISING PORTIONS OF THE HYPOTHETICAL OTTER TAIL RAILROAD (OTRR)

For:
Burlington Northern Santa Fe
Railroad Company

By:
Arnold S. Tesh CRE, GAA
FTI Consulting

Valuation Date: January 1, 2001
Report Date: October 6, 2003

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Function of The Appraisal 9
APPROACHES CONSIDERED 10
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Sales Collection and Analysis 14
Typical Parcels and Valuations Units 15
VALUE DETERMINATIONS FOR THE PORTIONS OF OTRR ROW APPRAISED HEREIN 18
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SUMMARY OF SALIENT FACTS AND CONCLUSIONS

I estimated the land cost as of January 1, 2001, to assemble certain portions of the rights-of-way ("ROW") for a hypothetical railroad, known as the Otter Trail Railroad ("OTRR"), which is based on the existing Burlington Northern Santa Fe Railroad Company ("BNSF") mainline. Otter Trail Power Co. ("OTPC") proposed OTRR in a rate reasonableness proceeding against BNSF before the Surface Transportation Board ("STB"). OTRR's ROW is based on BNSF's ROW and the portions appraised herein comprise approximately 401 miles in the states of Montana, Wyoming, North Dakota and Minnesota.

In preparing this appraisal, I assumed, subject to the indicated assumptions and limiting conditions, that OTRR would acquire fee simple interests or easements in perpetuity. I appraised only the underlying land without improvements, including any track or other attendant structures. My appraisal is based on an inspection of certain portions of OTRR's proposed ROW that I conducted from July 29 through August 5 of 2003, land sales data, other land valuation records and maps, and my expert knowledge.

PROPERTY APPRAISED:	Certain portions (as delineated hereinafter) of the land required for the development of the hypothetical OTRR
OWNERSHIP:	Numerous individual ownerships along the right of way
PROPERTY RIGHTS APPRAISED:	Fee Simple
VALUE APPRAISED:	Market Value
APPROACH TO VALUE:	Sales Comparison
DATE OF VALUE:	January 1, 2001
AREA APPRAISED:	Approximately 5,052 Acres
IMPROVEMENTS:	None
CURRENT USE:	Varies with location
HIGHEST AND BEST USE:	Varies with location
MARKET VALUE CONCLUSION:[1]	$36,139,000

[1] Used synonymously with Aggregate Market Value subject to the Assumptions and Limiting Conditions included in this report. Includes ROW, yards, and microwave sites.

APPRAISAL ASSIGNMENT

Subject Property of Appraisal

The subject property of this appraisal is the land required by OTRR, a hypothetical railroad proposed by OTPC in a rate reasonableness proceeding before the STB, for ROW, yards, facilities, microwave sites and an administrative building. OTRR's ROW follows the centerline of BNSF's ROW as follows:

The rail ROW appraised herein comprises certain limited segments of the complete OTRR (described at the conclusion of this insert) as follows:

1. OTRR right of way appraised herein follows BNSF's System from The Converse Yard North To Donkey Creek, Wyoming,
2. Then northwest through Gillette And Sheridan, Wyoming, through Jones Junction, Montana terminating at a nearby yard in Eastern Huntley.
3. Resuming with that OTRR ROW traversing The Bismark-Mandan Metropolitan Area, comprising selected portions of Morton and Burleigh Counties in North Dakota (Illustrated in detail on accompanying Valuation Maps at a scale of approximately 1 inch per 500 Ft.)
4. Again resuming with applicable OTRR segments in the Fargo/Moorhead Metropolitan Area, comprising selected portions of Cass County, North Dakota and Clay County, Minnesota (Illustrated in detail on accompanying Valuation Maps at a scale of approximately 1 inch per 500 Ft.)

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The OTRR – in its entirety – follows the existing BNSF ROW from the Converse Yard in Wyoming through the states of Montana, North Dakota and Minnesota to Big Stone, South Dakota. OTRR also includes branch lines to Jacob Junction, Eagle Butte Junction, Nerco Junction, Absaloka, Big Sky, Snowden, and Big Stone. Specifically,

1. OTRR follows BNSF's system from the Converse Yard north to Donkey Creek, Wyoming,
2. Then Northwest Through Gillette And Sheridan, Wyoming, Northwest Through Jones Junction, Montana To A Nearby Yard In Eastern Huntley,
3. Then Northeast From Jones Junction Through Moran Junction To Miles City To Glendive, Montana, – With A Connecting Branch To Snowdon, Montana
4. Then East Through Bismarck And Jamestown To Fargo, North Dakota
5. Then Southeast Through Moorhead To Brushvale, Minnesota From Which It Operates Over The Red River Valley And Western Railroad Via Trackage Rights Eastward To East Breckenridge, Minnesota,
6. Then Southeast To Benson, Minnesota, And Finally
7. Then West To Big Stone, South Dakota.

For purposes of this appraisal, unless otherwise noted, "land" is defined to include surface, subsurface, air, and riparian rights as designated as of the date of value in BNSF deeds and documents.

Interest Valued

The value conclusions are based on acquiring fee simple interests in the land.

Purpose of the Appraisal

The purpose of this appraisal is to determine the Aggregate Market Value of land that would comprise the herein-designated portion of the OTRR. That Aggregate Market Value is the sum of the value of the 738 Valuation Units into which I divided the subject ROW – as well as 14 yards and other supporting facilities and 18 microwave sites.

We determined the individual market values, as of January 1, 2001, of the properties that would be acquired for the OTRR components herein described. Each transaction would include a knowledgeable and prudent purchaser acting in its own self-interest, and without duress and a knowledgeable and prudent seller acting in its own self-interest, and without duress. This appraisal does not include an assemblage premium.

Standard of Value

The market value of each Acquisition Unit into which I divided the subject is defined as:

> *The most probable price which a property should bring in a competitive and open market under all conditions requisite to a fair sale.*

Implicit in this definition is the consummation of a sale as of a specified date and the passing of title from seller to buyer under conditions whereby:

1. Buyer and seller are typically motivated and act prudently;
2. Both parties are, knowledgeable, well informed or well advised and acting in what they consider their own best interests;
3. The property has been exposed in the open market for a reasonable time;

4. Payment is made in terms of cash in US Dollars or in terms of financial arrangements comparable thereto; and
5. The price represents the normal consideration for the property sold unaffected by special or creative financing or sales concessions granted by anyone associated with the sale.

Highest and Best Use

The market value of each Acquisition Unit reflects the Highest and Best Use of the unit. Highest and Best Use is defined as:

> *That reasonably probable use of land or sites as though vacant, found to be legally permissible, physically possible, financially feasible, and that results in the highest present land value.*[3]

The Highest and Best Use of a property must account for all three elements. For example, a use may be financially feasible, but it would be irrelevant if it were physically impossible or legally prohibited.

Moreover, Highest and Best Use is a market term and is determined, at least in part, by market forces. The Highest and Best Use is not a subjective analysis by the appraiser. "[R]ather, the highest and best use is shaped by the competitive forces within the market where the property is located," and is an economic study of market forces on each acquisition unit.[4]

The determination of Highest and Best Use takes into account the contribution of a specific use to the community and community development goals, as well as benefits of that use to individual property owners. Hence, in certain situations, the Highest and Best Use of land may be for parks, green belts, preservation, conservation, wildlife habitats and the like.

In classifying property as vacant, I considered the pattern of prevailing uses in the vicinity, as well as the apparent direction of market changes. Unless I had contrary indications, I assumed that the Highest and Best Use for such property included those enjoyed by surrounding land.

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3 THE APPRAISAL OF REAL ESTATE p. 297 (11th ed. 1996).

4 THE APPRAISAL OF REAL ESTATE p. 298 (11th ed. 1996).

Function of The Appraisal

I am providing this appraisal for use in a rate reasonableness proceeding before the STB that OTPC filed against BNSF. The proceeding addresses the reasonable rate for the transportation of coal between the Powder River Basin in Wyoming and OTPC's electric generating plant near Big Stone, South Dakota.

APPROACHES CONSIDERED

This section of the appraisal report explains the rationale and principal techniques underlying three primary approaches to appraising real estate and their applicability to the subject property.

The Sales Comparison Approach: In the sales comparison approach, fair market value is estimated by comparing the subject property to similar properties that have recently sold, are under contract, or are listed for sale.

When comparable sales data in the subject property's immediate area are limited, the appraiser may need to extend the data search to adjacent neighborhoods and similar communities. The appraiser may decide to use sales that are less current or offers to sell and purchase if the selection of data is limited to an unacceptably narrow sample of current market activity. With proper adjustment, these sales and listings may also be used as comparables.

The appraiser estimates the degree of similarity or difference between the subject property and the comparable sales by considering various elements of comparison, including:

- Real property rights conveyed;
- Financing terms;
- Conditions of sale;
- Market conditions;
- Location;
- Physical Characteristics (e.g., size and condition);
- Economic characteristics; and
- Use.[5]

The Income Approach: The income approach estimates the market value of property based on the future benefits of

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[5] THE APPRAISAL OF REAL ESTATE p. 91 (11th ed. 1996).

property ownership, such as income stream from improvements and resale value. This approach analyzes a property's capacity to generate income and converts that anticipated income-generating capacity into an estimate of the market value of the property.

This method first establishes a subject's base year net income (gross income less applicable expenses). The base year net income is then capitalized through direct capitalization or yield capitalization. Direct capitalization is "a method used to convert an estimate of a single year's income expectancy into an indication of value in one direct step—either by dividing the income estimate by an appropriate income rate or by multiplying the income estimate by an appropriate income factor."[6] The yield capitalization approach converts "future benefits into present value by discounting each future benefit at an appropriate yield rate or by developing an overall rate that explicitly reflects the investment's income pattern, value change, and yield rate."[7]

The Cost Approach: The cost approach reflects market value by recognizing that market participants relate value to cost. The principle of substitution, that no prudent buyer would pay more for a property than the cost to acquire a similar site and construct improvements of equal desirability and utility without undue delay, is basic to the cost approach. This approach involves three basic steps:

- Determining the cost to replace the improvements, which - together with the land - comprise a subject;
- Deducting both physical and economic depreciation (Economic depreciation is determined through recourse to one or both of the other two valuation methods - thereby rendering the Cost Approach incapable of actually producing an <u>independent</u> value that could be used to

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6 THE APPRAISAL OF REAL ESTATE p. 461 (11th ed. 1996).
7 THE APPRAISAL OF REAL ESTATE p. 298 (11th ed. 1996).

verify the value indications obtained through the other two approaches); and

- Adding the cost of replacement less depreciation to the value of the underlying land.

The cost approach is relevant in those cases where reproduction or replacement cost is necessary for insurance purposes, or for those properties that have a Highest and Best Use, which is not generally marketable.

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I relied entirely upon the Sales Comparison Approach because the hypothetical subject is vacant land[8] and there were hundreds of comparable sales in the vicinity of OTRR's ROW. I have not used the income approach because the data available regarding comparable land rental rates is inadequate. The cost approach is not relevant here because the subject is presumed to consist of vacant land.

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8 I therefore considered the land only and not the improvements.

ROW VALUATION METHODOLOGY

The practical process I used to determine the Aggregate Market Value for the acquisition of the subject ROW property involved the following steps:

- Inspecting and analyzing those properties abutting each side of the subject;
- Classifying the abutting property into Highest and Best Use categories;
- Collecting and analyzing sales and other relevant market data illustrating the market value for each land use in each market through which OTRR's ROW passes;
- Designating "Typical Parcels", on each side of OTRR's ROW, which best represent the value-determining characteristics (e.g. Highest and Best Use, size, shape, topography, etc.) of those properties abutting the subject – each such Typical Parcel represents either a single abutting property or a series of essentially similar abutting properties;
- Determining the unit value of each such Typical Parcel as supported by market data;
- Dividing the subject into "Valuation Units," which begin and end whenever a change in Highest and Best Use or unit value occurs on either side of OTRR's ROW;
- Determining each Valuation Unit's market value based on the combination of those Typical Parcels abutting each side of the Valuation Unit; and
- Summing the value of the Valuation Units to calculate the Aggregate Market Value for the subject property.

The next three report sections, Inspection and Classification Process, Sales Collection and Analysis, and Typical Parcel Definition and Valuation, describe how I carried out the above steps and identify certain fundamental issues relevant to the valuation process.

Inspection and Classification Process

I inspected the properties abutting OTRR's ROW from November 2000 through January of 2001. I drove or walked along both sides of OTRR's ROW appraised herein. During my inspection, I analyzed the properties abutting both sides of OTRR's ROW and classified them into the land use categories listed below based on the properties' Highest and Best Use.

<table>
<tr><td>S</td><td>Single-Family – Unattached residences with no or limited common area</td><td>M</td><td>Multi-Family – Attached or with common area; includes condos, apartments, retirement homes</td></tr>
<tr><td>A</td><td>Agricultural –Includes farming, grazing, stockyards, grain elevators and agricultural support</td><td colspan="2" rowspan="3">C – Commercial, including:

O, Office – Includes Single-tenant and multi-tenant

L, Lodging – Includes hotels, motels, hospitals, nursing homes and other short term stay facilities

R, Retail- Includes retail establishments and others selling or providing a service to walk-ins</td></tr>
<tr><td>I</td><td>Industrial – Includes manufacturing, shipping, utilities and other heavy uses</td></tr>
<tr><td>X</td><td>Extreme Terrain and Other Uses</td></tr>
<tr><td>T</td><td colspan="3">Transitional Land – generally vacant land in the path of development at the edge of a town. Such land, while often farmed or fallow, derives its market value from the anticipation of conversion to a higher use.</td></tr>
</table>

Sales Collection and Analysis

We collected and analyzed approximately 1500 sales in conducting this appraisal assignment. Among them over 660 sales have been entered in electronic form – thereby typifying the broader body of market activity. The others are in our workpapers. My team of real estate experts or I gathered and analyzed data on land transactions.[9] We visited or contacted county assessors'

[9] My assistants: Michael Caplan, Joseph A. Grouby, Benjamin J. Grouby and William N. Daly.

offices in 19 counties and cities through which OTRR's ROW pass. We also spoke with several independent appraisers in the various counties to confirm their findings. I also reviewed tax maps. In addition, I or my assistants reviewed precipitation maps, soil studies, topographical information on USGS Quad maps, land use and population density analyses to better understand the agricultural and range land values in Montana, Wyoming, Minnesota and North Dakota.

I used land sales that occurred throughout 1995 through 2000 – the six years immediately preceding the date of value. (Wherever practical, I used sales occurring no earlier than three years prior to the date of valuation.) Additionally, I used sales recorded as late as January 31, 2001 – as they may reasonably be viewed as having been consummated about 30 days prior to recordation.

In Appendix A we provide a listing of relevant sales, in each case indicating, the date of sale, the use of the property, the size of the property, the price, and the per acre or per square foot value. These sales also show address, general location, and/or legal descriptions.

Typical Parcels and Valuations Units

Based upon a review and analysis of sales data[10], I identified an appropriate unit value[11] for each Typical Parcel. Each such Typical Parcel represents either a single abutting property, or a consecutive series of abutting properties on the same side of OTRR's ROW – all having the same Highest and Best Use and relatively uniform value-determining characteristics.

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[10] When available sales data are limited, the practice of "benchmarking" is employed – whereby sales data over a broader area are used to bracket a value range within which

Primary value-determining characteristics that I considered include location, the nature and quality of immediate surroundings, size, shape, topography[12], rainfall

Primary value-determining characteristics that I considered include location, the nature and quality of immediate surroundings, size, shape, topography[12], rainfall soils, access, visibility, and predominant surrounding uses.[13] The respective importance of these characteristics varies with the Highest and Best Use and market conditions. While many exceptions exist, the following examples are generally true:

- Size most strongly affects residential and retail values; it least affects agricultural values.

  For example, a mile-long segment of the subject includes 12.12 acres. If it were bordered on both sides by 50 by 100 foot single-family properties, over 200 acquisitions would be necessary. Such an acquisition program is very different than buying a single 12.12-acre residential parcel. In such an instance, the unit value for such a series of acquisitions reflects the prices paid for similar 5,000 square foot residential lots – not that of a 12.12-acre parcel.

- Location, access and visibility are most critical for retail uses.

  Retailers often produce the highest economic return to the land and their ability to do so depends most critically upon location, access and visibility.

- Topography, wetness, rainfall, fertility are the strongest determinants of agricultural values.

  Indeed, abutter parcels classified as A and X frequently exhibit broad variation in such value determinants.

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[12] Topography is best illustrated by the USGS Quad maps. Conditions vary extensively and cannot be adequately captured in a one-word characterization. Accordingly, we identify and examine the specific Quad map containing each designated valuation unit.

[13] The Appraisal of Real Estate p. 403-404 (11th Ed. 1996).

Using these Typical Parcels, for reporting purposes, I divided OTRR's ROW into Valuation Units. A Valuation Unit is a segment of the OTRR ROW whose length extends so long as each of its sides has a consistent Highest and Best Use and a relatively uniform market value. A Valuation Unit ends whenever, on either side, a new and different Typical Parcel interrupts its continuity – by a change either in Highest and Best Use or in unit value.

The two Typical Parcels on the opposing sides of each OTRR Valuation Unit often differ from one another in use and/or unit value. In such instances, I assume that OTRR would acquire one-half of the width of its ROW from the respective landowners on each of its two sides. Therefore, I applied to each Valuation Unit's area a blended unit value – equaling one-half the unit value of the Typical Parcel on one side of the ROW plus one-half the unit value of the Typical Parcel on the opposing side. For example, if I valued the Typical Parcel on the west side of the ROW at $1.60 per square foot and the Typical Parcel on the east side of the ROW at $1.00 per square foot, I applied to the Valuation Unit a value of $1.30 per square foot.

VALUE DETERMINATIONS FOR THE PORTIONS OF OTRR ROW APPRAISED HEREIN

In total, OTRR's ROW appraised herein comprises 401.7 miles, equaling 4,753 acres. The Aggregate Market Value of this portion of OTRR's ROW acquisition is $33,924,000.

Details illustrating the sizes, topography, Highest and Best Use (on both sides), and the corresponding unit values associated with each of the 738 Valuation Units are listed our workpapers and in Appendix B – Value of Land for OTRR ROW Appraised Herein.

The above ROW cost figure does not include:

- The costs of acquiring additional lands required for yard, microwave, and office sites, which are subsequently summarized next in this report
- The costs of acquiring major portions of ROW and numerous yards and microwave sites not appraised herein
- Certain applicable corridor assembly premiums not included in this appraisal report

VALUE OF CERTAIN ADDITIONAL LAND ACQUISITIONS

In addition to OTRR's ROW, I appraised land for certain OTRR yards, staging tracks and other additional tracks based on requirements provided by BNSF. The market value of these 14 yards and facilities totals $1,947,000 and is developed in detail in Appendix C – Value of Land for Certain Yards and Facilities.

I also appraised land for certain OTRR microwave sites and communications centers, based on size requirements provided by BNSF. The market value of these 18 sites totals $268,000 and is developed in detail in Appendix D – Value of Land for Certain Microwave Sites.

SUMMARY OF VALUE DETERMINATIONS

The table below summarizes the preceding Tesh value determinations for the properties appraised herein.

Summary of Tesh Appraisal Conclusions Re: Certain Portions of OTRR Land Acquisition				
	Right-of-Way	**Yards and MOW Facilities**	**Microwave Tower Sites**	**Total**
Value	$33,924,000	$1,947,000	$268,000	$36,139,000
Miles	400.7	(n/a)	(n/a)	400.7
Acres	4,741	284	27	5,052
Number of Yards	(n/a)	8	(n/a)	8
Number of MOW Facilities	(n/a)	6	(n/a)	6
Number of Microwave Sites	(n/a)	(n/a)	18	18
$/Mile	$84,664	(n/a)	(n/a)	(n/a)
$/Acre	$7,156	$6,863	$9,926	$7,154

ASSUMPTIONS AND LIMITING CONDITIONS

This Restricted Use Appraisal Report of a Complete Retrospective Appraisal complies with the requirements set forth under Standard Rule 2-2c of the Uniform Standard of Profession Appraisal Practice ("USPAP"). As such, it includes discussions of the data, reasoning, and analyses used in the appraisal process to develop an opinion of value. Much of the supporting documentation concerning the data, reasoning, and analyses is provided for use in the STB proceeding, but I retained some documentation in my work file. The information contained in this report is specific to the needs of the client and for the intended use stated in this report. FTI Consulting is not responsible for unauthorized use of this report.

The following assumptions are underlying predicates to the determination of the aggregate market value conclusion. For the purpose of this appraisal, I assume that:

1. BNSF's ROW and associated rail improvements do not exist as of the January 1, 2001.
2. In the absence of BNSF, the size, shape, topography, Highest and Best Uses[15] and unit values of those parcels abutting the subject would be the same as they are with the existence of BNSF. Therefore, property acquired in assembling the subject has a unit price equal to the unit value of typical abutting parcels.
3. The right of way to be acquired is 100 feet wide – except in certain towns and cities where it is 75 feet wide. (Identified in workpapers.)
4. Half of the subject would have been acquired from the respective abutting property interests on each of its two sides.

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[15] Defined as that use which produces the highest land value. It is subject to certain limitations discussed under "Highest and Best Use" in this report.

5. The interest acquired excludes rights to oil or precious minerals.

6. The following acquisition costs are not incurred:

   - Brokerage fees
   - Legal and accounting fees
   - Insurance
   - Surveys
   - Appraisals
   - Title search
   - Transfer taxes
   - Landowner association fees
   - Special assessments
   - Permits for non-conforming use
   - Subdivision fees
   - Condition assessments and surveys
   - Demolition, relocation or rehabilitation of improvements on abutting parcels
   - Severance damages
   - Damages for creating any landlocked parcels not included in the acquisition

5. Except for certain properties identified separately in this report, I have not included an assemblage premium.

6. Title to the property is good and marketable -- the property is appraised free and clear of any and all other liens and encumbrances, except for leases cited herein.

7. Information furnished by others is reliable.

8. There are no hidden conditions of the property, subsoil, or structures that render it more or less valuable.

9. All applicable zoning and use regulations and restrictions have been complied with.

10. All required zoning, licenses, certificates of occupancy or other legislative or administrative authority from any local, state, or national governmental entity or private organization have been or can be obtained or renewed for any use on which the value conclusions contained in this report are based.
11. The use of the land is within the boundaries or property lines of the property described and there is no encroachment or trespass.
12. No property is encumbered by leasehold interest.

Assessing or verifying the presence or extent of conditions assumed, I do not assume responsibility for nor do I assume responsibility for arranging for engineering or other expert studies that may be required to discover or assess some of the condition of this report. The report's issuance and use is subject to the following limitations:

1. Possession of this report, or a copy of it, does not carry the right of publication. Without specific written consent, it may not be used for any purpose by any person other than BNSF, STB or a court hearing an appeal of the rate proceeding for which I prepared this report.
2. Neither all nor any part of the contents of this report (especially any conclusions as to value, the identity of the appraiser, or the firm with which the appraiser is connected) shall be distributed to the public through advertising, public relations, news sales, or other media without prior written consent and approval of the appraiser, except to the extent this information is disclosed in an opinion issued by STB or a court hearing an appeal of the rate proceeding for which I prepared this report.
3. The report may be used only in its entirety. Separation of any page from this report invalidates its conclusions.

CERTIFICATION

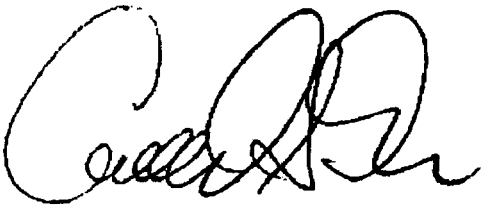
I certify that, to the best of my knowledge and belief:

1. The statements of fact contained in this report are true and correct.
2. The reported analyses, opinions, and conclusions are limited only by the reported assumptions and limiting conditions, and are my personal, unbiased professional analyses, opinions, and conclusions.
3. I have no present or prospective interest in the property that is the subject of this report and I have no personal interest or bias with respect to the parties involved.
4. My compensation is not contingent upon the reporting of a predetermined value or direction in value that favors the cause of the client, the amount of the value conclusion, the attainment of a stipulated result, or the occurrence of a subsequent event.
5. This appraisal was not based on a requested minimum valuation, a specific valuation, or the approval of a loan.
6. My analyses, opinions, and conclusions were developed, and this report has been prepared in conformity with the Uniform Standards of Professional Appraisal Practice.
7. I have made personal inspections of the property that is the subject of this report.
8. No one provided significant professional assistance in developing the conclusions of this report.
9. The reported analyses, opinions, and conclusions were developed, and this report has been prepared, in conformity with the requirements of the Code of Professional Ethics and the Standards of Professional Appraisal Practice of the Counselors of Real Estate and the National Association of Realtors.

10. The use of this report is subject to the requirements of the Counselors of Real Estate and the National Association of Realtors relating to review by their duly authorized representatives.
11. As of the date of this report, I have completed the requirements of the continuing education program of the Commonwealth of Virginia Board for Real Estate Appraisers.
12. The Aggregate Market Value of the subject appraised herein is:

$36,139,000

THIRTY SIX MILLION ONE HUNDRED THIRTY-NINE THOUSAND DOLLARS



Arnold S. Tesh, CRE
Certified General Appraiser

State of Wyoming
Certified Real Estate Appraiser
Permit No. 06988

State of Nebraska
Certified General Real Estate Appraiser
No. CG200064

State of North Dakota
Certified General Appraiser
Pending

State of Colorado
Certified General Appraiser
No. CG000040032101

State of Minnesota
Certified Real Property Appraiser
No. AP 20409206

State of Maryland
Certified General Appraiser
Certificate No. 10189

Commonwealth of Virginia
Certified General Appraiser
Certificate No. 4001001397

State of Montana, pending

QUALIFICATIONS OF ARNOLD S. TESH, CRE

Mr. Tesh is a Director in the Washington DC office of FTI Consulting, Inc. Mr. Tesh is internationally recognized as an expert in acquisition, disposal, negotiation, management, finance, appraisal, and litigation involving major asset portfolios. He has advised investors, government agencies, attorneys, accountants and various state and federal courts as to methodology, value, damages and business decisions for ventures totaling tens of billions of dollars.

Since 1966, Mr. Tesh has worked in various aspects of general business and real estate including appraisal, counseling, management, negotiation, brokerage, leasing, development, assessment, expert testimony, financing and investment. He has developed an expertise in analysis and valuation of various business and real property interests. He performs valuations which include, but are not limited to, railroads, public utilities, major retail portfolios, communication and energy corridors, and mega-land holdings. He was president of a subsidiary of a New York Stock Exchange (NYSE) real estate investment trust (REIT), which developed, owned, and managed over 15 million square feet of retail shopping centers.

He has established his reputation as an expert witness, advisor, and negotiator in resolving issues involving eminent domain, reorganization, liquidation, damages, collateral value, and contract disputes.

As an independent fiduciary for a Fortune 50 pension fund, Mr. Tesh has been involved in major asset management, negotiations and strategy decisions.

As an expert, Mr. Tesh has focused on developing solutions to problems and negotiating strategies involving railroads, public utilities, preferred health provider organizations, and various stock ownership disputes including majority/minority valuation issues. Each solution is unique to the asset class and purpose of the assignment. Certain of his approaches have been adopted as standards within the counseling and valuation professions.

EXPERIENCE

FTI Consulting, Washington, DC

In 1999, Mr. Tesh joined the economic consulting practice of Klick Kent & Allen, a division of FTI Consulting, of Annapolis, Maryland, to establish this Firm's real property counseling and valuation practice. In this capacity, Mr. Tesh also continues to emphasize negotiation and litigation support activities.

Tesh & Daly Advisors, LLC. Washington, DC

In 1998, Mr. Tesh and others formed Tesh & Daly Advisors, LLC. Mr. Tesh then devoted all of his professional time to this Washington, DC entity that specializes in counseling, negotiation, valuation, and litigation support for business and real property operating and valuation issues.

Arnold S. Tesh Advisors Washington, DC

In 1987, Mr. Tesh joined forces with other experts to form Arnold S. Tesh Advisors. He took an active role in providing expert counseling, negotiation, and valuation services for clients throughout the world. The firm specialized in general real property and business issues, rail corridor analysis, asset valuation, real property economics, expert testimony for both foreign and domestic portfolios.

In 1996, Arnold S. Tesh Advisors was sold to Zell Partners, Ltd. of Washington, DC. Mr. Tesh was Of Counsel to Zell Partners and was actively involved in its major litigation and counseling projects.

Jackson-Cross Company Washington, DC and Philadelphia, PA
Between 1982 and 1987, Mr. Tesh was an officer of Jackson-Cross Company. He held the positions of President and Chief Executive Officer of Jackson-Cross Appraisal Company and President and Chief Executive Officer of Jackson-Cross Advisors. In his various roles with this company, Mr. Tesh provided expert advice and counsel for some of the largest and most complex assignments in the fields of valuation and counseling. They included mergers, acquisitions involving several hundred millions of dollars, railroad transfers, bankruptcies, reorganizations, finance and legislative counseling with respect to transportation and real property issues.

United States Railway Association Washington, DC
Between 1977 and 1982, Mr. Tesh served the USRA in various high-level capacities. As its Director of Real Estate, he developed the strategy and coordinated in-house and contractor efforts in the largest real estate litigation in the history of the United States.
He testified regularly in the matter of the bankruptcy of the railroads covered by the Rail Revitalization and Reorganization Act of Congress. Due largely to his efforts, $17 billion in claims against the government parties were disposed of at a cost of less than one-sixth of that amount.
He was personally responsible for asset analysis and expert testimony for the Penn Central, Erie- Lackawanna, Reading, Ann Arbor, Lehigh Valley, Lehigh and Hudson River and Central of New Jersey. He negotiated the professional services

contracts for research and expert testimony regarding real property acquired by ConRail.

Arnold S. Tesh Associates Coral Springs, FL

During 1976-77, Mr. Tesh served as president of this company, specializing in consulting for matters related to real estate investment, development and management. During this time, he negotiated multi-million dollar workouts, development ventures, and income escalations.

General Growth Properties Des Moines, IA

From 1973 to 1976, Mr. Tesh served as president of a subsidiary of General Growth Properties. His responsibilities for this NYSE-listed company included tax management and negotiations; as well as site selection, acquisition, development, and marketing services.
In addition to administering the subsidiary company, he had specialized decision-making and negotiating responsibilities for over one-half billion dollars worth of regional mall shopping centers, apartments, motels and recreational facilities. Although the company was designed as a service entity for its NYSE parent, it evolved into a primary profit center.

Vanguard Appraisal Company Cedar Rapids, IA

Between 1972 and 1973, Mr. Tesh was Chief of Valuation for this national appraisal company. He was responsible for both government and private tax negotiation and appraisals. His projects, located primarily in the Midwest, typically involved commercial, industrial, residential and agricultural properties.

Los Angeles County Assessor Los Angeles, CA

From 1966 to 1972, Mr. Tesh was Deputy Assessor for Los Angeles County. He represented the County in Assessment Appeals Board actions involving all types of real property assets. He was also responsible for market value opinions (primarily on commercial and industrial properties) through the use of cost, comparable sale, and income approaches. He was empowered to negotiate assessment changes and to litigate when appropriate.

EDUCATION:

University of Arizona (BA) - Public Law and Public Speaking

California State University - International Politics and Real Estate

County of Los Angeles, California - one-year full-time (with pay) graduate curriculum in valuation and real property economics, culminating in graduation and licensing by the California Board of Equalization

Adjunct Professor

Northern Virginia Community College, Business and Real Estate Department
Currently teaching both live and televised courses throughout the Commonwealth of Virginia.

Miscellaneous Lecturing

Valuation of transportation, energy, and communication corridors for tax purposes—Kellogg Center School of Business—Michigan State University

Litigation Consulting--Insurance Market Conference--London Underwriting Centre

Real Property Consulting and Investing in Mexico—Real Property Section—American Bar Association

CERTIFICATE COURSES:

University of San Diego, Tampa University, and Arizona State University

ARBITRATOR:

National Association of Securities Dealers Regulation
Arbitration Panel Member

PROFESSIONAL AND BOARD MEMBERSHIPS:

Counselors of Real Estate (1984 - Present)
- Chairman of Capital Region, 1986-1993
- Vice President, 1995
- Chair, Public Policy Committee, 1996-1997
- Board of Directors, 1996-2000
- Vice-Chair, Ethics Committee, 1998-2001

National Association of Realtors – Appraisal Section
- General Accredited Appraiser (GAA)
- Commercial Legislation and Regulatory Subcommittee, 2002-2003

Northwestern University Medical School – Advisory Board

Future Diagnostics, Inc. (FDI) Los Angeles, CA
Chairman and Chief Financial Officer

Orthopedics USA (ORUSA) Los Angeles, CA
Chairman and Chief Financial Officer

ARTICLES:

Mr. Tesh has written numerous articles for general and professional publications. Among those, he authored a White Paper on the Resolution Trust Corporation on behalf of the American Society of Real Estate Counselors. He was a contributing author to the Iowa Appraisal Manual and the Federal Highway Administration Procedural Manual. He authored an article on ethics in Real Estate for the Counselors of Real Estate. His opinions are quoted in The Harvard University Environmental Law Review regarding the valuation of aesthetics. He has lectured before various professional organizations including the Center for Business Intelligence and the American Bar Association.

APPRAISAL LICENSE / CERTIFICATION

State of Wyoming
Certified Real Estate Appraiser
Permit No. 06988

State of Nebraska
Certified General Real Estate Appraiser
No. CG200064

State of North Dakota
Certified General Appraiser
Pending

State of Colorado
Certified General Appraiser
No. CG000040032101

State of Minnesota
Certified Real Property Appraiser
No. AP 20409206

State of Maryland
Certified General Appraiser
Certificate No. 10189

Commonwealth of Virginia
Certified General Appraiser
Certificate No. 4001001397

State of Montana, pending

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APPENDICES

Appendix A - Relevant Land Sales

Appendix B - Value of Land for OTRR Row Appraised Herein

Appendix C - Value of Land for Certain Yards and Facilities Appraised Herein

Appendix D - Value of Land for Certain Microwave Sites Appraised Herein

Appendix E - Partial List of Sources of Land Sales Data

Appendix A
Relevant Land Sales

Appendix A-1

Relevant Land Sales

County: Converse
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
363	A	$870	$400,000	460.00	12/08/99	10 miles W of Douglas	CN	WY	Larry Chamberlain	White Ranch GP	$1,140/ac for 268 ac irrigated crop; $570/ac for 85 ac bottom pasture; $209/ac for 80 ac avg pasture; $29,325 improvements
364	A	$1,384	$245,000	177.00	12/08/99	1 mile W and 3 miles N of Douglas	CN	WY	Joel Noel	Larry Chamberlain	$1,400/ac for 155 ac irrigated crop; $650/ac for bottom pasture; $13,856 improvements
41	A	$87	$1,000,000	11,503.00	08/26/98	7 miles S and 6 miles W of Bill	CN	WY	Charles E. Herron	Jeffery Dean Werner	326 AU; $118/ac for 400 ac irrigated pasture; $85/ac for 11,103 ac avg pasture; 163 AUM state lease; 6.5% to 7.8% annual escal.; reported, but not confirmed.
367	A	$90	$1,265,400	14,060.00	04/14/98	32 miles N of Glenrock	CN	WY	Spearhead Land & Livestock	Salt Creek LLC	$85/ac for 14,060 ac pasture; 208 AUM state lease; 548 AUM BLM lease; minimal improvements
369	A	$760	$209,000	275.00	07/08/97	4 miles W of Douglas	CN	WY	James & Colleen Harmeyer	Larime Ranch	$1,470/ac for 71 ac irrigated crop; $725/ac for 105 ac bottom pasture; $190/ac for 90 ac pasture; $8,501 improvements
368	A	$1,107	$310,000	280.00	05/09/97	1 mile N of Douglas	CN	WY	Harlan & Charlie Bradshaw	Jacobson-Anderson & Ander	103 AU; $1,500/ac for 140 ac irrigated; $750/ac for 5 ac bottom pasture; $315/ac for avg pasture; $50,870 improvements
366	A	$1,120	$560,000	500.00	06/07/96	7 miles S and 4 miles E of Douglas	CN	WY	Claus & Lois Clayton	Daniel & Sharon Lovitt	$1,625/ac for 180 ac irrigated; $810/ac for 185 ac bottom pasture; $272/ac for 125 avg pasture; $15,556 improvements; includes $60,000 required improvements by seller.
43	A	$75	$156,000	2,080.00	04/03/96	2 miles N and 2 miles E of Bill	CN	WY	Wayne & Billie Jean Hirsch	Coyote Cattle Co.	52 AU; $75/ac for 2,080 ac avg pasture
42	A	$72	$165,000	2,283.00	08/09/94	29 miles N and 9 miles E of Douglas	CN	WY	Sandra & Irle Benham	F & H Investments	57 AU; $70/ac for 2,283 ac avg pasture; Improvements contributed $5,190
44	A	$87	$1,400,000	16,055.00	03/10/94	5 miles N of Bill	CN	WY	JFW Corp./ Richie & Co.	Caprock Pipe & Supply	518 AU; $90/ac to $109/ac for bottom pasture; $67/ac to $73/ac for avg pasture; 788 AUM forest permit; 472 AUM State lease; 434 AUM private lease; $160,350 improvements

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-2

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
325	A	$146	$575,000	3,942.00	6/10/1999	Bitter Creek Road; 11 miles N of Recluse	CA	WY	Fred & May Ann Odedkoven	Gabriel Manigualt	125 AU; Improvements contribute $82,000
316	C	$7.22	$285,000	39,463.00	5/13/1999	2124 Douglas Hwy, Gillette	CA	WY	Security State Bank	Powder Basin Properties	Lot 2E, Homestead Add.
317	C	$1.00	$17,000	16,951.00	5/11/1999	1811 Echeta Rd, Gillette	CA	WY	James E. Campbell, et ux	Darrell Beck, et ux	Lot 8, Westside Add.
47	A	$144	$173,250	1,200.00	4/15/1999	S and E of Hwy 387	CA	WY	Richard Leavitt, Tr.	Dale & Marcia Wright	32 AU; $144/ac for 1,200 ac average pasture
376	A	$147	$575,000	3,907.00	4/15/1999	9 miles N of Recluse	CA	WY	Fred & Maryann Oedekoven	Gabrielle Manigault	157 AU; $275/ac for 220 ac dry cropland; $125/ac for 3,602 ac avg pasture; $170/ac for 85 ac bottom pasture; $48,864 improvements
324	A	$172	$950,000	5,516.00	4/1/1999	Hwy 59; 20 miles N of Gillette	CA	WY	Rod & Katie Smith	60 Bar Ranch, LLC	180 AU; Improvements contribute $170,000; Wyoming State lease 120 AUM
385	S	$1.57	$25,000	15,888.00	3/31/1999	514 Par Drive, Gillette	CA	WY	Patrick Paulson		
323	A	$157	$1,007,000	6,424.00	3/30/1999	510 Horse Creek Rd.; 35 miles NE of Gillette	CA	WY	Larry & Susan Shippy	Loren & Bonnie Peyrot	500 AU; BLM lease for 231 AUM
388	S	5.3 cents	$27,500	520,542.00	3/19/1999	4808 Roany Rd., Gillette	CA	WY	Chuck & Janice Yarnell		
386	S	7.8 cents	$23,750	304,920.00	3/16/1999	8 Thomas Paine Rd, Gillette	CA	WY	Deb Olsen		
318	C	$0.57	$25,000	43,596.00	3/15/1999	N. Highway 14/16, Turner Addition, Gillette	CA	WY	Michael Toun, et al	Darryl Lynde, et ux	Lots 10, 11, 12, Turner Add.

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
326	A	$105	$554,400	5,280.00	3/12/1999	20 miles SW of Gillette	CA	WY	WYO Davis Family LP	Dorothy L. Lindsey Revocable Trust	151 AU; $265/ac allocated to minerals; undivided 6/7th interest
374	A	$105	$646,800	6,160.00	3/12/1999	20 miles SW of Gillette	CA	WY	WYO Davis Family LP	Dorothy Lindsey Rev Trust	170 AU; $105/ac or 6,157 dry pasture; $0 improvements
375	A	$148	$950,000	6,424.00	3/1/1999	35 miles NE of Gillette	CA	WY	Larry & Susan Shippy	Loren & Bonnie Peyrot	207 AU; $134/ac for 6,327 ac dry pasture; $555/ac for 95 ac tame pasture; $35,000 improvements
381	A	$140	$105,000	751.00	Mar-99	Bay Horse Rd, 1.5 mi N of Elk Creek Rd.	CA	WY	NR	NR	Grass land, natural water; Lots 1 & 2, Tract 63 A-H Pt Tract 65, Section 13; PT N2 Section 14; T56N, R73W
321	A	$96	$2,090,304	21,773.00	2/1/1999	20 miles W of Gillette	CA	WY	Glenn J. Barlow	Trail Ridge Land Company LLC	624 AU; Improvements contribute $195,000
384	S	4.9 cents	$10,000	206,039.00	1/29/1999	36 Alpine, Gillette	CA	WY	Dykes		
387	S	5.5 cents	$18,000	328,791.00	1/29/1999	4701 Flying Dave Avenue, Gillette	CA	WY	Tia R. McElwain		
383	S	$0.14	$12,500	91,912.00	1/28/1999	5005 Falcon, Gillette	CA	WY	Bradley & Rasmussen		
49	A	$148	$100,800	682.00	1/21/1999	7 miles S and 10 miles W of Wright	CA	WY	Richard Leavitt	Eugene Sullivan	18 AU; $148/ac for 682 ac average pasture
389	S	$4.07	$28,500	7,000.00	1/20/1999	407 Carey, Gillette	CA	WY	William & Sue Kuhrt		This unit price looks high for a residential lot.
315	C	$1.48	$225,000	152,460.00	12/14/1998	W Second St. & Skyline Rd., Gillette	CA	WY	Keshav Patel	Robert & Ann Martens	Tract 1, Resub Block 2, Wagensen Add.

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
48	A	$98	$190,000	1,944.00	12/10/1998	15 miles W and 8 miles N of Wright	CA	WY	Ronald & Jean Schlautman	Morris Dean Ems	49 AU; $90/ac for 1,944 ac average pasture; Improvements contribute $15,086
392	S	$1.18	$16,500	14,000.00	11/13/1998	918 East 8th Streer, Gillette	CA	WY	Speiser		
380	A	$313	$200,000	639.20	11/5/1998	16 mi SE on Hwy 450 from Hwy 59	CA	WY	NR	NR	Dry Pasture 559.2 ac, Commercial 80 ac; Section 36, T34N, R70W
314	C	$7.04	$500,000	71,003.00	11/3/1998	106 W US Hwy 14/16, Gillette	CA	WY	Gastop, LLC	Steven Miles	Lot 2, Block 1, Westside Add.
399	S	$0.16	$20,000	123,710.00	10/30/1998	3106 Grand View, Gillette	CA	WY	Howard & Vi Collins		
313	C	$6.74	$286,000	42,448.00	10/26/1998	810 EZ St., Gillette	CA	WY	Johnson/Bruan/Engesser	Billy & Donna Johnson	Lot 1, Block 1, Marquiss Add.
393	S	1.8 cents	$14,448	786,694.00	9/25/1998	200 Fitch Road, Gillette	CA	WY	Oriva Hills Development		
310	C	$4.52	$325,000	71,874.00	9/23/1998	2400 S Douglas Hwy, Gillette	CA	WY	Rod A. Griffin	Powder Basin Properties	Lot 2C, Block 1, Homestead Add., Additional $3.50/SF cost for site work
395	S	4.2 cents	$18,000	426,496.00	9/14/1998	4501 Flying Dave Ave., Gillette	CA	WY	Tia R. McElwain		
311	C	$0.50	$14,500	29,123.00	8/11/1998	1800 W Warlow Dr., Gillette	CA	WY	Norton Construction	Rimrock West UC	Lot 6, Block 4, Gillette Business Park
406	S	$0.17	$37,000	217,800.00	8/6/1998	72 Nathan Hale, Gillette	CA	WY	James & Terrin Hinkle		

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C: Commercial I: Industrial

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
390	S	$1.43	$10,000	7,000.00	8/5/1998	807 Richards, Gillette	CA	WY	Helen D. Close		
400	S	$1.90	$20,000	10,500.00	7/9/1998	3907 Teepee St., Gillette	CA	WY	Jeanne M. Bryant		
398	S	$0.91	$20,000	22,000.00	6/25/1998	4200 Hidden Valley Rd., Gillette	CA	WY	Jackson		
404	S	$0.45	$24,000	53,154.00	6/12/1998	2510 Dove Road, Gillette	CA	WY	Crane		
312	C	$8.45	$280,000	33,133.00	6/1/1998	2100 S Douglas Hwy, Gillette	CA	WY	FFCA Acquisition Corp	David & Julie Fall	Lot 5F, Block 1, Homestead Add.
309	C	$3.94	$86,800	22,041.00	5/29/1998	818 Country Club Rd., Gillette	CA	WY	BTS LLC	Kanti R. Patel	Lot 1C, Block 6, Marquiss Add.
405	S	$1.72	$27,000	15,682.00	5/29/1998	2530 Cocklebur, Gillette	CA	WY	Robert Sinclair		
308	C	$1.41	$160,000	113,561.00	5/15/1998	1402 W Second St., Gillette	CA	WY	Karl Johnson	Mustang, Inc.	Lot 8, Block 10, Westside; See #300 for appreciation
382	I	$0.78	$78,000	99,511.00	4/22/1998	3503 Echeta Rd, Gillette	CA	WY	NR	NR	NWSW, Sectioin 20, T50N, R72W
394	S	$1.59	$15,000	9,447.00	4/17/1998	2405 James Court, Gillette	CA	WY	Jarreds		
391	S	$0.83	$13,000	15,750.00	4/16/1998	4209 Teepee, Gillette	CA	WY	Wilkson		

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S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
403	S	$1.37	$24,000	17,518.00	4/15/1998	3304 Jonquil, Gillette	CA	WY	Powder River Homes		
397	S	$2.71	$19,000	7,000.00	3/31/1998	915 Greenwood, Gillette	CA	WY	A.D. & Lawrence Gaddis		
402	S	$0.84	$24,000	28,617.00	3/16/1998	618 Par Dr., Gillette	CA	WY	Patricia Paulsen		
396	S	$1.88	$18,500	9,838.00	3/12/1998	5006 Gordon, Gillette	CA	WY	Darr & Donna Hammond		
46	A	$194	$500,000	2,578.00	3/5/1998	8 miles S and 5 miles W of Wright	CA	WY	Richard Leavitt	Justin Joe Reno	100 AU; $250/ac for 250 ac hay; $150/ac for 2,328 ac pasture;Improvements contribute $88,472
401	S	$0.17	$22,000	132,422.00	2/17/1998	59 Montgomery Rd., Gillette	CA	WY	Dan & Connie Hopper		
407	S	$0.99	$39,000	39,287.00	2/11/1998	650 Par Dr., Gillette	CA	WY	Patricia Paulsen		
302	C	$3.65	$135,000	37,026.00	2/9/1998	1616 E Hwy 14-16, Gillette	CA	WY	Maverik Country Stores	Wayne & Sandra Worthen	Lot C1, Highway Addition
411	S	$0.10	$10,900	108,190.00	12/23/1997	3403 Bird Dr., Gillette	CA	WY	Reynolds		
322	A	$142	$1,350,000	9,480.00	11/21/1997	18 miles NE of Gillette	CA	WY	Cow Creek, LLC	60 Bar Ranch, LLC	190 AU; $30,000 hunting lease; purchased to facilitate BLM land swap
373	A	$142	$1,350,000	9,480.00	11/21/1997	18 miles N of Gillette	CA	WY	Cow Creek, LLC	60 Bar Ranch, LLC	190 AU; unimproved; purchased for land swap with BLM.

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Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
303	C	$0.24	$105,000	435,600.00	11/7/1997	2201 Boxelder Rd., Gillette	CA	WY	Wyoming Beverages, Inc.	Kanti & Sulabha Patel	Pt. SW 1/4, Section 25 T50N, R72W
417	S	$1.79	$25,000	14,000.00	10/20/1997	612 E. Longmont	CA	WY	Leona Heptner		
421	S	$1.25	$36,000	28,800.00	9/5/1997	2708 Rapid St., Gillette	CA	WY	Gilliam Construction		
412	S	$2.19	$15,000	6,845.00	8/21/1997	4702 Milton, Gillette	CA	WY	Coulter		
419	S	$2.04	$32,000	15,660.00	8/13/1997	4003 Roanoke, Gillette	CA	WY	Donkey Creek Development		
408	S	$0.76	$4,850	6,342.00	8/11/1997	225 Yellowstone, Wright	CA	WY	Harley Hall		Mobile Home Lots (1 of 9 sales)
415	S	$2.64	$18,500	7,000.00	8/11/1997	702 S. Miller, Gillette	CA	WY	Bernard Roark Trust		
304	C	$3.83	$300,000	78,277.00	8/5/1997	2533 S. Douglas Hwy, Gillette	CA	WY	Real Estate Plus LLC	James H. Baker, et ux.	Lot 2, Genesee Park Addition
414	S	$1.33	$16,000	12,000.00	7/30/1997	1500 Denver, Gillette	CA	WY	Arlene Edwards		
305	C	$0.23	$212,000	927,349.00	7/21/1997	Union Chapel Rd. & S Hwy 59, Gillette	CA	WY	Sharon K. Doud	Harry Lee & Ruth Wolff	SWNE, Sec. 13, T49N, R72W
306	C	$0.83	$25,000	30,056.00	6/27/1997	400 Frontage Rd., Gillette	CA	WY	Michael F. Cook	CCC Rentals Ptshp	Lot 2, Block 3, Energy Park

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
422	S	3.1 cents	$47,000	1,524,600.00	6/23/1997	4850 Centennial Dr., Gillette	CA	WY	Don & Jay Kahle		
307	C	$0.80	$57,500	71,874.00	5/21/1997	401 W Walnut St., Gillette	CA	WY	K C Apartments Ptnrs	Bruce Schilling	Lot 3, Block 2, Esquire Estates, Phase III
409	S	$0.76	$5,150	6,742.00	5/12/1997	202 Yellowstone, Wright	CA	WY	Harley Hall		Mobile Home Lots (1 of 9 sales)
410	S	$0.76	$5,400	7,092.00	4/25/1997	206 Yellowstone, Wright	CA	WY	Harley Hall		Mobile Home Lots (1 of 9 sales)
51	A	$135	$658,000	4,880.00	4/15/1997	6 miles S of Spotted Horse	CA	WY	Crump Land & Livestock LLC	Fitch Family Rev. Trust	151 AU; $257/ac for 700 ac dry crop; $89/ac for 4,180 ac pasture; 120 AUM state lease; 250 AUM BLM lease; Improvements contribute $89,480
418	S	$0.14	$30,000	221,760.00	4/3/1997	140 Shober Rd., Gillette	CA	WY	Tom & Luann Fries		
327	A	$135	$658,000	4,880.00	4/1/1997	28 miles NW of Gillette	CA	WY	Crump Land & Livestock, LLC	Fitch Revocable Trust	360 AU; Improvements contribute $35,000; BLM lease 252 AUM; Wyoming State lease 120 AUM
413	S	$0.63	$15,800	25,265.00	3/21/1997	2509 Little Powder Rd, Gillette	CA	WY	Hector Lopez		
416	S	1.1 cents	$19,283	1,721,491.00	3/21/1997	201 Fitch Rd., Gillette	CA	WY	Oriva Hills Development		
300	C	$1.01	$97,000	96,040.00	3/20/1997	1300 W Second St. Gillette	CA	WY	Karl M. Johnson	Douglas & Isabel Turner Trust	Lot 2, Block 9, Westside Addition, Corner lot
319	I	$0.48	$32,000	66,211.00	3/14/1997	1523 East Energy St., Gillette	CA	WY	Schwans Sales Enterprises, Inc.	Edgar & Maugrett Hoffman	Lot 18, Block 1, Energy Park Add.

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Campbell
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
301	C	$2.23	$750,000	336,719.00	3/10/1997	Boxelder Rd. & I-90, Gillette	CA	WY	Davis Chevrolet/Buick/Cadillac, Inc.	Windmill LP	Ag zoning
320	I	$1.13	$19,600	17,400.00	2/20/1997	610 W First St., Gillette	CA	WY	City of Gillette	Anear, Inc.	Lot 2, Block 1, Glacier Add.
420	S	$1.09	$34,500	31,643.00	2/14/1997	2650 Pinehurst Ct., Gillette	CA	WY	Larry & Mary Fox		
50	A	$102	$477,000	4,680.00	12/23/1996	14 miles S and 16 miles E of Wright	CA	WY	North American L & L, LLC	Daniel Tracy et al.	113 AU; $109/ac for 1,576 ac avg. pasture; $92/ac for 3,152 ac below avg. pasture; 185 AUM state lease; 120 AUM Forest permit
371	A	$101	$477,000	4,727.99	12/23/1996	14 miles S and 16 miles E of Wright	CA	WY	North American Land & Livestock, LLC	Daniel Tracey, et al.	100 AU; $114/ac for 1,600 ac avg pasture; $89/ac for 3,128 ac fair pasture; 185 AUM state lease; 120 AUM Forest lease
372	A	$80	$230,400	2,880.00	5/15/1996	15 miles N of Gillete	CA	WY	60 Bar Ranch	Consolidated Coal	84 AU; $80/ac for 2,880 ac dry pasture

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-3

Relevant Land Sales

County: Sheridan
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
23	A	$4,500	$1,620,000	360.00	4/17/2000	15 MI. NE of Sheridan	SH	WY	Robert & Carol Berry	Karolyn Kane Gainan	
21	A	$950	$3,800,000	4,000.00	3/31/2000	7 MI. NE of Sheridan	SH	WY	Robert & Carol Berry	PK Ranch Co.	Conservation easement reduced sales price.
52	S	$1.78	$14,500	8,134.00	8/30/1999	Lot 8, Blk. 4, North Heights Sub.	SH	WY	James & Claudia Schaffer	Heights Dev. Corp.	
36	A	$3,865	$1,090,000	282.00	8/17/1999	170 Beckton Hall Road(10 MI. West of Sheridan)	SH	Wy	Ruth O'Donnell	Peter & Lucy Widener	Improvements valued @ $175,00 reported.
53	S	$1.90	$19,000	10,000.00	8/12/1999	253 W. 8th. Street, Sheridan	SH	WY	Elden Streeter & John Whitney	Myrl Wiliamson	Lot 5, Blk. 32, Sheridan Land Co. 2nd.
22	A	$6,202	$1,780,000	287.00	7/28/1999	3 MI. SE of Big Horn	SH	WY	Homer Scott, Jr.	Estate of Earl Hanslip	County Rd. 28 & SR 355
54	S	$2.05	$16,500	8,058.00	6/21/1999	Corner 8th & Dana Streets, Sheridan	SH	WY	Jack Wasson	Wilber Bryant	Lot 3, Fishpond Minor Addition
55	S	$1.81	$14,500	8,031.00	5/18/1999	Taylor & Park Streets, Sheridan	SH	WY	Tracy Davis	David & In Suk Githens	Lot 14, Blk. 6, Krause Addition
27	A	$297	$363,605	1,226.00	5/14/1999	16 MI. NE of Sheridan	SH	WY	Brent Peterson	Stanley & Shari Peddicord	Two-year lease back to seller included in reported sales price($13,605).
31	A	$275	$473,000	1,720.00	4/12/1999	14 MI. East of Sheridan	SH	WY	Craig & Karen Scheckla	Spring Willow Ranch, Inc.	Better than average pasture.
38	A	$1,071	$450,000	420.00	4/9/1999	151 Passaic, Leiter, WY	SH	WY	Steven & Mona Mitzel	Robert & Darlene McCue	Improvement values not reported

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Relevant Land Sales

County: Sheridan
State: Wyoming

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
96	C	$12.37	$365,000	29,500.00	3/29/1999	Lot 1, Blk. 1 East Glacier Park Addition	SH	WY	David Frank	JJD Partnership	
379	S	0.7 cents	$14,880	2,138,796.00	2/2/1999	Acme, Sheridan, WY	SH	WY	NR	NR	PT E2 SW4, Section 20, T57N, R84W
45	A	$247	$2,446,600	9,898.00	1/13/1999	5 MI. North and 5 MI. East of Sheridan	SH	WY	Kyle Brinkerhoff, Inc.	Dyecrest Ranch, LLC	Improvement values depreciated to $281,590.
97	C	$8.12	$225,000	27,695.00	1/8/1999	Coffeen Av. & Riverside, Sheridan	SH	WY	Brian Huskee	Tom & Lynette Neighbors	Vacant lot adjacent to Coffeen Av.
39	A	$1,331	$2,050,000	1,540.00	1/5/1999	2022 Hwy 14(25 MI. East of Sheridan)	SH	WY	Miller Cattle Co.	Not Reported	1540 Deeded AC, 1000 Leased AC, Improvement values not reported.
377	C	$3.50	$83,000	23,734.00	Dec-98	North edge of town, Sheridan, WY 82801	SH	WY	NR	NR	Tract B, Block 2, Lot 2, West Glacier Subdivision
331	A	$166	$2,850,000	17,176.00	10/23/1998	2423 Passiac Rd., Leiter	SH	WY	Jane Dunbar	BAR Corporation	700 AU; $357/ac for 1,192 ac pasture; $146/ac for 15984 ac rangeland; 251 AUM Wyoming lease (1,386 ac); 993 AUM BLM lease (8,132 ac)
93	C	$2.54	$350,000	137,716.00	10/23/1998	NW quadrant 5th. Street & I-90, Sheridan	SH	WY	Western Dining, LLC	Gary Decker & Larry Suchor	Vacant, improved city lot for use as restaurant site.
37	A	$2,425	$485,000	200.00	9/4/1998	152 River Rd., Ranchester, WY	SH	WY	Mark & Susan Porden	Dana & Alice Kerns	Improvements valued @ $65,000 reported.
56	S	$1.21	$12,500	10,352.00	8/21/1998	1355 Birch Street, Sheridan	SH	WY	Gene & Anne Kilpatrick	Kurt & Jodi Hgen	Lot 2, Blk. 2, Schwabaur Sub.
57	S	$1.04	$11,000	10,556.00	7/16/1998	1341 Birch Street, Sheridan	SH	WY	Bruce & Teresa Madill	Kurt & Jodi Hgen	Lot 4, Blk. 2, Schwabaur Sub.

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Relevant Land Sales

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Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
330	A	$646	$155,000	240.00	7/2/1998	8 miles W of Sheridan on Big Goose Rd.	SH	WY	Unknown	Roger Lingenfelter	
58	S	$1.13	$13,500	11,913.00	6/25/1998	On Spaulding AV., between 8th & 9th Streets, Sheridan	SH	WY	Don & Linda Cherni	Arthur & Florence Tonnies	Lot 2, Blk. 32, Sheridan Land Co. 2nd.
94	C	$9.24	$150,000	16,232.00	6/15/1998	SE quadrant of Brook & Algers St., Sheridan	SH	WY	Wayne & Eidella Baumann	Helen Legerski, et al	Base parking lot one block west of Main Street in Central Business District
95	C	$6.74	$223,000	33,105.00	6/15/1998	1384 Coffeen AV., Sheridan	SH	WY	Dunn Investments	John & Erin Quarterman	Site for Blimpies Restaurant required $33,000 in site work(included in sales price).
26	A	$273	$330,000	1,208.00	4/30/1998	2.5 MI/ North of Ulm, WY	SH	WY	Golden Willow Ranch	Robert & Eleanor Demple	Summer pasture land
59	S	$1.63	$12,000	7,380.00	4/2/1998	1340 Taylor AV., Sheridan	SH	WY	DK Construction, Inc.	Robert & Teresa Phillips	Lot 9, Blk. 6, Krause Addition
60	S	$2.73	$28,350	10,400.00	4/1/1998	Lot 36, Holly Ponds Phase 1, Unit 3, Sheridan	SH	WY	Gerald & Delores Pelesky	Holly Ponds, LLC	Buyer is builder.
61	S	$0.18	$200,000	1,135,174.00	3/31/1998	Holly Ponds, Sheridan	SH	WY	Holly Ponds, LLC	Holly Sugar	Phase two bulk land take out.
32	A	$265	$520,000	1,964.00	3/26/1998	Along Powder River in Arvada	SH	WY	Stephen & Judith Hofheimer Trust	Diane Pincus	Some improvements; Value not reported.
40	A	$735	$499,500	680.00	3/25/1998	8 MI. West, and 4 MI. North of Ucross	SH	WY	Garry & Marilyn Marken	Frances Felde	Dry crop Avg. 90AC @ $675/AC = $60,750. Pasture Avg. 590 AC@ $675/AC=$398,25. Improvements depreciated to $40,338.
62	S	$2.01	$22,425	11,130.00	3/16/1998	Holly Ponds, Sheridan	SH	WY	Mark & Teresa Law	Holly Ponds, LLC	Lot 32, Holly Ponds Phase1, Unit 3

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63	S	$1.56	$11,500	7,380.00	3/10/1998	Highland, Sheridan	SH	WY	John & Marie Kobielusz	Robert & Teresa Phillips	Lot 12, Blk. 6, Krause Addition
329	A	$1,232	$505,000	410.00	3/5/1998	3 miles W of Ucross	SH	WY	Shirley Ann Poston	Todd Ranch, Inc.; Jack & Barb Marton	Small hobby ranch; 2 AU; $1,100/ac for 38 ac irrigated; $329/ac for 372 ac rangeland; Improvements contribute $30,000
28	A	$1,600	$400,000	250.00	3/1/1998	West of Wakely; NE of Sheridan	SH	WY	Melinda Greenough	AC Ranch, Inc.	Price influenced by location and rural homesite pressures.
64	S	$0.34	$57,000	165,528.00	2/18/1998	NE Corner, S. Big Horn Av & Brundage, Sheridan	SH	WY	Fyco Investments	Mark & Colleen Ferries	Bulk land sale; Ferries Minor Subd.
378	C	$5.30	$175,000	33,000.00	Feb-98	North Main, Sheridan, WY	SH	WY	NR	NR	
328	A	$2,056	$2,400,000	1,167.50	1/12/1998	5 miles S of Banner	SH	WY	Big Sky Land Co. LLC	Ruth Rice & Shirley Poston	Scenic and historic small farmstead; 55 AU; limited hay and pasture
17	A	$131	$276,000	2,105.00	12/30/1997	Ucross	SH	WY	T & P Rhoades Investment	Alfred & Pegge Cooksley	Summer pasture land. Part In Johnson County
65	S	$1.87	$19,550	10,440.00	12/23/1997	Holly Ponds, Phase 1	SH	WY	Fletcher Construction Co.	Holly Ponds, LLC	Lot 2, Holly Ponds Phase 1, Unit 1
66	S	$2.88	$29,925	10,400.00	12/22/1997	Holly Ponds, Phase 1	SH	WY	David & In Suk Githens	Holly Ponds, LLC	Lot 35, Holly Ponds Phase 1, Unit 3
30	A	$120	$450,000	3,760.00	12/19/1997	4 MI. NW of Clearmont	SH	WY	Paula Leuschen/Mark & Shelly Kirby	William Pease	
19	A	$120	$450,000	3,760.00	12/18/1997	NW of Clearmont	SH	WY	Mark & Shelly Kirby	William L. Pease	Pasture land

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Relevant Land Sales

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Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
67	S	$1.86	$16,000	8,603.00	12/15/1997	Krause Addition, Sheridan	SH	WY	Kim Young Ki	Left Hand Land Co.	Lot 12, Blk. 8, Krause Addition
68	S	$2.58	$45,000	17,467.00	12/1/1997	Summit at Sparrow Hawk, Sheridan	SH	WY	Lany & Brandith Bangerter	Clinton Ed Foslein	Lot 5, Summit at Sparrow Hawk
69	S	$2.05	$25,750	12,589.00	11/26/1997	Lot 32, Summit at Sparrow Hawk	SH	WY	Joseph & Melissa Kosma	Garland Enterprises	Lot 32, Summit at Sparrow Hawk
91	C	$0.37	$129,871	355,014.00	11/20/1997	South Big Horn Av., Sheridan	SH	WY	Jack D/Kathryn L. Landon, Trustees	Bruce Burns	R-3 at purchase, changed to B-1. Purchased for veterinary clinic. Frontage on Hwy 87, but no direct access.
92	C	$0.41	$82,129	200,812.00	11/20/1997	South Big Horn Av., Sheridan	SH	WY	Pilch/Vlahos, LLC	Bruce Burns	R-3 at purchase, changed to B-1. Purchased for veterinary clinic. Frontage on Hwy 87, but no direct access.
85	C	$0.38	$135,404	355,014.00	11/19/1997	505 College Meadow Drive	SH	WY	Jack & Kathryn Landon, Jr.	Burns Industries, Inc.	Lot1, College Meadow Development
86	C	$0.38	$76,596	200,812.00	11/19/1997	510 College Meadow Drive	SH	WY	Pilch/Vlahos, LLC	Burns Industries, Inc.	Lot 2, College Meadow Development
1	S	6.1 cents	$37,000	608,533.00	11/4/1997	Lot 6, Parkman Hills	SH	WY	Billie/Sheldon Johnson	Donna Diers	
7	S	5.5 cents	$20,000	365,033.00	10/31/1997	8MI. NW of Ranchester	SH	WY	Kevin S. King	James & Rebecca Evans	Mobil homes allowed in Subdivision
10	S	2.3 cents	$36,000	1,568,160.00	10/27/1997	10 MI. North of Sheridan off Hwy 338	SH	WY	Janice Feaster	Scott & Sandra Nicholson	Building areas limited by terrain
70	S	$1.54	$11,000	7,150.00	10/8/1997	North Heights, Sheridan	SH	WY	Dennis Wisenbacker	Heights Dev. Corp.	Lot 11, Blk. 11 North Heights

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Relevant Land Sales

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Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
71	S	$2.29	$16,500	7,200.00	9/19/1997	960 Park Drive, Sheridan	SH	WY	Dave & Shari Willett	Left Hand Land Co.	Lot 11, Blk. 8, Krause Addition
20	S	$0.21	$3,500	16,553.00	9/16/1997	Clearmont	SH	WY	James & Dana Gorzalka	Ira & Peggy Roadifer	Lot purchased by adjoining owner
12	S	5.1 cents	$83,182	1,637,856.00	8/26/1997	3 Mi. SW of Dayton	SH	WY	David Perfetti	Ron Vanderhauf	Lot 6, Horseshoe Estates
11	S	5.1 cents	$82,742	1,638,292.00	8/20/1997	3 Mi. SW of Dayton	SH	WY	David Perfetti	Ron Vanderhauf	Lot 5, Horseshoe Estates
72	S	$0.22	$175,000	809,955.00	8/19/1997	Holly Ponds, Sheridan	SH	WY	Holly Ponds, LLC	Holly Sugar	Phase One bulk land take out.
87	C	$0.65	$375,000	574,948.00	8/18/1997	Corner 5th. St. & East Ridge Rd., Sheridan	SH	WY	Creed & Clarene Law	Richard Shaner, et al	Lot 1 Blk. 2 Valley Park Addition. Contract for $60,000 to level site for use.
73	S	$2.90	$45,000	15,507.00	8/14/1997	Summit at Sparrow Hawk, Sheridan	SH	WY	R.C. & Ruth Syring	Charles Hutton	Lot 9, Summit at Sparrow Hawk
5	S	9.6 cents	$21,500	223,027.00	8/5/1997	2 MI. West of Ranchester on Hwy 345	SH	WY	Jeffrey & Julie David	Jerry & Mary Herden	Rural subdivision/Utilities on Site
88	C	$6.25	$46,966	7,515.00	7/29/1997	Coffeen Av., Sheridan	SH	WY	Gary Husske	Riverside Dev. Corp.	Lot 2 of Pamida Subdivision
74	S	$1.73	$15,000	8,650.00	6/25/1997	North Heights, Sheridan	SH	WY	Dennis Wisenbacker	Heights Dev. Corp.	Lot C, HDC Subdivision
75	S	$1.54	$12,500	8,131.00	6/18/1997	North Heights, Sheridan	SH	WY	Leni & Louraine Salo	Heights Dev. Corp.	Lot 6, Blk. 8, North Heights

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89	I	$8.12	$225,000	27,695.00	6/6/1997	NW quadrant Riverside St. & Coffeen AV.	SH	WY	Brian Huskee	Thomas & Lynette Neighbors	Lot 1, Pamida Sub.
90	I	$6.25	$46,966	7,515.00	6/6/1997	Adj. South side of Riverside St., 500 ft west of Riverside & Coffeen	SH	WY	Daycas & Teresa Dewald	Riverside Dev. Corp.	Lot 3, Pamida Sub.
76	S	$1.81	$13,000	7,200.00	6/3/1997	North Heights, Sheridan	SH	WY	Kim Young Ki	Left Hand Land Co.	Lot 10, Blk. 8, Krause Addition
77	S	$2.76	$20,000	7,254.00	5/21/1997	North Heights, Sheridan	SH	WY	Michael Zapp	Richard & Judy Jones	Lot 3, Blk. 1, Hill Pond Sub.
78	S	$1.14	$11,500	10,090.00	5/9/1997	North Heights, Sheridan	SH	WY	Phillip & Kimberly Cummings	Heights Dev. Corp.	Lot 1, Blk. 13, North Heights
79	S	$2.08	$33,500	16,117.00	3/19/1997	Summit at Sparrow Hawk, Sheridan	SH	WY	Robert & Cynthia Edwards	Garland Enterprises	Lot 24, Summit at Sparrow Hawk
80	S	$1.73	$15,000	8,650.00	3/6/1997	North Heights, Sheridan	SH	WY	Dennis Wisenbacker	Heights Dev. Corp.	Lot B, HDC Subdivision
81	S	$2.75	$37,500	13,634.00	3/3/1997	Summit at Sparrow Hawk, Sheridan	SH	WY	Douglass & Donna Raney	Garland Enterprises	Lot 18, Summit at Sparrow Hawk
13	S	2.5 cents	$43,900	1,773,240.00	2/17/1997	10 MI. North of Sheridan off Hwy 338	SH	WY	Roger & Stacey Ross	Scott & Sandra Nicholson	Building areas limited by terrain
82	S	$1.91	$27,300	14,288.00	2/13/1997	Summit at Sparrow Hawk, Sheridan	SH	WY	Dewayne & Melanie Jacobs	Garland Enterprises	Lot 34, Summit at Sparrow Hawk
83	S	$1.69	$12,500	7,380.00	2/5/1997	Highland, Sheridan	SH	WY	Richard Kindt	Robert & Teresa Phillips	

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84	S	$2.25	$45,000	19,994.00	1/24/1997	Summit at Sparrow Hawk, Sheridan	SH	WY	Lawrence & Bridgette Gill, III	Garland Enterprises	
34	S	$0.60	$30,000	49,658.00	8/31/1996	Hwy. 14-16, Clearmont	SH	WY	Steven & Anna Switzer	Donovan & Loretta Shannon	Mobil home on site.
24	A	$213	$235,000	1,102.00	6/17/1996	14 MI. North of Sheridan	SH	WY	TR Ranch, LLC	Forest & Susan Dunning	Poor livestock water
4	S	6.9 cents	$105,000	1,524,600.00	11/13/1995	3MI. East of Ranchester on Hwy 345	SH	WY	Geo. K. & Frances Warner	Sean & Kellie Carroll	River Bottom Land/Wetlands
14	A	$75	$72,250	963.00	1/31/1995	Clearmont	SH	WY	T & H Enterprises, Ltd	Cynthia J. Rhoades	
9	S	4.1 cents	$64,818	1,568,596.00	10/28/1994	4 MI. SW of Dayton	SH	WY	Tom & Clair Hajostek	Wayne & Audrey Clawson	
8	S	4.1 cents	$61,797	1,524,600.00	9/2/1994	3 Mi. SW of Dayton	SH	WY	Guy & Francis Morris	Robert Herrera & Steven Glaser	Horseshoe Estates
33	A	$537	$233,150	434.00	2/4/1994	Along Clear Creek, SW of Clearmont	SH	WY	Louis Moore Rev. Trust	State of Wyoming	
6	S	$0.11	$38,500	335,412.00	7/3/1991	1058 Railway St., Ranchester	SH	WY	Kendal & Cathy Moore	Wynn & Catherine Terwilliger	

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Relevant Land Sales

County: Big Horn
State: Montana

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232	A	$160	$28,400	177.50	4/1/1999	6 miles NW of Lodge Grass	BH	MT	Crow Indian Tribe	Melvin Paul Williamson	Native Range
233	A	$675	$135,000	200.00	3/3/1999	14 miles N of Hardin	BH	MT	Rusty & Deborah Rokita	Robert C. & Cynthia Mehling	$1,500/ac for 55 ac irrigated; $360/ac for 145 ac corner
235	A	$664	$58,500	88.08	2/5/1999	2 miles S of Hardin	BH	MT	Robert & Judy Watson	Leroy & Marvin Enzminger	$1,200/ac for 31 ac irrigated; $500/ac for 7.6 ac cropland; $350/ac for 49.18 river btm pasture
234	S	1.7 cents	$30,000	1,742,400.00	1/28/1999	2 miles S of Hardin	BH	MT	Aaron & Carnie Billin	Leroy & Marvin Enzminger	Purchased for building site
201	A	$176	$169,050	960.00	1/13/1999	Seven miles S of Wyola	BH	MT	William Klinkosh	James Burton	$300/ac for 200 ac dry crop; $130/ac for 750 ac grazing; $300/ac for 5 ac farmstead.
231	A	$40	$3,200	80.00	1/1/1999	10 miles NW of Hardin	BH	MT	Douglas & Bonita Adkins	Church of Christ of Billings	Native grassland
215	A	$263	$247,000	937.50	11/19/1998	1.5 miles NW of Crow Agency	BH	MT	Wayne & Diana Uffelman	Farm Service Agency	$295/ac for 695.1 ac dry cropland; $100/ac for 241.4 ac grazing; $295/ac for 1 ac farmstead
216	S	8.1 cents	$25,000	310,147.00	10/15/1998	2 miles NE of Ft. Smith	BH	MT	Jesse Sanchez, et al	Greenwalt Farms, Inc.	Part of 80 ac subdivision
217	A	$166	$156,500	940.00	9/9/1998	4 miles SW of Pryor	BH	MT	Rubert Wayne, et al	Rodney N. Stanford	$360/ac for 227 ac dry crop; $105/ac for 712 ac grazing
218	A	$275	$1,550,000	5,629.00	7/29/1998	16 miles SE of Billings	BH	MT	Ronald L Harding	Blue Creek Farms, Inc.	$363/ac for 3,230 ac dry cropland; $165/ac for 114 ac pasture; $110/ac for 2,285 ac grazing
219	A	$220	$17,600	80.00	7/22/1998	12 miles SE of Pryor	BH	MT	Harold G. Stanton	John M. Old Dwarf	grazing

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State: Montana

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220	A	$135	$1,900,000	14,041.46	6/29/1998	NE of Decker; Quietus area	BH	MT	James W. Guercio	Lexian Fowler	$460/ac for 166 ac creek bottom; $322/ac for 120 ac creek bottom; $276/ac for 445 ac dry hayland; $175/ac for creek bottom grazing
221	A	$40	$8,000	200.00	6/19/1998	9 miles NNW of Decker	BH	MT	Resource Development Co., Inc.	John & Florence Young	Traded 400 ac for 200 ac plus $8,000
222	A	$40	$16,000	400.00	6/9/1998	10 miles NE Decker	BH	MT	John & Florence Young	Resource Development Co., Inc.	
223	A	$265	$637,200	2,401.98	5/15/1998	13 miles SE of Lodge Grass	BH	MT	Carter Mikovich	Daryl/Scott Ohmstede	$350/ac for 1,390 ac dry crop; $144/ac for 1,010 ac grazing
224	A	$622	$595,224	956.23	5/14/1998	1 mile E of Decker	BH	MT	Decker Coal Co.	James Muller, et al.	$1,299/ac for 256 ac irrig crop; $325/ac for 700.23 grazing
225	A	$622	$595,224	956.23	5/14/1998	1 mile E of Decker	BH	MT	Decker Coal Co.	James Muller, et al.	$$1,299/ac for 256 ac irrigated; $324/ac for 700.23 ac grazing
226	A	$265	$637,200	2,401.98	5/1/1998	13 miles E and 2 miles N of Wyola	BH	MT	Miklovich	Chmstede/Schaak Trust	$360/ac for 1,390 ac dry crop; $130/ac for 1,010 ac pasture
227	A	$1,315	$251,100	191.00	4/23/1998	2 miles S of Wyola	BH	MT	Rodney K. Parr, et al.	Manuel Castillo, et al.	$1,400/ac for 32 ac irrigated; $200/ac for 159 ac improved pasture
230	A	$659	$105,000	159.33	1/26/1998	3 miles SW of Lodge Grass	BH	MT	Kent & Stephani Murdock	Joseph H. & Christine K. Chauvin	$930/ac for 77 ac irrigated; $160/ac for 82 ac grazing
229	A	$131	$168,000	1,280.00	1/9/1998	6 miles NW of Ft. Smith	BH	MT	Crow Tribe	Oliver Hill	Native grazing
228	A	$201	$48,000	239.27	1/8/1998	1 mile NW of Wyola	BH	MT	Crow Tribe	Paulette/Cleveland Bellrock	Native pasture

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206	A	$246	$3,402,000	13,814.72	12/18/1997	West of St. Xavier	BH	MT	Terry & Coral Langstraat	Beauvais Livestock	$800/ac for 192 ac irrigated; $430/ac for 4,556 ac dry crop; $120/ac for 9,051 ac range; $800/ac for 15 ac farmstead.
208	A	$185	$6,995	37.81	10/3/1997	6 miles NE of Decker	BH	MT	Montana DNRC	Decker Coal Co.	Native grazing
207	A	$387	$680,000	1,757.58	10/1/1997	10 miles S of Wyoal	BH	MT	Amory E. Hubbard	Paul A. Nicholson	$1,240/ac for 155.6 ac irrigated; $530/ac for 205.4 ac creek bottom; $225/ac for 1,380.58 for foothill; $1,240/ac for 6 ac farmstead
209	A	$892	$3,150,000	3,529.64	9/14/1997	5 miles NE of Parkman	BH	MT	Paula Leuschen	Nicholson Trust	$2,000/ac for 219.7 ac irrigated; $1,500/ac for creek bottom; $350/ac or 2,629.74 ac foothill; $2,000/ac for 10 ac farmstead
210	A	0 cents	$0	67.89	6/13/1997	6 miles NE of Decker	BH	MT	Decker Coal Co.	Montana DNRC	Trade between grantor/grantee
211	A	$170	$80,000	469.44	6/13/1997	Sioux Pass Rd; SE of Lodge Grass	BH	MT	Linda Smith	Joseph T., Junior & Rita Laforge	$143/ac for 469 ac grazing; $300/ac for 43,000 bdft timber
212	A	$100	$29,277	292.27	6/2/1997	6.5 miles NE Decker	BH	MT	Montaylor Corp.	Montana DNRC	$100/ac for 292.27 grazing land
213	A	$123	$40,000	323.89	4/13/1997	W of I-90; 2 miles SE Wyola	BH	MT	Matthew J. Johnston	Myron Little Light, et al	$123/ac for 323 ac grazing
236	A	$238	$410,000	1,720.00	3/13/1997	6 miles E of Pryor	BH	MT	Jerene Block	Thor K. Lande	$400/ac for 341 ac dry crop; $162/ac for 1,365 ac grazing
214	A	$160	$51,200	320.00	1/29/1997	15 miles SW of Wyola	BH	MT	James Yellowtail	Joe Medicine Crow	$160/ac for 320 ac grazing
200	A	$478	$640,000	1,340.00	12/19/1996	Two miles S of Decker	BH	MT	Forest & Susan Dunning	Jerry & Mary Seifert	$1,106/ac for 240 irrigated acres; $340/ac for 1,100 ac grazing

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Big Horn
State: Montana

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
202	A	$304	$475,000	1,560.00	10/15/1996	10 miles E of Lodge Grass	BH	MT	Anne Terry Straus	Thomas Zito	$800/ac for 30 ac dry crop; $200/ac for 1,530 ac grazing.
203	A	$233	$4,901,500	21,011.92	9/30/1996	St. Xavier/Ft. Smith	BH	MT	Crow Tribe of Indians	Soap Creek Cattle Co.	Range
204	A	$200	$144,000	720.00	9/20/1996	10 miles S of Wyola	BH	MT	Nancy Knight	Garner Bouyer, et al	Grazing
205	A	$57	$127,264	2,247.69	9/1/1996	15 miles E of Decker	BH	MT	Padlock Ranch	J. Guercio	Grazing
282	S	$0.52	$7,000	13,504.00	May-96	907 Agate Court, Hardin 59034	BH	MT	NR	NR	Lot 8, Block 9, West Heimet
279	C	$0.36	$5,000	13,939.00	Oct-95	BH-CM-01	BH	MT	NR	NR	
283	S	7 cents	$15,900	226,512.00	Sep-95	Rural Route, Hardin, MT 59034	BH	MT	NR	NR	Blk 1, Lot 10, Two Leggin Subdivision

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Yellowstone
State: Montana

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
286	S	3.3 cents	$15,000	453,024.00	Mar-99	2 miles W of Pryor Creek Golf Course, Huntley, MT	YS	MT	NR	NR	Tract 185, C/S 1363
281	A	$125	$20,000	160.00	Jan-99	North Custer, Custer MT 59024	YS	MT	NR	NR	SW4, Sect. 12, T5N, R31E
288	S	$0.22	$25,000	113,692.00	Jan-99	NHN Lot 1, Huntley, MT	YS	MT	NR	NR	Lot 1, Block 55, Osborn Townsite
290	S	$0.30	$12,900	43,560.00	Oct-98	NHN Road 8 North, Huntley, MT	YS	MT	NR	NR	
285	S	4 cents	$17,900	451,717.00	Sep-98	0 Shadow Canyon, Huntley, MT 59037	YS	MT	NR	NR	Tract 49, C/S 1363
289	S	$0.90	$19,500	21,780.00	Jul-98	NHN South Canal Road, Huntdley, MT 59037	YS	MT	NR	NR	
277	A	$4,500	$180,000	40.00	2/24/1998	NE of Huntley	YS	MT	Schwartz Family Trust	James & Elaine Bruce	Feedlot; $1,365/ac for 40 ac range; Improvements $125,400
280	A	$1,450	$116,000	80.00	Feb-98	West M/North 19 Road, Worden, MT 59088	YS	MT	NR	NR	NESW & SESW, Sec 21; T3N, R29E
278	A	$2,663	$106,500	40.00	1/1/1998	3.5 miles NE of Huntley	YS	MT	Gein Olson	Ray Krum Huntley	$2,662.50/ac for 40 ac irrigated crop; improvements $6,500
287	S	3 cents	$45,000	1,524,600.00	Nov-97	2911 Road 17 North	YS	MT	NR	NR	NW4 SE4, Sect 20, T3N, R29E
263	A	$3,591	$119,900	33.39	10/1/1997	2.5 miles NE of Huntley	YS	MT	M. Lorenz	K. Turner	irrigated crop land
264	A	$3,294	$110,000	33.39	10/1/1997	2.5 miles NE of Huntley	YS	MT	Mont Lorenz	K. Turner	irrigated crop land

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Yellowstone
State: Montana

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
265	A	$2,375	$95,000	40.00	9/1/1997	3 miles W of Worden	YS	MT	Cliff Larson	Whittman Estate	$2,400/ac for 20 ac irrigated crop; $1,350/ac for 20 ac irrigated pasture
266	A	$2,681	$84,000	31.33	8/1/1997	3 miles W of Worden	YS	MT	M. Weinrib	Irene Kembel	$2,200/ac for 31.33 ace irrigated site; Improvments value $15,000.
284	S	5.5 cents	$32,000	583,704.00	Jul-97	9 North Road, Huntley, MT 59037	YS	MT	NR	NR	Tract 2A of Amended Track 2 C/S 2191
267	A	$100	$115,600	1,156.00	7/8/1997	3 miles S of Custer	YS	MT	GLS Partnership	John Korver/Frank C. Banderob Estate	$100/ac for 1,156 ac grazing
268	A	$127	$405,000	3,200.00	6/30/1997	18 miles E of Billings	YS	MT	Frank Pelican	Joseph Eli Banderob	$270/ac for 433 ac dry crop; $95/ac for 2,767 ac native grazing; $25/ac for 118 ac state grazing
269	A	$127	$405,000	3,200.00	6/30/1997	18 miles E of Billings	YS	MT	Frank Pelican	Frank C. Banderob Estate	$270/ac for 423 ac dry crop; $95/ac for 2,767 ac grazing; $270/ac for 10 ac farmstead; Improvements were $22,310
270	A	$2,422	$225,000	92.91	5/1/1997	2 miles NE of Worden	YS	MT	Mic. Littler	Donald Kurth	$2,500/ac for 53 ac irrigated crop; $2,500/ac for 5 ac homestead; $563/ac for 20 ac grazing; 15 ac waste; $70,000 improvements; riverfront
271	S	$1,962.07	$134,127	68.36	4/1/1997	2 miles E of Ballantine	YS	MT	Leland Hawkins	Jack & Kathryn Davidson	13 ac irrigated crop; 10 ac subirrigated hay; 25 ac dry crop; 10 ac irrigated pasture; 3 ac dry pasture; sold as homesite
272a	A	$253	$730,000	2,880.00	4/1/1997	13 miles N of Shepherd	YS	MT	Rich Morgan	X Lent Corp	$140/ac for 2,880 ac grazing; dwelling $320,000
272b	A	$140	$403,200	2,880.00	4/1/1997	13 miles N of Shepherd	YS	MT	Rich Morgan	X Lent Corp	$140/ac for 2,880 ac grazing; dwelling $320,000
273a	A	$2,770	$200,000	72.19	3/1/1997	3.5 miles W of Worden	YS	MT	G. Reichert	Krum Family	$2,200/ac for 66.4 ac irrigated; 5 ac homesite; .79 ac waste; improvements $42,900
273b	A	$2,200	$146,080	66.40	3/1/1997	3.5 miles W of Worden	YS	MT	G. Reichert	Krum Family	$2,200/ac for 66.4 ac irrigated; 5 ac homesite; .79 ac waste; improvements $42,900

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Yellowstone
State: Montana

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
274	A	$707	$40,325	57.07	2/24/1997	4 miles NE of Ballantine	YS	MT	Daniel & Teri Swartz	Winnie Davis Estate	$764 for 53 ac irrigated crop; 4.27 ac waste
244	A	$900	$315,970	351.08	2/1/1997	6 miles W of Billiings	YS	MT	Echo LLC	Fa Zimmerman	For development; Grazing and farmstead
245	A	$1,000	$382,592	382.59	2/1/1997	6 miles NW of Billings	YS	MT	Puunoa Estate	Fa Zimmerman	Development land; $1,000/ac for 382.59 ac grazing
275	A	$150	$42,000	280.00	1/15/1997	9 miles N of Pompey's Pillar	YS	MT	Claire Tempro	Scott Barrett	$150/ac for 280 ac grazing
276	S	5.1 cents	$900,000	17,666,629.00	1/1/1997	2 miles E of Shepherd	YS	MT	Eagle Bend Land	Rod Hanson	To be subdivided
248	A	$589	$376,800	640.00	12/1/1996	6 mile NW of Billings	YS	MT	Lawrence McEvoy	Fa Zimmerman	Development land; grazing and farmstead
249	A	$2,477	$95,000	38.36	12/1/1996	0.5 mile N of Ballantine	YS	MT	Gary Karst	Stout Family	$2,477/ac for 38 ac irrigated crop land
250	A	$2,464	$95,000	38.56	12/1/1996	0.5 mile E of Worden	YS	MT	Gary & Linda Karst	Stout Family	$2,500/ac for 38 ac irrigated beet land
251	A	$384	$20,000	52.07	11/1/1996	5 miles SE of Huntley	YS	MT	Vogel Land & Livestock	Russ Becker	$384/ac for 52 ac grazing
252	A	$3,500	$175,000	50.00	11/1/1996	1.5 miles SW of Pompey's Pillar	YS	MT	Albert Leroy Malenovsky	Vic Tedrow	1,400 SF house, garage, 900 SF barn worth about $65,000
291	S	1.3 cents	$50,000	3,769,682.00	Oct-96	Pompey's Pillar Rd, Pompey , MT	YS	MT	NR	NR	C/S 2861
253	A	$2,500	$100,000	40.00	9/1/1996	NW of Huntley	YS	MT	John Moerman	Pat Seader	$2,500/ac for 40 ac irrigated crop

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Relevant Land Sales

County: Yellowstone
State: Montana

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
255	A	$376	$300,000	798.71	9/1/1996	Comanche Flat near Broadview	YS	MT	C. Jones	T. VanSky	$390/ac for 469 ac dry crop; $140/ac for 250 ac dry grazing; $100/ac for 67 ac saline land; $390/ac for 5 ac farmstead
254	S	$0.10	$18,200	174,240.00	8/1/1996	S of Billings	YS	MT	Unknown	Swaningson	C/S 1833 - TR 1-B-1 of Amended Lot 1-B
256	S	6.9 cents	$30,000	435,600.00	8/1/1996	4 miles S of Billings on Yellowstone River	YS	MT	Bangart	Beartooth, Inc.	Lot 10, Secret Valley Subdivision
257	S	2.2 cents	$19,500	871,200.00	7/19/1996	S of Billings; E of Briarwood	YS	MT	Unknown	Tafln	C/S 2260, Tract 15
258	A	$259	$165,800	640.00	7/1/1996	5 miles SE of Molt	YS	MT	Randy Hultgren	Will Ramage	$290/ac for 539 ac dry crop; $95/ac for 100 ac grazing
259	A	$1,645	$280,000	170.21	7/1/1996	3.5 miles NE of Huntley	YS	MT	Russel Becker	C. Grantham	$2,250/ac for 57 ac irrigated; $300/ac for 8 ac grazing; $465/ac for 92 ac dry crop; $2,250 for 5 ac farmstead
260	A	$2,190	$100,000	45.67	7/1/1996	3 miles SW of Worden	YS	MT	David & Janice Oxendahl	Van Luchene	$2,250/ac for 38.6 ac irrigated; $315/ac for 5 ac grazing
261	A	$175	$91,000	520.39	7/1/1996	21 miles E of Billings	YS	MT	R. Uffelman	Jerke/DeVrie	$300/ac for 212 ac dry crop; $95/ac for 295 ac grazing
262	A	$2,463	$315,000	127.90	6/13/1996	1.5 miles SE of Blue Creek School	YS	MT	Fetz et al.	Robert & Deloris Jacobson	House and farm structures worht $145,000
246	I	1.6 cents	$9,000	571,072.00	6/1/1996	10 miles W of Custer; Waco exit I-94	YS	MT	Jack Olson	Montana Dept of Highways	Public auction; adjacent to RR; oil pipeline; gravel pit
247	C	3.4 cents	$29,500	873,814.00	5/23/1996	2 miles E of Custer	YS	MT	Frederick Johnson	SBA	Public auction; at interchange of I-94 and SH 47; commercial and homesite
238	A	$157	$110,750	705.63	5/1/1996	11 miles SE of Billings	YS	MT	Joan Coburn	J. Reinhardt	$157/ac for 706 ac grazing

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Relevant Land Sales

County: Yellowstone
State: Montana

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Location	Cty.	ST	Grantee/ Owner	Grantor	Comments
239	S	2.1 cents	$18,500	871,200.00	4/9/1996	1 mile E of Acton	YS	MT	Murray C. Townsend	Diane L. Paulson	Lot 64, Antler Butte Subdivision
240	A	$299	$74,643	250.00	3/12/1996	11603 CA Road; 7 miles NE of Shepherd	YS	MT	Shawn & Nicloe Shelhamer/Rodney & Phyllis Brosz	Susanna Meyer/Margaret Taylor	$300/ac for 175 ac grazing & 75 ac wheat/hay
241	S	8.2 cents	$12,500	152,460.00	2/23/1996	7 miles NE of Shepherd	YS	MT	Lee & Dawn Dungan	Rodney & Phyllis Brosz	Residential home site; C/S 2800 Trl A, Peaceful Plateau Subdivision
242	A	$313	$100,000	320.00	2/1/1996	12 miles E of Broadview	YS	MT	Mike Dobesh	Robert Tew	$417/ac for 220 ac dry crop; $138/ac for 60 ac grazing
243	A	$260	$208,000	800.00	2/1/1996	6 miles SE of Huntley	YS	MT	Paul Siewert	Bill Davison	Grazing
237	A	$225	$9,000	40.00	1/8/1996	19 miles NW of Custer	YS	MT	Rusty & Patty Wilson	Murray C. Townsend	$225/ac for 40 ac grazing

A: Ag. X:Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-6

Relevant Land Sales

County: Morton
City: Mandan
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	S	$0.73	$29,500	40149	12/5/1997	98-02405	River Place Dr N	MO	ND	N/A	N/A	
2	S	$0.50	$15,500	30840	1/21/1998	92-05266	Captain Marsh Dr	MO	ND	N/A	N/A	
3	S	$2.38	$45,000	18928	1/27/1998	99-00499	3524 Falcon Rd SE	MO	ND	N/A	N/A	
4	S	$0.81	$5,000	6173	2/25/1998	98-01603	120 9th Av SE	MO	ND	N/A	N/A	
5	S	$0.77	$31,000	40040	3/31/1998	99-01349	River Place	MO	ND	N/A	N/A	
6	S	$0.77	$31,000	40040	4/9/1998	97-00573	River Place Dr	MO	ND	N/A	N/A	
7	S	$0.89	$35,500	40042	4/9/1998	97-0575	River Place Dr	MO	ND	N/A	N/A	
8	S	$1.25	$25,000	20000	4/13/1998	98-01604	3307 46th Av SE	MO	ND	N/A	N/A	
9	S	$1.04	$23,000	22080	4/20/1998	98-01605	2015 11th Av SE	MO	ND	N/A	N/A	
10	S	$1.06	$11,000	10375	5/15/1998	99-00829	2208 8th AV SE	MO	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Morton
City: Mandan
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
11	I	$0.21	$270,000	1306800	6/25/1998	99-0632	Auditor Lot C	MO	ND	N/A	N/A	W1/4SE1/4 26-39-8
12	C	$1.29	$170,200	132197	6/30/1998	99-01046	3714 Memorial Hgwy	MO	ND	N/A	N/A	
13	C	$0.29	$57,000	199940	7/10/1998		2640/2550 Old Red Trail	MO	ND	N/A	N/A	
14	S	$1.49	$14,500	9750	7/15/1998		1913 12th AV SE	MO	ND	N/A	N/A	
15	C	$3.15	$106,500	33824	8/1/1998	115-003-001	1401 E main Ave.	MO	ND	N/A	N/A	
16	S	$0.90	$36,000	40040	8/27/1998		River Place Dr	MO	ND	N/A	N/A	
17	S	$0.56	$5,000	9000	9/3/1998		3501 37th St NW	MO	ND	N/A	N/A	
18	S	$0.80	$20,500	25700	9/29/1998		59 Captain Marsh Dr	MO	ND	N/A	N/A	
19	S	$1.49	$21,250	14300	10/3/1998		Harbor Trail SE	MO	ND	N/A	N/A	
20	S	$2.08	$48,000	23118	12/7/1998		3528 Falcon Rd SE	MO	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Morton
City: Mandan
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
21	S	$0.61	$7,500	12393	4/27/1999		4000 37th Av	MO	ND	N/A	N/A	
22	S	$0.74	$8,500	11475	4/29/1999		1905 2nd St SE	MO	ND	N/A	N/A	
23	S	$0.52	$90,000	174240	5/21/1999		Mandan Av/I 94	MO	ND	N/A	N/A	
24	C	$0.60	$50,000	83200	6/1/1999		4411 Memorial Hwy	MO	ND	N/A	N/A	
25	C	$1.99	$109,324	54886	6/2/1999		501 Burlington St SE	MO	ND	N/A	N/A	
26	S	$1.76	$13,000	7371	6/9/1999		1217 9th Av SE	MO	ND	N/A	N/A	
27	S	$0.73	$29,500	40151	6/18/1999		River Place Dr N	MO	ND	N/A	N/A	
28	S	$0.73	$29,500	40147	6/18/1999		River Place Dr N	MO	ND	N/A	N/A	
29	C	$2.02	$142,500	70554	6/24/1999		130 3rd Av SE	MO	ND	N/A	N/A	
30	C	$2.05	$142,500	69603	6/24/1999		131 3rd Av SE	MO	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-6

Relevant Land Sales

County: Morton
City: Mandan
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
31	S	$1.82	$58,600	32234	6/28/1999		47 Captain Maarsh Dr	MO	ND	N/A	N/A	
32	S	$1.05	$12,000	11475	8/2/1999		2008 8th Av SE	MO	ND	N/A	N/A	
33	S	$1.19	$10,000	8400	6/21//99		4210 LaSalle Dr NE	MO	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-7

Relevant Land Sales

County: Burleigh
City: Bismarck
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	C	$12.00	$45,000	3750	9/1/1997	001-040-025	802 E Main Ave.	BU	ND	N/A	N/A	
2	C	$10.62	$238,944	22500	6/1/1998	020-044-010	600 N 9th St.	BU	ND	N/A	N/A	
3	C	$8.93	$66,985	7500	7/1/1998	020-044-040	808 E Ave. B	BU	ND	N/A	N/A	
4	C	$7.96	$71,500	8983	8/1/1998	001-057-040	235 W Sweet Ave.	BU	ND	N/A	N/A	
5	C	$3.15	$106,500	33824	8/1/1998	115-003-001	1401 E main Ave.	BU	ND	N/A	N/A	
6	C	$2.70	$74,000	27400	10/1/1999	115-004-500	1202 E Front Ave.	BU	ND	N/A	N/A	
7	C	$3.49	$68,000	19500	10/1/1999	115-004-450	1105 E Main Ave.	BU	ND	N/A	N/A	
8	C	$9.01	$228,600	25373	10/1/1999	001-008-050	317 E main Ave.	BU	ND	N/A	N/A	
9	C	$2.50	$70,000	27976	11/1/1999	010-000-050	1216 E Front Ave.	BU	ND	N/A	N/A	
10	C	$3.31	$250,000	75481	11/1/1999	010-000-001	1207-1301 E. Main Ave.	BU	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Burleigh
City: Bismarck
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
11	C	$2.17	$18,500	8527	11/1/1999	115-003-655	218 S. 26th St.	BU	ND	N/A	N/A	
12	C	$4.25	$82,875	19500	11/1/1999	115-004-400	901 E. Main Ave.	BU	ND	N/A	N/A	
13	C	$5.50	$118,200	21494	11/1/1999	001-028-001	201-209 W. Main Ave.	BU	ND	N/A	N/A	
14	C	$5.10	$159,750	31329	11/1/1999	001-009-001	304 E. Front Ave.	BU	ND	N/A	N/A	
15	C	$7.14	$250,000	35000	11/1/1999	001-006-100	201-211 E. Front Ave.	BU	ND	N/A	N/A	
16	C	$10.29	$72,000	7000	11/1/1999	001-006-001	2230 E. Main Ave.	BU	ND	N/A	N/A	
17	C	$14.60	$95,000	6507	11/1/1999	001-130-045	415 N 8th St.	BU	ND	N/A	N/A	
18	C	$24.19	$508,909	21041	11/1/1999	001-068-035	500 E Broadway	BU	ND	N/A	N/A	
19	C	$5.52	$62,330	11300	12/1/1999	001-008-000	301-313 E Main Ave.	BU	ND	N/A	N/A	
20	C	$9.13	$205,409	22500	12/1/1999	020-036-015	500-514 N 10th St.	BU	ND	N/A	N/A	

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Appendix A-7

Relevant Land Sales

County: Burleigh
City: Bismarck
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
21	C	$3.75	$63,000	16800	3/1/2000	005-000-525	925 E. Main Ave.	BU	ND	N/A	N/A	
22	C	$3.07	$180,000	58578	3/1/2000	115-003-003	1505 E. Main Ave.	BU	ND	N/A	N/A	
23	C	$5.01	$345,700	69061	3/1/2000	001-016-001	717 E. Maine Ave.	BU	ND	N/A	N/A	
24	C	$4.63	$454,250	98047	3/1/2000	001-113-001	500-520 E Front Ave.	BU	ND	N/A	N/A	
25	C	$3.62	$345,600	95388	3/1/2000	001-005-001	118 S. 3rd St.	BU	ND	N/A	N/A	
26	C	$3.50	$34,125	9750	4/1/2000	005-024-001	1131 E. Main Ave.	BU	ND	N/A	N/A	
27	C	$4.76	$430,490	90418	4/1/2000	001-001-050	200 W. Front Ave.	BU	ND	N/A	N/A	
28	C	$4.38	$226,500	51715	5/1/2000	001-011-050	420 E. Front Ave.	BU	ND	N/A	N/A	
29	C	$4.02	$146,250	36400	5/1/2000	005-000-010	910 E. Front Ave.	BU	ND	N/A	N/A	
30	C	$6.00	$385,000	64200	6/1/2000	001-042-001	715 E. Broadway	BU	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Burleigh
City: Bismarck
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
31	C	$2.33	$32,200	13819	7/1/2000	005-000-8000	1120 E. Front Ave.	BU	ND	N/A	N/A	
32	M	$13.40	$100,491	7500	9/1/2000	020-044-055	615 N. 8th St.	BU	ND	N/A	N/A	
33	C	$1.61	$16,875	10472	10/1/2000	115-003-012	1600 E. Main Ave.	BU	ND	N/A	N/A	
34	C	$2.19	$42,800	19544	11/1/2000	010-000-500	1416 E. Frount Ave.	BU	ND	N/A	N/A	
35	C	$4.06	$78,000	19192	11/1/2000	005-000-500	917 E. Main Ave.	BU	ND	N/A	N/A	
36	C	$13.70	$95,926	7000	12/1/2000	020-029--020	907 E. Ave. A	BU	ND	N/A	N/A	
37	C	$5.25	$139,650	26600	3/1/2000	115-004-300	815 E. Main Ave.	BU	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-8

Relevant Land Sales

County: Stutsman
City: Jamestown
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	S	$0.38	$4,000	10400	1/1/1999	74-288-0640		ST	ND	LI2	N/A	
2	S	$1.03	$9,900	9600	2/1/1999	74-484-1950		ST	ND	Evergreen Properties	N/A	
3	C	$2.75	$11,143	4052	2/1/1999	74-201-1750		ST	ND	Joseph Larson	N/A	
4	S	$0.45	$18,956	42253	3/1/1999	74-309-2100		ST	ND	Vernon & Cleo Harr	N/A	
5	S	$0.48	$15,000	30947	3/1/1999	74-313-6200		ST	ND	Meritcard Medical Group	N/A	
6	S	$0.35	$16,000	45900	4/1/1999	74-420-0700		ST	ND	Douglas & Marilyn Hock	N/A	
7	M	$1.09	$18,250	16800	4/1/1999	74-541-6150		ST	ND	Richard Qual	N/A	
8	S	$0.85	$22,900	27075	6/1/1999	74-570-1500		ST	ND	Rodney & Teresa Wolter	N/A	
9	C	$2.81	$45,000	16000	7/1/1999	74-432-2000		ST	ND	Farmers Union Oil	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-8

Relevant Land Sales

County: Stutsman
City: Jamestown
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
10	S	$0.94	$11,800	12600	8/1/1999	74-484-1650		ST	ND	Evergreen Properties	N/A	
11	S	$0.94	$43,560	46398	12/1/1999	74-201-0200		ST	ND	Michael Munsey	N/A	
12	S	$1.14	$8,000	7000	2/1/2000	74-197-0280		ST	ND	Donald Williams	N/A	
13	S	$0.77	$9,000	11625	3/1/2000	74-346-2700		ST	ND	James Morris	N/A	
14	C	$1.67	$10,000	6000	3/1/2000	74-487-2400		ST	ND	George DeMos	N/A	
15	C	$0.69	$38,000	55000	3/1/2000	74-634-7000		ST	ND	Exner Basic Care	N/A	
16	C	$1.62	$17,381	10720	4/1/2000	74-201-2550		ST	ND	Marty Zachrison/Earl Hil	N/A	
17	S	$0.96	$8,720	9100	5/1/2000	74-484-2000		ST	ND	Gregg & Tracy Schweitz	N/A	
18	S	$1.16	$23,020	19856	5/1/2000	74-484-0200		ST	ND	Robert Johnson	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-8

Relevant Land Sales

County: Stutsman
City: Jamestown
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
19	S	$382.98	$22,500	58.75	6/1/2000	74-252-1000		ST	ND	Steven & Barbara Looyse	N/A	
20	S	$1,061.81	$33,500	31.55	6/1/2000	74-252-2000		ST	ND	Enzminger Family Trust	N/A	
21	S	$0.58	$14,500	24960	6/1/2000	74-286-1440		ST	ND	Jeffery & Connie Werbel	N/A	
22	S	$0.22	$4,000	18458	6/1/2000	74-485-0800		ST	ND	Evergreen Properties	N/A	
23	I	$0.30	$50,000	168142	8/1/2000	74-116-2220		ST	ND	Harold & Catherine Lars	N/A	
24	S	$0.84	$26,500	31470	8/1/2000	74-484-0750		ST	ND	Clyde Eriksen	N/A	
25	C	$0.30	$145,000	479160	9/1/2000	74-169-6000		ST	ND	Liechty Asso	N/A	
26	C	$0.77	$24,000	31300	9/1/2000	74-387-6300		ST	ND	Dale Fettig	N/A	
27	S	$0.66	$19,900	30281	9/1/2000	74-570-1000		ST	ND	Ronald & Rita Huber	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Stutsman
City: Jamestown
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
28	I	$0.97	$10,000	10300	10/1/2000	74-116-1020		ST	ND	Dale & Cheryl Lende	N/A	
29	C	$1.00	$5,375	5375	10/1/2000	74-201-2550		ST	ND	Terrence Ulrich/Karen M	N/A	
30	S	$0.49	$18,000	36432	10/1/2000	74-286-1320		ST	ND	Wayne Looysen	N/A	
31	I	$1.84	$45,000	24400	12/1/2000	74-392-1200		ST	ND	Vernon Wegner	N/A	
32	S	$0.97	$14,500	14919	2/1/2001	74-484-3600		ST	ND	N/A	N/A	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-9

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	A	$2,786	$27,500	9.87	3/5/1997		N of Horace; 1 mi on Cnty 17; West on Cnty Rd 6	Horace	CA	ND	Russell Brink	N/A	96-01870
2	S	$0.57	$11,000	19280	3/21/1997		Park Dr W	Horace	CA	ND	Horace Development Ltd	N/A	96-03411
3	S	$0.31	$13,500	43560	5/1/1997	763500090	4770 35 Av N	Reiles Acres	CA	ND	Reile Farms	N/A	97-01134
4	S	$1.65	$15,000	9100	6/3/1997		3 Av S	Casselton	CA	ND	Fred Haskins	N/A	97-01017
5	S	$0.33	$13,500	41400	8/7/1997	76300060	4505 36 Av N	Reiles Acres	CA	ND	Reile Farms	N/A	97-02534
6	S	$0.45	$15,000	33150	9/19/1997	6426000008	513 West Brook Dr	Horace	CA	ND	Conley Toschakert	N/A	97-02374
7	R	$0.28	$15,000	53040	9/19/1997	6426000008	513 West Brook		CA	ND	Tochakert	N/A	97-02374
8	S	$0.33	$13,500	41400	10/9/1997	7630012000	4505 37 Av N	Reiles Acres	CA	ND	Reile Farms	N/A	97-03298
9	R	$2.69	$55,000	20422	10/20/1997	350 & 360	2709 S 27th (L11-12B1 BP2&d	Fargo	CA	ND	N/A		
10	C	$1.73	$45,000	26000	11/3/1997	30070038	918 Front St	Casselton	CA	ND	Ed/Evelyn Holt	N/A	97-01541

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
11	A	$1,563	$125,000	80	11/14/1997	60-0000-00	s1/2T14 R48&49W REED TWI	Fargo	CA	ND	NPN Rental		
12	R	$3.06	$95,000	31000	12/2/1997	642600001	West Brook Sub`		CA	ND	Tochakert	N/A	96-03468
13	S	$0.11	$25,000	217800	1/3/1998		72 St S	Horace	CA	ND	Conley Tschakert	N/A	97-03565
14	S	$0.28	$11,500	41400	1/3/1998	763009000	3548 S 45	Reiles Acres	CA	ND	Reile Farms	N/A	97-02072
15	R	$0.33	$14,500	44431	3/13/1998	6412000001	L1B1 Sunnyside St	Fargo	CA	ND	Pete Doll		
16	S	9.4 cents	$24,000	255697	4/1/1998		72 St S	Horace	CA	ND	Dennis./Cathy Holmen	N/A	97-03161
17	S	$0.23	$10,000	43560	5/1/1998		Plumtree Rd	Hickson	CA	ND	Zacher	N/A	98-00407
18	S	$0.18	$13,500	73181	5/26/1998		Broadway/Rt 979	Abercrombie	CA	ND	Robert Hane	N/A	98-00614
19	S	$1.07	$7,500	7000	6/18/1998	3900491000	431 6 Av S	Casselton	CA	ND	Leo/Evelyn Corcoran	N/A	98-01468
20	R	$0.57	$18,200	32100	7/27/1998		Lot 5 Block C Hightland Park	Fargo	CA	ND	NPN Rental		

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
21	R	$1.25	$26,800	21400	7/27/1998	60-110-710	6308 North 13	Fargo	CA	ND	James Smith		
22	R	$0.76	$10,700	14000	7/29/1998	3010000013	201 S Langer Ave	Casselton	CA	ND	John/ Janice Hersch	N/A	98-00936
23	A	$2,800	$14,000	5	8/10/1998			Horace	CA	ND	Dennis Holmen	N/A	95-02500
24	R	$1.18	$26,000	22000	8/12/1998	1201401601	631 Royal Oaks Dr	Fargo	CA	ND	Broadway Ranch Inc		
25	A	$36,000	$180,000	5	8/31/1998		L 18,19,20,21,22 B1 Red River	Fargo	CA	ND	Broadway Ranch Inc		
26	R	$1.14	$22,900	20125	10/2/1998		Lot 13 Block 5 Hightland Park	Fargo	CA	ND	NPN Rental		
27	R	$1.18	$31,000	26250	10/16/1998	78-0010-01	721 Southwood Dr	Oxbow	CA	ND	M/M Spring	N/A	96-01096
28	R	$1.14	$24,000	21000	11/1/1998		lot 15 Block 5 Hoghland	Fargo	CA	ND	NPN Rental		
29	R	$0.30	$12,750	42000	12/10/1998		Lots 152 &153 Oxbow center & club estates	Oxbow	TR	ND	Oxbow Partners	N/A	99-00016
30	R	$0.43	$26,500	62000	12/30/1998		Lost Meadows LN L1 B2	Fargo	CA	ND	ABB INC		

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
31	A	$974	$300,000	307.98	1/8/1999	604 &605	I-29 to Alstad Exit Rt 100; 2.75 mi West	Hillsboro	CA	ND	K.E./Alice Lenaas	N/A	99-00066
32	A	$1,200	$144,000	120	1/29/1999		N of Casselton to Amenia Exit, East 3.5 mi	Casselton	CA	ND	Darryl/Denise Hansen	N/A	99-00406
33	I	$2.00	$65,765	32880	4/8/1999	10530	3320 17Ave South	Fargo	CA	ND	Candlepark Partners		
34	R	$0.55	$21,000	38100	4/29/1999	6408000026	L 26 Jemini Circle	Fargo	CA	ND	M/M Havig		
35	S	8.4 cents	$13,500	159865	5/10/1999		701 2 Av S	Casselton	CA	ND	Larry Pietsch	N/A	98-03591
36	R	$0.57	$18,500	32670	6/1/1999	6425000007	1077 Shadow Ln	Horace	CA	ND	Stieha	N/A	98-03082
37	R	$0.57	$18,500	32670	6/1/1999	6425000007	Lot 8 Shadow Ln	Horace	CA	ND	Stieha	N/A	98-03084
38	A	$3,684	$70,000	19	6/4/1999	6400000237	4 mi S on Rt 81, Right on 100 Av S	Horace	CA	ND	Robert Denis	N/A	99-01742
39	R	$0.56	$36,000	64400	6/9/1999	6415100040	Lot 4 Block 1 Lost Meadows	Fargo	CA	ND	Kosrinlek		
40	C	#DIV/0!	$60,000		6/11/1999		485 Mian Sr	Audubon	CA	ND	Haugrud	N/A	99-00101

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
41	R	$2.45	$35,000	14266	6/15/1999	40	739 Roayal Oaks Dr	Fargo	CA	ND	George Houston		
42	R	$1.02	$13,000	12714	7/30/1999		North Wood Dr Lot 2	Horace	CA	ND	Orth	N/A	98-00759
43	S	$0.81	$20,500	25249	9/1/1999	3086000030000	542 10 Av N	Casselton	CA	ND	George/Frances Nesemei	N/A	99-00658
44	S	$0.31	$14,000	45540	9/12/1999	7635080	4802 35 Av NW	Reiles Acres	CA	ND	Reile Farms	N/A	99-02958
45	A	$4,436	$70,000	15.78	9/30/1999	5700001201	PT L2 3,4,9 SEC 6 Stanley TW	Fargo	CA	ND	N/A		
46	R	$1.43	$10,000	7000	10/15/1999	1151	1015 N 14	Fargo	CA	ND	Wade Wolf		
47	S	$0.27	$14,000	52000	10/26/1999	7635030	4801 Deans Dr	Reiles Acres	CA	ND	Reile Farms	N/A	99-03284
48	R	$0.34	$15,000	44431	10/27/1999	6412000001	Sunny Side St	Fargo	CA	ND	Kyle & Lois Eid		
49	R	$8.07	$420,500	52107	12/1/1999	236.7	4301 Riverwood Dr North	Fargo	CA	ND	N/A		
50	S	$0.80	$12,000	15000	12/7/1999	1502001306000	207 Park Dr	Horace	CA	ND	Pat Passon	N/A	99-02156

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
51	R	$0.80	$12,000	15000	12/7/1999	1502001306	207 Park Dr	Horace	CA	ND	Pat Passon	N/A	99-02156
52	R	$1.31	$25,000	19040	1/31/2000	7800100029	L29 Oakbow Country Club	Fargo	CA	ND			
53	R	$0.37	$19,000	51718	3/1/2000	6413400060	L1B4 Sunnyside St	Fargo	CA	ND	Ford		
54	S	$0.31	$14,000	45548	4/26/2000	7635060000	4874 Deans Dr	Reiles Acres	CA	ND	Reile Farms	N/A	20-01220
55	R	$2.22	$52,500	23700	5/5/2000	2485-00600	4602 Rose Creek Pkwy	Fargo	CA	ND	Maring		
56	S	$0.34	$14,700	43560	5/17/2000	7635040000	3342 Landview Rd	Reiles Acres	CA	ND	Reile Farms	N/A	20-01517
57	R	$1.04	$50,000	47916	6/5/2000	6011000139	6414 N 15	Fargo	CA	ND	Burggraff		
58	S	$1.01	$22,500	22259	6/15/2000	30860000	552 10 AV N	Casselton	CA	ND	George/Frances Nesemei	N/A	99-00659
59	R	$0.65	$28,500	43995	6/30/2000	6425010011	1343 Cossette Dr	Fargo	CA	ND	Lewis		
60	R	$0.97	$26,500	27340	7/13/2000	170	3961 Noth 10	Fargo	CA	ND	McGeehan		

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
61	A	$2,200	$31,900	14.5	7/21/2000	74-201-2550	East edge of Village, Cnty Rd 10	Wheatland	CA	ND	Truman/Connie Kingsley	N/A	20-00005
62	R	$1.65	$18,100	10965	7/24/2000		Lot 5 Bl 3 Riverwood	Fargo	CA	ND	Larson		
63	R	$0.25	$35,000	139392	8/15/2000		Lot 13 Block 1 Heritage Hils Es	Fargo	CA	ND	Scott/Cheryl Rising		

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-10

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	S	$2.82	$30,700	10,877	1/30/2001	5920-00100	3306 Wheatland DR	CA	ND	RJS Building Systems	Howard W. Kremer	
2	C	$7.94	$155,000	19,533	1/17/2001	3508-12300	501 Main Ave	CA	ND	City of Fargo	BNSF Railway Co	
3	C	$6.81	$397,000	58,285	1/17/2001	3508-12200	20 4 ST N	CA	ND	City of Fargo	BNSF Railway Co	
4	C	$10.51	$580,000	55,190	1/17/2001	3508-12100	602 NP Ave	CA	ND	City of Fargo	BNSF Railway Co	
5	C	$13.48	$66,800	4,955	1/2/2001	2381-00250	54 Broadway	CA	ND	52 Broadway LLC	Swanson Properties	
6	C	$0.72	$150,000	207,157	1/1/2001	0010-02870	2101 12 ST N	CA	ND	Jim Bortnem Enterprises, Inc.	Municipal Airport Authority	
7	C	$3.64	$90,000	24,734	12/29/2000	3508-11900	2401 Main Ave	CA	ND	Bayard L. Grant	BNSF Railway Co	
8	C	$1.30	$195,200	150,154	12/20/2000	3500-50070	4240 32 Ave SW	CA	ND	Gerald Breyer	Aslesen	
9	C	$1.16	$120,000	103,870	12/12/2000	6270-01000	1251 54 Ave S	CA	ND	C/D River Square Ltd. Ptshp.	Sisters of Presentation	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-10

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
10	C	$5.05	$475,973	94,196	12/1/2000	1885-00001	1619 32 Ave S	CA	ND	Provident Partners LLC	Zong Ming Cheng & Xia Li	
11	S	$4.00	$99,800	24,923	11/29/2000	2489-01210	2049 Rose Creek Blvd	CA	ND	Terry Welle Construction Inc.	Joel W. Nickle	
12	C	$4.98	$465,400	93,456	11/28/2000	5180-00500	3203 32 Ave SW	CA	ND	Commercial Resources Group	Commercial Resources Group, LLC	
13	A	$80,397	$105,400	1.311	11/27/2000	5400-03000	2012 49 ST SW	CA	ND	George Gaukler	Valley Realty Inc.	
14	S	$2.65	$33,100	12,469	11/22/2000	5080-00700	5520 14 ST S	CA	ND	Rokke Construction	Ryland Dev. Corp	
15	C	$1.66	$106,000	63,895	10/30/2000	4012-00181	426 40 ST SW	CA	ND	Bradley Sather & Jim Ingstad	Ralph W. & Carolee Thomas	
16	S	$3.25	$37,600	11,587	10/28/2000	5160-02200	2418 Parkview DR	CA	ND	Thomas P. Nicki L. Frappier	Kathie J. Holoien	
17	S	$1.76	$33,200	18,825	10/25/2000	5080-01200	1403 55 Ave S	CA	ND	Dean B. & Susan E. Kellar	Ryland Dev. Corp	
18	S	$4.62	$76,500	16,549	10/19/2000	2489-00200	2005 Rose Creek Blvd	CA	ND	Adamar Dev. LLC	Erickson Contracting of F-M	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
19	C	$2.89	$80,100	27,759	10/13/2000	3508-11600	1443 Main Ave	CA	ND	Craig S. Bjoisjolie	BNSF Railway Co	
20	C	$3.07	$130,000	42,411	10/9/2000	3508-11700	1345 Main Ave	CA	ND	Dactyl Building LLP	BNSF Railway Co	
21	C	$3.64	$54,500	14,959	10/2/2000	3508-11500	307 Main Ave	CA	ND	James E. Dixon	BNSF Railway Co	
22	C	$0.80	$204,000	256,194	9/27/2000	5410-07000	4004 33 ST NW	CA	ND	West Central, Inc.	Robert L. & Patty L. Nelson	
23	S	$3.30	$36,200	10,965	9/5/2000	5700-01400	1222 46 Ave N	CA	ND	Jordahl-Miller Custom Homes	Arnold & Charmeaon C. Larson	
24	C	$2.16	$60,900	28,255	8/29/2000	2488-01000	4809 University DR S	CA	ND	Sunset Memorial Gardens	Fargo Youth Commission	
25	S	$5.28	$83,800	15,878	8/23/2000	2489-00600	2025 Rose Creek Blvd	CA	ND	Fiske Construction	Rose Creek Dev. Corp.	
26	S	$2.60	$32,900	12,636	8/18/2000	5390-01400	4419 10 ST N	CA	ND	Durwood D. & Sandy K. Geier	Timothy W. & Sandra E. Nathe	
27	S	$4.86	$79,500	16,350	8/17/2000	2489-02800	2309 Rose Creek Blvd	CA	ND	Terry G. & Rhonda L. Becker	Baird Construction Inc.	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
28	C	$3.06	$77,000	25,180	8/11/2000	3508-12500	2813 Main Ave	CA	ND	D. Piepkorn Family Ltd. Ptshp.	BNSF Railway Co	
29	A	$90,923	$119,200	1.311	8/9/2000	5400-02000	1930 49 ST SW	CA	ND	George Gaukler	Valley Realty Inc.	
30	C	$3.70	$231,900	62,685	8/8/2000	3825-00500	4344 20 Ave SW	CA	ND	Paradox Properties, LLC	West Acres Dev. LLP	
31	S	$4.02	$85,000	21,128	8/1/2000	4080-04810	128 Woodcrest DR N	CA	ND	James E. & Kathleen F. Nelson	George Nelson	
32	C	$1.67	$135,000	81,051	7/25/2000	0285-00700	3301 4 Ave SW	CA	ND	Michael Huempfner	E & D Realty, LLC	
33	C	$6.02	$486,000	80,728	7/20/2000	3508-08000	106 NP Ave	CA	ND	Mid America Steel Inc.	BNSF Railway Co	
34	S	$2.93	$32,800	11,190	7/19/2000	5080-02400	5511 16 ST S	CA	ND	Ryland Corp.	Ryland Dev. Corp	
35	S	$0.97	$26,500	27,340	7/13/2000	2335-01700	3961 10 ST N	CA	ND	Shawn B. Stewart	Richard & Cynthia McGeehan	
36	S	$3.04	$42,600	14,030	6/30/2000	2489-08400	5003 Rose Creek Pkwy	CA	ND	Alan K. C. & Rita S. Yan	Rose Creek Dev. Corp.	

A: Ag X: Other
S: SF M: MF
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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
37	C	$2.97	$157,400	53,016	6/30/2000	0375-00310	1202 28 ST SW	CA	ND	Fercho Dev. Co, Inc	Krider Trust	
38	C	$2.69	$250,000	93,000	6/24/2000	1172-03000	1530 21 Ave N	CA	ND	Pand Holdings, LLC	Hector Etal	
39	C	$3.53	$272,900	77,369	6/24/2000	1172-02500	1516 21 Ave N	CA	ND	Pand Holdings, LLC	Fred Hector, Etal	
40	S	$0.40	$106,700	265,589	6/23/2000	1079-00720	401 Harwood DR	CA	ND	Ronald & Karen Offutt	John H. Hastings	
41	C	$3.51	$134,000	38,148	6/22/2000	3508-09500	2305 Main Ave	CA	ND	Venture Dev. Co.	BNSF Railway Co	
42	S	$3.14	$41,000	13,050	6/19/2000	5700-01000	4529 10 ST N	CA	ND	Ryland Corp.	Arnold & Charmeaon C. Larson	
43	S	$1.82	$32,300	17,717	6/16/2000	5080-00400	1406 57 Ave S	CA	ND	David E. Johnson & Robin Kac	Ryland Dev. Corp	
44	S	$1.26	$15,400	12,240	6/15/2000	2335-02800	3857 10 ST N	CA	ND	David S Knutson	Bonnita K. Krueger	
45	S	$2.98	$31,400	10,530	6/12/2000	5080-03100	1510 57 Ave S	CA	ND	Ryland Corp.	Ryland Dev. Corp	

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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
46	S	$2.88	$37,100	12,887	6/7/2000	09000-12500	3221 46 Ave SW	CA	ND	Kochmann Brothers Homes Inc	Nelson Construction Inc.	
47	C	$3.05	$172,500	56,525	6/6/2000	3508-05000	1425 Main Ave	CA	ND	Bullinger Enterprises, LLP	BNSF Railway Co	
48	S	$3.30	$37,000	11,223	6/3/2000	5700-00600	1119 46 Ave N	CA	ND	David W. Anderson	Joseph A. Larson	
49	S	$3.30	$36,200	10,965	6/1/2000	5700-01700	1118 46 Ave N	CA	ND	Ryland Corp.	Arnold & Charmeaon C. Larson	
50	S	$3.00	$27,300	9,100	5/26/2000	5050-11200	1842 52 ST SW	CA	ND	Murray J. Dietz	Dakota Dev. LLP	
51	C	$3.45	$194,000	56,250	5/26/2000	2580-01150	1339 34 ST SW	CA	ND	B & H Investment, LLP	Estate of Ruben Lenthe	
52	S	$3.03	$18,100	5,964	5/22/2000	2100-12100	1714 4 ST N	CA	ND	Beyond Shelter Inc.	Annmarie E Wade	
53	S	$1.31	$16,400	12,536	5/17/2000	5070-01700	3034 31 ST SW	CA	ND	Contemporary Builders, Inc	Westlake, Inc	
54	S	$9.90	$136,400	13,776	5/13/2000	2777-00700	1615 51 ST SW	CA	ND	Sam J. Skaff	Glen A. Bayne	

A: Ag X: Other
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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
55	A	$94,834	$71,600	0.755	5/10/2000	0530-06520	3320 17 Ave SW	CA	ND	B & H Investment, LLP	Wm. Steidl; Schuyler Hawes	
56	S	$1.93	$25,000	12,936	5/6/2000	5710-07300	3526 Park Ave	CA	ND	Adamar Dev. LLC	Woodbury Park LLC	
57	S	$2.23	$25,000	11,200	5/6/2000	5710-06700	3509 Park Ave	CA	ND	Adamar Dev. LLC	Woodbury Park LLC	
58	S	$2.23	$25,000	11,200	5/6/2000	5710-06600	3515 Park Ave	CA	ND	Adamar Dev. LLC	Woodbury Park LLC	
59	S	$2.62	$62,500	23,826	5/5/2000	2485-00600	4602 Rose Creek Pkwy	CA	ND	Richard A. Ward & Lorraine I.	Barimore S. & Elizabeth S. Maring	
60	S	$3.30	$36,200	10,965	5/1/2000	5700-01800	1102 46 Ave N	CA	ND	Jordahl-Miller Custom Homes	Arnold & Charmeaon C. Larson	
61	C	$3.08	$27,000	8,779	5/1/2000	3508-12400	2775 Main Ave	CA	ND	Kelly & Rick Kolpin	BNSF Railway Co	
62	C	$9.00	$573,000	63,682	4/12/2000	6100-01000	1621 45 ST SW	CA	ND	Harold A. Gershman	Ramsey National Bank & Trust Co.	
63	S	$2.65	$49,300	18,594	3/30/2000	5040-02600	2634 Wheatland DR	CA	ND	Holte Construction	Cullen Insulation	

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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
64	S	$2.74	$34,900	12,750	3/30/2000	2367-02400	4408 Riverwood DR	CA	ND	Holte Construction	Robert E. Becker Jr. & Brenda KP	
65	C	$9.33	$15,000	1,608	3/28/2000	2320-00353	3902A Main Ave	CA	ND	Farmers Union Oil Co. of Minc	Dennis W. Lunde	
66	C	$3.55	$79,500	22,366	3/10/2000	1172-01530	1503 19 Ave N	CA	ND	GRB Subway Properties LLC	Tosco, Inc	
67	C	$2.02	$85,000	42,038	3/3/2000	1150-04010	2131 16 ST N	CA	ND	NW Leasing, LLP	Caroline H. Dady, Trustee	
68	C	$1.15	$97,000	84,010	3/3/2000	1150-04000	1522 23 Ave N	CA	ND	NW Leasing, LLP & Maurice L	Hector Etal	
69	S	$2.73	$31,600	11,587	2/25/2000	5160-02200	2418 Parkview DR	CA	ND	Kathie J. Holoien	Howard & Linda C. Kremer	
70	S	$4.46	$62,200	13,947	2/15/2000	2486-04300	1803 Rose Creek Pkwy E	CA	ND	Terry G. & Rhonda L. Becker	Baird Construction Inc.	
71	S	$3.09	$40,300	13,050	1/28/2000	5700-01100	4521 10 ST N	CA	ND	Mark & Janine Eberhart	Arnold & Charmeaon C. Larson	
72	S	$6.04	$95,900	15,878	1/8/2000	2489-01500	2061 Rose Creek Blvd	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	

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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
73	S	$3.00	$29,800	9,940	1/4/2000	2293-05700	2404 33 ST SW	CA	ND	Holte Construction	Howard W. Kremer	
74	S	$2.97	$43,100	14,511	1/3/2000	5700-01900	1008 46 Ave N	CA	ND	James L. Johnson	Arnold & Charmeaon C. Larson	
75	C	$2.85	$130,700	45,863	12/28/1999	5270-03010	1644 Tom Williams DR	CA	ND	Southgate Properties	M. T. Williams, Estate	
76	**A**	**$72,464**	**$100,000**	**1,380**	**12/24/1999**	**5760-01000**	**3502 30 Ave SW**	**CA**	**ND**	**George Gaukler**	**Ryan Gaukler, LLP**	
77	S	$1.35	$15,100	11,223	12/16/1999	5290-01300	1106 44 Ave N	CA	ND	Starlite Builders	Arnold & Charmeaon C. Larson	
78	S	$3.21	$32,500	10,140	12/6/1999	5080-04900	5524 16 ST S	CA	ND	Molony Construction	Ryland Dev. Corp	
79	S	$3.40	$35,000	10,284	12/1/1999	5080-01300	1409 55 Ave S	CA	ND	Anderson Constuctors LLC	Ryland Dev. Corp	
80	S	$0.50	$13,600	27,340	11/8/1999	2335-01700	3961 10 ST N	CA	ND	Richard & Cynthia McGeehan	Jeffers & Marcella Knopp	
81	C	$1.55	$156,300	101,160	10/1/1999	0285-0045	3431 4 Ave SW	CA	ND	Engkjer Investments, LLC	E & D Realty, LLC	

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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
82	C	$2.08	$25,000	12,000	9/30/1999	1410-04330	4315 14 Ave NW	CA	ND	Phoenix International Corp.	Bradley William Kosel, Etal	
83	S	$1.33	$13,500	10,140	9/21/1999	5080-03900	5522 15 ST S	CA	ND	Robert D. Staiger	Ryland Dev. Corp	
84	S	$1.17	$12,200	10,400	9/3/1999	5070-00700	3039 31 ST SW	CA	ND	Contemporary Builders, Inc	Westlake, Inc	
85	C	$7.54	$203,500	27,000	9/2/1999	2112-00800	330 Main Ave	CA	ND	Wesley W. & Georgia R. Better	Fargo Gateway Center	
86	S	$3.64	$70,400	19,334	8/26/1999	2489-00100	2001 Rose Creek Blvd	CA	ND	Darrel L. Crissler & Niropa M.	Contemporary Builders	
87	S	$3.99	$70,100	17,576	8/18/1999	2489-02900	2315 Rose Creek Blvd	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	
88	S	$3.25	$66,900	20,555	8/17/1999	2489-02000	2079 Rose Creek Blvd	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	
89	C	$2.36	$106,100	44,866	7/30/1999	5480-02500	3247 39 ST SW	CA	ND	Ideaone Telecom Group, LLC	Cass County Elec. Coop., Inc	
90	C	$2.64	$209,200	79,301	7/28/1999	0285-01600	462 36 ST S	CA	ND	Don Dabbert (dba Contempora	Prime Properties, Inc	

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Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
91	C	$2.43	$254,000	104,544	7/27/1999	3508-02000	3039 Main Ave	CA	ND	Service Oil Inc	BNSF Railway Co	
92	C	$2.47	$101,300	40,946	7/12/1999	5480-02000	3239 39 ST SW	CA	ND	Ideaone Telecom Group, LLC	Cass County Elec. Coop., Inc	
93	C	$1.71	$209,200	122,535	7/2/1999	0285-00600	3321 4 Ave SW	CA	ND	David A. & Marlys M. Kosciol	Prime Properties, Inc	
94	C	$1.64	$90,000	55,000	7/1/1999	0285-02190	3222 4 Ave SW	CA	ND	H & M Enterprises, ND PTSHI	Prime Properties, Inc	
95	C	$1.50	$82,500	55,000	6/23/1999	0285-02180	3242 4 Ave SW	CA	ND	JCF, Inc	Prime Properties, Inc	
96	S	$2.35	$26,700	11,362	5/28/1999	5160-00400	2521 Parkview DR	CA	ND	Richard W. & Mary Jane Fergu	Howard & Linda C. Kremer	
97	C	$0.81	$60,507	74,313	5/21/1999	1042-01000	1940 Dakota DR	CA	ND	RAP Ltd Ptshp	Greenberg Roofing & Sheet Metal	
98	C	$6.00	$577,248	96,208	4/23/1999	5550-03000	4429 19 Ave SW	CA	ND	Fargo Business Traveler, LLC	West Acres Dev.	
99	A	$89,028	$67,200	0.755	4/8/1999	0530-06520	3320 17 Ave SW	CA	ND	Wm. Steidl; Schuyler Hawes &	Canole Park Partners, LLP	

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Appendix A-10

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
100	S	$4.25	$68,700	16,177	2/28/1999	2489-01900	2075 Rose Creek Blvd	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	
101	S	$4.79	$76,000	15,878	2/28/1999	2489-01800	2071 Rose Creek Blvd	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	
102	C	$5.74	$469,000	81,732	1/15/1999	3802-04210	4231 15 Ave SW	CA	ND	Nader B Tadros	FEBCO, Inc	
103	S	$2.25	$28,700	12,750	12/18/1998	2489-06800	5119 Rose Creek Pkwy	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	
104	S	$2.09	$27,300	13,075	12/18/1998	2489-06200	5155 Rose Creek Pkwy	CA	ND	Contemporary Builders, Inc	Rose Creek Dev. Corp.	
105	A	$70,175	$161,100	2.296	9/24/1998	1390-00430	1431 35 ST SW	CA	ND	Regstad Investments	SAKS	
106	C	$0.93	$75,400	81,248	7/1/1998	0285-00900	3221 4 Ave SW	CA	ND	J & J Properties, LLC	Trillium Corp.	
107	C	$1.03	$83,600	81,078	7/1/1998	0285-00800	3241 4 Ave SW	CA	ND	Eubene S. & Robert J. Sweeney	Trillium Corp.	
108	C	$1.52	$301,700	198,634	6/15/1998	0285-03100	?????	CA	ND	Master Construction, Inc	Trillium Corp.	

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Appendix A-10

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
109	C	$3.28	$301,700	91,912	6/15/1998	0285-03000	?????	CA	ND	Master Construction, Inc	Trillium Corp.	
110	C	$3.28	$301,700	91,912	6/15/1998	0285-02900	?????	CA	ND	Master Construction, Inc	Trillium Corp.	
111	C	$3.28	$301,700	91,912	6/15/1998	0285-02800	?????	CA	ND	Master Construction, Inc	Trillium Corp.	
112	C	$3.01	$66,870	22,216	6/12/1998	5270-02250	1632 Tom Williams DR	CA	ND	Jill Ellingson & Jodi Dahl	Glenn T. & Scott I. Williams, cotrustees	
113	C	$1.45	$205,559	141,570	6/8/1998	5140-01510	845 34 ST NW	CA	ND	Goodin Co.	RWA	
114	S	$1.81	$31,500	17,424	5/6/1998	2489-07900	5033 Rose Creek Pkwy	CA	ND	Barry E & Kristin L Hamilton	Rose Creek Dev. Corp.	
115	S	$1.74	$23,500	13,504	5/6/1998	2489-04700	5016 Rose Creek Pkwy	CA	ND	Don Dabbert Jr.	Rose Creek Dev. Corp.	
116	S	$1.81	$27,600	15,246	5/6/1998	1895-05700	2618 Meadow Creek Cir.	CA	ND	Barry E & Kristin L Hamilton	Rose Creek Dev. Corp.	
117	A	$74,250	$97,500	1.31	4/1/1998	3804-05530	1810 39 ST SW	CA	ND	Dale Buchholz	RD Offutt Co.	

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Appendix A-10

Relevant Land Sales

County: Cass
City: Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
118	C	$4.27	$212,250	49,658	3/17/1998	1885-13630	1531 32 Ave S	CA	ND	Eau Claire Mattress Manufacturing		
119	C	$2.33	$1,676,000	719,176	3/3/1998	5250-00500	3000 32 Ave SW	CA	ND	Medical Properties	Robert Hoy, Etal	
77		#DIV/0!										

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S: SF M: MF
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Appendix A-11

Relevant Land Sales

County: Clay
City: Moorhead
State: Minnesota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	S	$1.02	$8,500	8307	12/15/2000		N 18	CL	MN	Wilson Investment LLC		99-03366
2	S	$1.06	$8,950	8424	12/15/2000		N 18	CL	MN	Wilson Investment LLC		20-00114
3	S	$0.50	$12,900	25600	11/22/2000	230500402	205 65 Av N	CL	MN	Pierce Properties		20-00011
4	S	$0.13	$168,159	1306800	11/13/2000	58-9000480	15 Av N	CL	MN	Peterson Estate		93-03511
5	S	$0.47	$5,400	11388	9/1/2000		18 Av Cir N	CL	MN	Wilson Investment LLC		99-03362
6	S	$0.15	$6,500	43560	7/20/2000	2304002204	North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Charles Anderson		20-01610
7	S	$0.72	$18,500	25807	7/18/2000	230650401	8 59 Av NW	CL	MN	Anatoly Kovalyova		20-00602
8	S	$0.66	$10,000	15190	5/31/2000	586450310	1833 29 St Cir S	CL	MN	Du Wayne Langseth		99-02160
9	S	$0.68	$10,000	14725	5/31/2000	586450300	1829 29 St Cir S	CL	MN	Du Wayne Langseth		99-02161

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S: SF M: MF
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Appendix A-11

Relevant Land Sales

County: Clay
City: Moorhead
State: Minnesota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
10	C	$1.90	$96,000	50600	5/15/2000	58170080	1500 30 Av S	CL	MN	Tony Eileen Tortorice		99-02420
11	S	$1.13	$8,000	7080	12/16/1999	58-440-0250	1114 N 18 1/2 St	CL	MN	P Guajardo		99-01278
12	S	$1.20	$8,500	7080	12/16/1999	58-440-0240	1118 N 18 1/2 St	CL	MN	P Guajardo		99-01277
13	S	$0.43	$11,900	27590	9/30/1999	23-050-0203	6617 N 4th St	CL	MN	Interstate Roofing		99-02495
14	S	$1.13	$15,000	13288	8/23/1999	586440055	1303 32 St Cir S	CL	MN	Geo Mallick Realty Agent		99-00170
15	S	$0.44	$5,000	11310	4/22/1999		18 Av Cir N	CL	MN	Wilson Investment LLC		98-02799
16	S	$0.46	$5,000	10800	4/22/1999		13 Av/18 1/2/ St N	CL	MN	Wilson Investment LLC		98-02808
17	S	$1.25	$16,900	13500	10/29/1998	58-458-0030	891 S 30 (near Meadows Golf Course	CL	MN	Proffutt		97-01131
18	S	$0.17	$7,500	43560	10/12/1998		North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Barrows		98-00194

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Relevant Land Sales

County: Clay
City: Moorhead
State: Minnesota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
19	S	$0.23	$12,000	52708	7/7/1998	18-080-0107	North on Hwy 75; to West on Cnty 26; tp North on Cnty 98; 0.5 miles	CL	MN	Reule		98-01514
20	S	$0.15	$3,000	19800	5/1/1998	23-018-1818	7008 N 1	CL	MN	Adeline Sanford	N/A	97-01744
21	S	$3.88	$18,500	4765	4/5/1998	580150720	601 36 Av s	CL	MN	T&C Agent		98-00465
22	S	$4.11	$18,500	4500	4/5/1998	580150690	3619 7th St S	CL	MN	T&C Agent		98-00467
23	S	$5.05	$18,500	3660	4/5/1998	580150680	3615 7 St S	CL	MN	T&C Agent		98-00466
24	S	$0.12	$57,500	475675	10/1/1997	589001830	18 Av N	CL	MN	Peterson/Watt		94-03395
25	S	$0.22	$9,800	44170	9/3/1997	230400107	North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Wilson Investment LLC		97-00434
26	S	$0.17	$7,500	44115	6/6/1997	230400204	North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Richard Curfman		97-00545
27	C	$2.25	$42,750	19000	9/14/1997	58.617.0165	1606 30th Av S	CL	MN	Roger Erickson	Gregg Morlock	

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-12

Relevant Land Sales

County: Clay
State: Minnesota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	S	$0.17	$7,500	44115	6/6/1997	230400204	North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Richard Curfman		97-00545
2	S	$0.22	$9,800	44170	9/3/1997	230400107	North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Wilson Investment LLC		97-00434
3	S	$0.12	$57,500	475675	10/1/1997	589001830	18 Av N	CL	MN	Peterson/Watt		94-03395
4	S	$3.88	$18,500	4765	4/5/1998	580150720	601 36 Av s	CL	MN	T&C Agent		98-00465
5	S	$5.05	$18,500	3660	4/5/1998	580150680	3615 7 St S	CL	MN	T&C Agent		98-00466
6	S	$4.11	$18,500	4500	4/5/1998	580150690	3619 7th St S	CL	MN	T&C Agent		98-00467
7	S	$0.15	$3,000	19800	5/1/1998	23-018-1818	7008 N 1	CL	MN	Adeline Sanford	N/A	97-01744
8	S	$0.23	$12,000	52708	7/7/1998	18-080-0107	North on Hwy 75; to West on Cnty 26; tp North on Cnty 98; 0.5 miles	CL	MN	Reule		98-01514
9	S	$0.17	$7,500	43560	10/12/1998		North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Barrows		98-00194

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-12

Relevant Land Sales

County: Clay
State: Minnesota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
10	S	$1.25	$16,900	13500	10/29/1998	58-458-0030	891 S 30 (near Meadows Golf Course	CL	MN	Proffutt		97-01131
11	S	$0.44	$5,000	11310	4/22/1999		18 Av Cir N	CL	MN	Wilson Investment LLC		98-02799
12	S	$0.46	$5,000	10800	4/22/1999		13 Av/18 1/2/ St N	CL	MN	Wilson Investment LLC		98-02808
13	S	$1.13	$15,000	13288	8/23/1999	586440055	1303 32 St Cir S	CL	MN	Geo Mallick Realty Agent		99-00170
14	S	$0.43	$11,900	27590	9/30/1999	23-050-0203	6617 N 4th St	CL	MN	Interstate Roofing		99-02495
15	S	$1.13	$8,000	7080	12/16/1999	58-440-0250	1114 N 18 1/2 St	CL	MN	P Guajardo		99-01278
16	S	$1.20	$8,500	7080	12/16/1999	58-440-0240	1118 N 18 1/2 St	CL	MN	P Guajardo		99-01277
17	C	$1.90	$96,000	50600	5/15/2000	58170080	1500 30 Av S	CL	MN	Tony Eileen Tortorice		99-02420
18	S	$0.66	$10,000	15190	5/31/2000	586450310	1833 29 St Cir S	CL	MN	Du Wayne Langseth		99-02160

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Relevant Land Sales

County: Clay
State: Minnesota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
19	S	$0.68	$10,000	14725	5/31/2000	586450300	1829 29 St Cir S	CL	MN	Du Wayne Langseth		99-02161
20	S	$0.72	$18,500	25807	7/18/2000	230650401	8 59 Av NW	CL	MN	Anatoly Kovalyova		20-00602
21	S	$0.15	$6,500	43560	7/20/2000	2304002204	North 5 Mi on Hwy 75; East 1.6 Mi on Cnty 93	CL	MN	Charles Anderson		20-01610
22	S	$0.47	$5,400	11388	9/1/2000		18 Av Cir N	CL	MN	Wilson Investment LLC		99-03362
23	S	$0.13	$168,159	1306800	11/13/2000	58-9000480	15 Av N	CL	MN	Peterson Estate		93-03511
24	S	$0.50	$12,900	25600	11/22/2000	230500402	205 65 Av N	CL	MN	Pierce Properties		20-00011
25	S	$1.02	$8,500	8307	12/15/2000		N 18	CL	MN	Wilson Investment LLC		99-03366
26	S	$1.06	$8,950	8424	12/15/2000		N 18	CL	MN	Wilson Investment LLC		20-00114

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-13

Relevant Land Sales

County: Burleigh
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	R	$1.60	$18,700	11710	6/27/2000		1236 Ward Rd	Bismarck	Burleigh	ND			97-00951
2	R	$2.08	$24,900	12000	11/8/2000		1831 26th st. N.	Bismarck	Burleigh	ND			00-02107
3	C	$0.13	$25,000	186872	5/1/2000		Fuller Rd.	Bismarck	Burleigh	ND	Igoe		99-02590
4	R	$6.01	$120,000	19962	3/31/2000		1154 Divide Ave W	Bismarck	Burleigh	ND	Cenex		99-01024
5	A	$85,464	$974,284	11.4	7/27/2000		3665 Rosser Ave E	Bismarck	Burleigh	ND	McCormick		99-02159
6	R	$1.80	$30,000	16675	10/9/1998		2636 Clydesdale Dr	Bismarck	Burleigh	ND	Olson		97-01169
7	R5	$1.88	$32,000	17000	8/18/1998		2626 Clydesdale Dr	Bismarck	Burleigh	ND	Olson		97-01168
8	I	$1.17	$34,000	29000	1/7/1998		Morrison Ave	Bismarck	Burleigh	ND			97-01973
9	I	$0.37	$37,000	100200	4/20/1998		1233 Frontier Dr	Bismarck	Burleigh	ND	Kastro		97-02062
10	C	$0.94	$71,666	76151	4/1/1998		2401 Vermont Ave	Bismarck	Burleigh	ND	McCormick		95-02128

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-13

Relevant Land Sales

County: Burleigh
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Town	Cty.	ST	Grantee/ Owner	Grantor	Comments
11	C	$1.27	$71,666	56400	4/1/1998		2501 Vermont Ave	Bismarck	Burleigh	ND	McCormick		95-02129
12	C	$1.27	$100,040	78979	5/1/1998		1706 Revere Dr	Bismarck	Burleigh	ND	Mhft		97-00106
13	A	$1,000	$40,000	40	1/21/1998		10th Ave SE	Bismarck	Burleigh	ND			97-02596
14	R	$1.96	$16,500	8400	8/2/1999		2307 Grant Dr	Bismarck	Burleigh	ND	Bakke, Dirk and Cindy		99-01244
15	C	$2.22	$175,000	78845	3/30/1999		1675 Capital Way	Bismarck	Burleigh	ND			98-01493
16	C	$2.40	$375,000	155945	11/15/1999		501 Memorial Way	Bismarck	Burleigh	ND	Azar and Youness		98-01106
17	R	$0.12	$16,000	128938	6/7/1999		Olive/Choke Cherry Ln	Bismarck	Burleigh	ND	Hoggarth		99-00115
18	A	$1,000	$19,330	19.33	8/3/1999		Apple Creek Rd	Bismarck	Burleigh	ND	Medearis		98-01932
19	A	$875	$35,000	40	2/12/1999		1 19th St and HWY 10	Bismarck	Burleigh	ND			98-00317

A: Ag X: Other
S: SF M: MF
C: Commercial I: Industrial

Appendix A-14

Relevant Land Sales

County: Cass
City: West Fargo
State: North Dakota

Sale No.	Use Code	Unit Price	Price	Size (SF except A,X)	Sale Date	Tax ID	Street Address	Cty.	ST	Grantee/ Owner	Grantor	Comments
1	C	$1.66	$124,750	75000	1/27/1999		705 East Main	CA	ND	Pierce Properties	N/A	98-00314
2	R	$0.40	$29,000	72000	8/28/1998	219400001	1626 Sheyenne	CA	ND	David Larson	N/A	98-02004
3	R	$1.28	$13,440	10500	12/15/1998	220700038	504 3rd Ave NW	CA	ND	Lyle Schock	N/A	97-03607
4	I	$0.60	$15,000	24800	7/21/1999	230000256	901 12th Ave North	CA	ND	Cheryl Stanley	N/A	99-01783
5	A	$3,864	$42,500	11	10/15/1999		Part NE 1/4 Sec 33,140	CA	ND	Alice Sheldon	N/A	99-02792
6	A	$12,405	$490,000	39.5	7/30/1999		17-139-49	CA	ND	John L Beaton	N/A	95-00674
7	R	$1.03	$9,000	8775	4/23/1999	910120	1026 W 9th	CA	ND	Doug/ Vicki Kastet	N/A	99-03261
8	R	$1.47	$12,900	8750	7/9/1997	02-2070-00510	512 Second Ave NW	CA	ND	Lyle Schock	N/A	94-01437

A: Ag
S: SF
C: Commercial
X: Other
M: MF
I: Industrial

Appendix B
Value of Land for OTRR Row Appraised Herein

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
Wyoming									
2-1-M-1	A	$150.00	A	$150.00	$150	1.60	100.0	19.4	$2,909
2-2-M-1	A	$150.00	A	$150.00	$150	1.50	100.0	18.2	$2,727
2-2-M-2	A	$150.00	S	$0.01	$293	0.51	100.0	6.1	$1,794
2-2-M-3	A	$150.00	S	$0.01	$293	0.65	100.0	7.9	$2,322
2-3-M-1	A	$150.00	S	$0.01	$293	0.94	100.0	11.4	$3,336
2-3-M-2	A	$150.00	A	$150.00	$150	0.74	100.0	8.9	$1,338
2-3-M-3	A	$250.00	A	$250.00	$250	1.90	100.0	23.0	$5,758
2-4-M-1	A	$250.00	A	$250.00	$250	3.90	100.0	47.3	$11,818
2-5-A-1	I	$0.05	A	$300.00	$1,239	0.16	100.0	1.9	$2,369
2-5-A-2	S	$0.05	A	$300.00	$1,239	0.18	78.2	1.7	$2,154
2-5-A-3	S	$0.05	I	$0.02	$1,525	0.29	75.0	2.7	$4,089
2-5-A-4	I	$0.05	I	$0.02	$1,525	0.08	75.0	0.7	$1,120
2-5-A-5	I	$0.05	I	$0.05	$2,178	0.22	75.0	2.0	$4,418
2-5-A-6	A	$450.00	I	$0.05	$1,314	0.10	75.0	0.9	$1,149
2-5-M-1	A	$250.00	A	$250.00	$250	0.59	77.1	5.5	$1,378

S: Single-Family M: Multi-Family
C: Commercial I : Industrial
A: Agricultural X: Other
T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-5-M-2	A	$650.00	A	$300.00	$475	0.29	100.0	3.5	$1,654
2-5-M-3	A	$250.00	A	$200.00	$225	0.84	100.0	10.1	$2,280
2-5-M-4	A	$150.00	A	$200.00	$175	0.41	100.0	4.9	$860
2-5-M-5	A	$250.00	A	$200.00	$225	0.16	100.0	1.9	$434
2-5-M-6	A	$250.00	A	$250.00	$250	0.28	100.0	3.4	$855
2-5-M-7	A	$150.00	A	$250.00	$200	0.28	100.0	3.4	$684
2-6-M-1	A	$250.00	A	$250.00	$250	2.87	100.0	34.8	$8,705
2-6-M-2	A	$250.00	A	$200.00	$225	0.59	100.0	7.2	$1,609
2-7-M-1	A	$200.00	A	$200.00	$200	0.89	100.0	10.8	$2,164
2-7-M-2	X	$50.00	A	$200.00	$125	0.43	100.0	5.2	$645
2-7-M-3	A	$250.00	A	$200.00	$225	0.53	100.0	6.4	$1,441
2-7-M-4	A	$400.00	A	$300.00	$350	0.95	100.0	11.6	$4,048
2-7-M-5	A	$400.00	A	$200.00	$300	0.59	100.0	7.2	$2,145
2-7-M-6	A	$100.00	A	$200.00	$150	0.35	100.0	4.3	$644
2-8-M-1	X	$100.00	X	$100.00	$100	1.87	100.0	22.7	$2,269
2-8-M-2	S	$0.01	A	$300.00	$411	0.63	100.0	7.6	$3,143

S: Single-Family M: Multi-Family
C: Commercial I : Industrial
A: Agricultural X: Other
T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-9-M-1	X	$300.00	X	$200.00	$250	0.41	100.0	4.9	$1,228
2-9-M-2	A	$550.00	X	$200.00	$375	1.71	100.0	20.8	$7,788
2-9-M-3	I	$0.15	X	$300.00	$3,417	0.24	100.0	2.9	$9,986
2-9-M-4	S	$0.25	X	$500.00	$5,695	0.45	100.0	5.4	$30,807
2-10-M-1	S	$0.30	X	$1,000.00	$7,034	0.22	100.0	2.7	$18,806
2-10-M-2	S	$0.30	X	$1,500.00	$7,284	0.18	100.0	2.2	$15,851
2-10-M-3	I	$0.45	X	$1,500.00	$10,551	0.12	100.0	1.4	$15,089
2-10-M-4	I	$0.45	X	$2,000.00	$10,801	0.24	100.0	2.9	$31,564
2-10-A-1	X	$100.00	X	$2,000.00	$1,050	0.05	100.0	0.6	$637
2-10-A-2	S	$0.55	X	$2,000.00	$12,979	0.38	100.0	4.6	$60,125
2-10-A-3	C	$2.70	X	$2,000.00	$59,806	0.12	100.0	1.5	$88,321
2-10-A-4	I	$1.50	X	$5,000.00	$35,170	0.08	100.0	1.0	$34,444
2-10-B-1	I	$1.50	X	$5,000.00	$35,170	0.40	100.0	4.9	$171,672
2-10-B-2	C	$3.50	X	$5,000.00	$78,730	0.06	100.0	0.7	$57,522
2-10-B-3	C	$3.25	X	$5,000.00	$73,285	0.06	100.0	0.7	$53,544
2-10-C-1	C	$3.25	X	$5,000.00	$73,285	0.02	100.0	0.2	$17,089

S: Single-Family M: Multi-Family
C: Commercial I : Industrial
A: Agricultural X: Other
T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-10-C-2	M	$3.25	X	$5,000.00	$73,285	0.07	100.0	0.8	$58,101
2-10-C-3	I	$2.00	X	$5,000.00	$46,060	0.18	100.0	2.2	$102,390
2-10-C-4	I	$2.25	I	$0.65	$63,162	0.22	86.6	2.3	$147,877
2-11-M-1	A	$1,100.00	A	$1,100.00	$1,100	0.41	75.0	3.7	$4,052
2-11-M-2	A	$800.00	A	$800.00	$800	0.88	86.6	9.2	$7,366
2-11-M-3	A	$650.00	A	$650.00	$650	0.65	100.0	7.9	$5,133
2-11-A-1	I	$2.25	I	$0.65	$63,162	0.08	100.0	1.0	$61,858
2-11-A-2	I	$2.70	I	$0.75	$75,141	0.21	100.0	2.6	$192,734
2-11-A-3	I	$2.70	S	$1.40	$89,298	0.15	100.0	1.8	$165,191
2-11-A-4	I	$2.70	S	$1.60	$93,654	0.11	100.0	1.4	$126,661
2-11-A-5	C	$3.25	S	$1.60	$105,633	0.12	100.0	1.4	$149,430
2-11-B-1	C	$3.25	S	$1.60	$105,633	0.14	100.0	1.7	$182,272
2-11-B-2	X	$100.00	C	$3.25	$70,835	0.12	100.0	1.5	$104,609
2-11-B-3	X	$100.00	I	$2.00	$43,610	0.11	100.0	1.3	$56,268
2-11-B-4	X	$100.00	I	$1.50	$32,720	0.24	100.0	3.0	$96,642
2-11-B-5	I	$1.10	I	$1.50	$56,628	0.09	100.0	1.0	$58,980

S: Single-Family M: Multi-Family
C: Commercial I : Industrial
A: Agricultural X: Other
T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-11-B-6	S	$1.10	I	$0.75	$40,293	0.13	100.0	1.5	$62,010
2-11-C-1	X	$1,100.00	I	$1.10	$24,508	0.11	100.0	1.3	$31,622
2-11-C-2	X	$1,100.00	I	$0.75	$16,885	0.21	100.0	2.5	$42,784
2-11-C-3	X	$5,400.00	I	$0.55	$14,679	0.21	100.0	2.5	$37,195
2-11-C-4	X	$3,250.00	X	$3,000.00	$3,125	0.12	100.0	1.4	$4,421
2-11-C-5	X	$2,000.00	X	$2,000.00	$2,000	0.09	100.0	1.1	$2,207
2-11-C-6	X	$1,100.00	X	$1,000.00	$1,050	0.09	100.0	1.1	$1,159
2-12-M-1	A	$700.00	A	$700.00	$700	1.14	100.0	13.8	$9,662
2-12-M-2	A	$650.00	A	$650.00	$650	0.55	100.0	6.7	$4,324
2-12-M-3	A	$550.00	A	$550.00	$550	1.57	100.0	19.0	$10,464
2-12-M-4	A	$450.00	A	$450.00	$450	0.36	100.0	4.4	$1,987
2-13-M-4	A	$300.00	A	$250.00	$275	0.95	100.0	11.5	$3,163
2-13-M-3	A	$400.00	A	$300.00	$350	0.52	100.0	6.4	$2,224
2-13-M-2	A	$300.00	A	$300.00	$300	0.60	100.0	7.3	$2,196
2-13-M-1	A	$400.00	A	$400.00	$400	0.92	100.0	11.2	$4,472
2-14-M-1	A	$300.00	A	$300.00	$300	1.11	100.0	13.5	$4,053

S: Single-Family M: Multi-Family
C: Commercial I : Industrial
A: Agricultural X: Other
T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-14-M-2	A	$300.00	A	$250.00	$275	1.07	100.0	12.9	$3,551
2-14-M-3	A	$300.00	A	$200.00	$250	0.25	100.0	3.0	$762
2-15-M-1	A	$300.00	A	$200.00	$250	1.90	100.0	23.0	$5,754
2-15-M-2	A	$250.00	A	$150.00	$200	0.27	100.0	3.3	$658
2-16-M-1	A	$250.00	A	$150.00	$200	0.96	100.0	11.6	$2,320
2-16-M-2	A	$150.00	A	$150.00	$150	0.39	100.0	4.7	$708
2-16-M-3	A	$100.00	A	$100.00	$100	1.21	100.0	14.7	$1,471
2-17-M-1	A	$100.00	A	$100.00	$100	2.58	100.0	31.3	$3,133
2-19-M-1	X	$100.00	X	$100.00	$100	2.60	100.0	31.6	$3,157
2-20-M-1	X	$100.00	X	$100.00	$100	1.67	100.0	20.2	$2,021
2-21-M-1	A	$450.00	A	$450.00	$450	0.29	100.0	3.6	$1,598
2-21-M-2	A	$400.00	A	$400.00	$400	0.67	100.0	8.1	$3,248
2-21-M-3	A	$300.00	A	$300.00	$300	1.18	100.0	14.3	$4,297
2-21-M-4	A	$200.00	A	$200.00	$200	0.77	100.0	9.3	$1,866
2-21-M-5	A	$400.00	A	$400.00	$400	0.78	100.0	9.5	$3,802
2-22-M-1	A	$250.00	A	$200.00	$225	1.96	100.0	23.8	$5,348

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-22-M-2	A	$250.00	A	$250.00	$250	0.45	100.0	5.5	$1,376
2-22-M-3	A	$250.00	A	$200.00	$225	0.33	100.0	4.1	$912
2-22-M-4	A	$250.00	A	$150.00	$200	0.51	100.0	6.2	$1,246
2-23-M-1	A	$150.00	A	$150.00	$150	2.44	100.0	29.6	$4,437
2-23-M-2	A	$150.00	A	$250.00	$200	0.91	100.0	11.0	$2,202
2-23-M-3	A	$100.00	A	$250.00	$175	1.80	100.0	21.8	$3,821
2-23-M-4	A	$150.00	A	$150.00	$150	0.45	100.0	5.5	$826
2-23-M-5	A	$100.00	A	$100.00	$100	0.97	100.0	11.7	$1,173
2-23-M-6	A	$100.00	A	$100.00	$100	2.24	100.0	27.2	$2,716
2-23-M-7	A	$50.00	A	$150.00	$100	2.58	100.0	31.3	$3,127
2-23-M-8	A	$150.00	A	$150.00	$150	1.05	100.0	12.7	$1,905
2-24-M-1	A	$150.00	A	$150.00	$150	0.16	100.0	2.0	$297
2-24-M-2	A	$100.00	A	$100.00	$100	0.10	100.0	1.2	$119
2-24-M-3	A	$100.00	A	$100.00	$100	0.11	100.0	1.3	$132
2-24-M-4	A	$60.00	A	$60.00	$60	0.08	100.0	1.0	$61
2-25-M-1	A	$60.00	A	$60.00	$60	0.08	100.0	1.0	$57

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Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-25-M-2	A	$50.00	A	$50.00	$50	0.06	100.0	0.8	$39
2-25-M-3	A	$60.00	A	$60.00	$60	0.09	100.0	1.1	$64
2-25-M-4	A	$50.00	A	$50.00	$50	0.06	100.0	0.8	$39
2-26-M-1	A	$50.00	A	$50.00	$50	0.75	100.0	9.1	$457
2-27-M-1	A	$50.00	A	$50.00	$50	0.97	100.0	11.7	$587
2-27-M-2	A	$50.00	A	$50.00	$50	0.45	100.0	5.5	$275
2-27-M-3	A	$50.00	A	$50.00	$50	0.55	100.0	6.7	$336
2-28-M-1	A	$50.00	A	$50.00	$50	0.17	100.0	2.1	$106
2-28-M-2	A	$50.00	A	$50.00	$50	0.13	100.0	1.6	$82
2-29-M-1	A	$50.00	A	$50.00	$50	0.55	100.0	6.7	$336
2-29-M-2	A	$60.00	A	$60.00	$60	0.51	100.0	6.2	$374
2-30-A-1	C	$0.05	S	$0.05	$2,178	0.49	100.0	6.0	$13,042
2-30-A-2	C	$0.10	S	$0.05	$3,267	0.85	100.0	10.3	$33,791
2-30-A-3	C	$0.15	S	$0.05	$4,356	0.53	100.0	6.5	$28,192
2-30-A-4	C	$0.10	S	$0.05	$3,267	1.07	100.0	12.9	$42,288
2-30-A-5	C	$0.05	S	$0.02	$1,525	1.13	100.0	13.7	$20,846

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-30-A-6	S	$0.05	S	$0.02	$1,525	0.55	100.0	6.7	$10,239
2-30-A-7	S	$0.05	A	$300.00	$1,239	0.53	81.3	5.3	$6,517
2-30-A-8	A	$550.00	A	$300.00	$425	1.21	92.5	13.5	$5,757
2-30-M-1	A	$60.00	A	$60.00	$60	0.51	100.0	6.2	$374
2-30-M-2	A	$400.00	A	$100.00	$250	0.27	100.0	3.3	$832
2-30-M-3	A	$450.00	A	$100.00	$275	0.51	100.0	6.2	$1,713
2-30-M-4	A	$550.00	A	$300.00	$425	0.35	100.0	4.3	$1,825
2-30-M-5	A	$550.00	A	$300.00	$425	0.57	100.0	7.0	$2,956
2-31-M-1	A	$300.00	A	$550.00	$425	0.59	100.0	7.2	$3,059
2-31-M-2	A	$450.00	A	$450.00	$450	1.90	100.0	23.0	$10,370
2-31-M-3	A	$300.00	A	$300.00	$300	0.41	100.0	5.0	$1,506
2-31-M-4	A	$400.00	A	$300.00	$350	1.21	100.0	14.6	$5,123
2-31-M-5	A	$250.00	A	$250.00	$250	0.79	100.0	9.6	$2,404
2-32-M-1	A	$200.00	A	$250.00	$225	1.01	100.0	12.2	$2,749
2-32-M-2	A	$250.00	A	$250.00	$250	0.33	100.0	4.1	$1,013
2-32-M-3	A	$250.00	A	$200.00	$225	0.82	100.0	9.9	$2,235

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Val Unit Detail
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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-32-M-4	A	$300.00	A	$200.00	$250	0.17	100.0	2.0	$510
2-33-M-1	A	$300.00	A	$200.00	$250	0.11	100.0	1.4	$344
2-33-M-2	A	$300.00	A	$300.00	$300	0.16	100.0	1.9	$576
2-33-M-3	A	$250.00	A	$250.00	$250	0.41	100.0	5.0	$1,248
2-33-M-4	A	$200.00	A	$250.00	$225	0.27	100.0	3.3	$749
2-33-M-5	A	$250.00	A	$250.00	$250	0.59	100.0	7.2	$1,799
2-33-M-6	A	$200.00	A	$150.00	$175	0.91	100.0	11.0	$1,926
2-34-M-1	A	$200.00	A	$150.00	$175	0.51	100.0	6.2	$1,090
2-34-M-2	A	$100.00	A	$100.00	$100	0.28	100.0	3.4	$345
2-34-M-3	A	$150.00	A	$150.00	$150	1.84	100.0	22.3	$3,348
2-34-M-4	A	$100.00	A	$100.00	$100	1.17	100.0	14.2	$1,415
2-35-M-1	A	$100.00	A	$100.00	$100	2.28	100.0	27.6	$2,764
2-35-M-2	A	$100.00	A	$100.00	$100	1.47	100.0	17.8	$1,778
2-35-M-3	A	$60.00	A	$60.00	$60	1.15	100.0	13.9	$835
2-35-M-4	A	$50.00	A	$50.00	$50	1.47	100.0	17.8	$889
2-36-M-1	A	$50.00	A	$50.00	$50	0.69	100.0	8.4	$420

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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
2-37-A-1	S	$0.01	A	$150.00	$293	0.69	100.0	8.4	$2,463
2-37-A-2	C	$0.05	A	$150.00	$1,164	0.51	100.0	6.2	$7,252
2-37-A-3	S	$0.01	A	$100.00	$268	0.65	100.0	7.9	$2,124
2-37-A-4	S	$0.01	A	$100.00	$268	0.33	100.0	4.1	$1,086
2-37-M-1	A	$50.00	A	$50.00	$50	1.37	100.0	16.6	$829
2-37-M-2	A	$100.00	A	$100.00	$100	0.77	100.0	9.4	$938
2-37-M-3	A	$150.00	A	$100.00	$125	0.39	100.0	4.8	$597
2-37-M-4	A	$100.00	A	$100.00	$100	0.19	100.0	2.4	$236
2-37-M-5	A	$100.00	A	$100.00	$100	0.27	100.0	3.3	$333
2-38-M-1	A	$60.00	A	$60.00	$60	1.01	100.0	12.2	$733
2-38-M-2	A	$50.00	A	$50.00	$50	1.71	100.0	20.7	$1,034
2-39-M-1	A	$50.00	A	$50.00	$50	0.17	100.0	2.1	$106
2-40-M-1	A	$50.00	A	$50.00	$50	1.09	100.0	13.2	$659
3-1-M-1	A	$60.00	A	$60.00	$60	1.59	100.0	19.2	$1,154
3-1-M-2	A	$60.00	A	$100.00	$80	2.67	100.0	32.4	$2,594
3-2-M-1	A	$60.00	A	$60.00	$60	3.61	100.0	43.7	$2,624

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Val Unit Detail
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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-2-M-2	A	$50.00	A	$60.00	$55	1.39	100.0	16.8	$925
3-2-M-3	A	$50.00	A	$100.00	$75	1.69	100.0	20.4	$1,533
3-2-M-4	A	$50.00	A	$100.00	$75	0.55	100.0	6.7	$504
3-2-M-5	A	$50.00	A	$60.00	$55	1.35	100.0	16.3	$898
3-3-M-1	A	$50.00	A	$60.00	$55	0.95	100.0	11.5	$632
3-3-M-2	A	$50.00	A	$50.00	$50	0.69	100.0	8.4	$420
3-3-M-3	A	$50.00	A	$50.00	$50	1.33	100.0	16.1	$804
3-3-M-4	A	$60.00	A	$60.00	$60	0.31	100.0	3.8	$229
3-3-M-5	A	$50.00	A	$60.00	$55	0.31	100.0	3.8	$210
3-4-M-1	A	$50.00	A	$60.00	$55	0.49	100.0	6.0	$329
3-4-M-2	A	$50.00	A	$50.00	$50	0.39	100.0	4.8	$239
3-5-M-1	A	$50.00	A	$50.00	$50	0.33	100.0	4.1	$203
3-5-M-2	A	$50.00	A	$50.00	$50	0.45	100.0	5.5	$275
3-5-M-3	A	$50.00	A	$50.00	$50	0.47	100.0	5.7	$287
3-6-M-1	A	$50.00	A	$50.00	$50	0.57	100.0	7.0	$348
3-7-M-1	A	$50.00	A	$50.00	$50	0.13	100.0	1.6	$82

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3-8-M-1	A	$50.00	A	$50.00	$50	0.17	100.0	2.1	$106
3-8-M-2	A	$50.00	A	$50.00	$50	0.07	100.0	0.8	$42
3-9-M-1	A	$50.00	A	$50.00	$50	0.10	100.0	1.2	$60
3-9-M-2	A	$60.00	A	$60.00	$60	0.24	100.0	2.9	$172
3-9-M-3	A	$100.00	A	$100.00	$100	0.15	100.0	1.9	$186
3-9-M-4	A	$100.00	A	$100.00	$100	0.55	100.0	6.7	$667
3-10-M-1	A	$100.00	A	$100.00	$100	0.03	100.0	0.3	$35
3-10-M-2	A	$100.00	A	$100.00	$100	0.03	100.0	0.4	$41
3-10-M-3	A	$150.00	A	$150.00	$150	0.05	100.0	0.6	$88
3-10-M-4	A	$150.00	A	$150.00	$150	0.35	100.0	4.2	$631
3-10-M-5	S	$0.05	A	$250.00	$1,214	0.13	100.0	1.6	$1,891
3-10-M-6	A	$450.00	A	$300.00	$375	0.19	100.0	2.3	$879
3-10-M-7	A	$300.00	A	$300.00	$300	0.11	100.0	1.3	$395
3-11-M-1	A	$700.00	A	$1,100.00	$900	0.19	100.0	2.3	$2,055
3-11-M-2	T	$1,100.00	T	$2,000.00	$1,550	0.17	100.0	2.0	$3,164
3-11-M-3	I	$0.20	T	$3,000.00	$5,856	0.15	100.0	1.8	$10,538

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3-11-M-4	I	$0.30	T	$3,000.00	$8,034	0.17	100.0	2.1	$16,888
3-11-A-1	I	$0.30	T	$8,000.00	$10,534	0.06	100.0	0.8	$8,124
3-11-A-2	I	$0.45	T	$8,000.00	$13,801	0.06	100.0	0.8	$10,644
3-11-A-3	S	$0.80	T	$8,000.00	$21,424	0.09	100.0	1.1	$23,003
3-11-A-4	I	$0.45	T	$8,000.00	$13,801	0.10	100.0	1.2	$16,488
3-11-A-5	I	$0.55	S	$0.80	$29,403	0.03	100.0	0.4	$12,005
3-11-A-6	C	$8.00	S	$0.80	$191,664	0.12	100.0	1.5	$286,944
3-11-B-1	C	$8.00	C	$2.70	$233,046	0.06	100.0	0.7	$165,638
3-11-B-2	I	$1.35	I	$2.70	$88,209	0.15	100.0	1.9	$164,074
3-11-B-3	I	$1.35	I	$1.35	$58,806	0.09	100.0	1.1	$66,697
3-11-B-4	I	$1.50	I	$1.50	$65,340	0.05	100.0	0.6	$38,536
3-11-B-5	I	$1.10	I	$0.80	$41,382	0.05	100.0	0.7	$26,909
3-11-B-6	I	$1.10	I	$1.10	$47,916	0.13	100.0	1.6	$74,634
3-11-B-7	I	$1.35	I	$1.10	$53,361	0.07	100.0	0.8	$44,382
3-12-A-1	I	$1.35	I	$1.50	$62,073	0.05	100.0	0.7	$40,364
3-12-A-2	I	$1.50	S	$1.35	$62,073	0.08	100.0	1.0	$62,892

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3-12-A-3	I	$1.35	I	$1.35	$58,806	0.08	100.0	1.0	$59,582
3-12-A-4	I	$1.35	S	$1.35	$58,806	0.11	100.0	1.4	$80,925
3-12-A-5	C	$7.00	C	$4.00	$239,580	0.28	100.0	3.4	$818,805
3-12-A-6	C	$7.00	S	$1.90	$193,842	0.14	100.0	1.7	$325,381
3-12-A-7	C	$7.55	S	$1.90	$205,821	0.29	100.0	3.5	$728,328
3-12-A-8	C	$6.00	S	$1.90	$172,062	0.13	100.0	1.6	$278,413
3-12-A-9	C	$6.00	I	$1.50	$163,350	0.08	100.0	1.0	$165,507
3-12-A-10	C	$6.00	I	$1.50	$163,350	0.15	100.0	1.8	$293,959
3-12-B-1	C	$6.00	I	$1.50	$163,350	0.06	100.0	0.8	$125,983
3-12-B-2	C	$6.00	I	$1.50	$163,350	0.08	100.0	1.0	$155,626
3-12-B-3	C	$7.00	I	$1.50	$185,130	0.10	100.0	1.3	$232,368
3-12-B-4	C	$5.50	I	$1.50	$152,460	0.16	100.0	1.9	$292,807
3-12-B-5	C	$4.85	I	$1.50	$138,303	0.08	100.0	1.0	$131,763
3-12-B-6	C	$5.40	I	$1.50	$150,282	0.07	100.0	0.8	$124,995
3-12-B-7	C	$4.85	I	$1.50	$138,303	0.25	100.0	3.1	$422,478
3-12-B-8	C	$5.40	I	$1.50	$150,282	0.18	100.0	2.2	$324,986

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-12-B-9	C	$4.85	I	$1.50	$138,303	0.10	100.0	1.2	$165,227
3-12-B-10	C	$5.40	I	$1.50	$150,282	0.15	100.0	1.9	$279,533
3-12-B-11	C	$4.85	I	$1.50	$138,303	0.08	100.0	1.0	$131,763
3-12-C-1	I	$0.75	I	$1.40	$46,827	0.67	100.0	8.2	$382,370
3-12-C-2	T	$20,000.00	I	$1.40	$40,492	1.11	100.0	13.4	$543,720
3-12-C-3	T	$20,000.00	I	$1.50	$42,670	0.87	87.9	9.3	$394,774
3-12-C-4	T	$20,000.00	I	$1.90	$51,382	0.85	75.0	7.8	$398,586
3-12-C-5	T	$20,000.00	S	$1.10	$33,958	0.47	75.0	4.3	$146,346
3-12-C-6	T	$20,000.00	I	$2.00	$53,560	0.41	75.0	3.8	$201,666
3-12-D-1	T	$16,150.00	I	$2.00	$51,635	0.41	75.0	3.8	$194,418
3-12-D-2	T	$10,000.00	I	$1.90	$46,382	0.25	75.0	2.3	$107,309
3-12-D-3	T	$5,400.00	I	$1.50	$35,370	0.39	75.0	3.6	$126,758
3-12-D-4	T	$3,500.00	I	$1.50	$34,420	0.31	75.0	2.9	$98,371
3-12-D-5	T	$3,250.00	I	$1.50	$34,295	0.39	75.0	3.6	$122,906
3-13-A-1	T	$2,700.00	S	$1.50	$34,020	0.73	77.5	6.9	$234,446
3-13-A-2	T	$2,000.00	S	$1.50	$33,670	0.18	100.0	2.2	$73,058

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-13-A-3	T	$2,000.00	I	$0.25	$6,445	0.10	100.0	1.2	$7,726
3-13-A-4	T	$1,950.00	I	$0.25	$6,420	0.15	100.0	1.9	$11,982
3-13-A-5	A	$1,300.00	I	$0.25	$6,095	0.08	100.0	1.0	$5,826
3-13-M-1	A	$1,300.00	I	$0.05	$1,739	0.68	100.0	8.2	$14,248
3-13-M-2	I	$0.05	I	$0.05	$2,178	1.11	100.0	13.5	$29,345
3-13-M-3	A	$1,300.00	A	$1,300.00	$1,300	0.87	100.0	10.6	$13,728
3-14-M-1	A	$1,300.00	A	$1,300.00	$1,300	0.86	100.0	10.4	$13,492
3-14-M-2	A	$1,100.00	A	$800.00	$950	0.48	100.0	5.8	$5,477
3-14-M-3	A	$800.00	A	$650.00	$725	0.42	100.0	5.0	$3,652
3-14-M-4	A	$650.00	A	$450.00	$550	0.42	100.0	5.0	$2,771
3-14-M-5	A	$650.00	A	$250.00	$450	0.26	100.0	3.1	$1,393
3-14-M-6	A	$300.00	A	$200.00	$250	0.40	100.0	4.8	$1,199
3-14-M-7	A	$300.00	A	$150.00	$225	0.32	100.0	3.8	$860
3-14-M-8	A	$300.00	A	$150.00	$225	0.40	100.0	4.8	$1,079
3-14-M-9	A	$250.00	A	$200.00	$225	0.74	100.0	8.9	$2,007
3-15-M-1	A	$300.00	A	$200.00	$250	0.74	100.0	9.0	$2,244

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-15-M-2	A	$1,300.00	A	$300.00	$800	0.86	100.0	10.4	$8,355
3-15-M-3	A	$900.00	A	$300.00	$600	1.82	100.0	22.0	$13,224
3-15-M-4	A	$650.00	A	$300.00	$475	0.94	100.0	11.4	$5,396
3-16-M-1	A	$300.00	A	$300.00	$300	2.42	100.0	29.4	$8,813
3-17-M-1	A	$150.00	A	$150.00	$150	2.92	100.0	35.4	$5,313
3-18-M-1	A	$150.00	A	$150.00	$150	1.90	100.0	23.0	$3,454
3-19-M-1	A	$300.00	A	$300.00	$300	0.28	100.0	3.4	$1,008
3-19-M-2	A	$450.00	A	$450.00	$450	0.25	100.0	3.0	$1,364
3-19-M-3	A	$300.00	A	$300.00	$300	0.27	100.0	3.3	$982
3-19-M-4	A	$200.00	A	$200.00	$200	1.29	100.0	15.6	$3,127
3-19-E-1	A	$400.00	A	$400.00	$400	5.57	100.0	67.5	$27,006
3-20-M-1	A	$150.00	A	$150.00	$150	2.41	100.0	29.2	$4,385
3-21-M-1	A	$150.00	A	$150.00	$150	2.72	100.0	33.0	$4,950
3-22-M-1	A	$150.00	A	$200.00	$175	2.18	100.0	26.4	$4,614
3-23-M-1	A	$200.00	A	$200.00	$200	2.25	100.0	27.3	$5,464
3-24-M-1	A	$150.00	A	$150.00	$150	2.31	100.0	28.0	$4,200

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Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-25-M-1	A	$150.00	A	$150.00	$150	2.33	100.0	28.3	$4,242
3-25-M-2	A	$100.00	A	$100.00	$100	0.82	100.0	10.0	$998
3-26-M-1	A	$100.00	A	$100.00	$100	2.33	100.0	28.3	$2,828
3-27-M-1	A	$100.00	A	$100.00	$100	2.33	100.0	28.3	$2,828
3-28-M-1	A	$100.00	A	$100.00	$100	2.19	100.0	26.6	$2,660
3-29-M-1	A	$100.00	A	$100.00	$100	2.16	100.0	26.1	$2,613
3-30-M-1	A	$100.00	A	$100.00	$100	1.94	100.0	23.5	$2,349
3-30-M-2	A	$150.00	A	$150.00	$150	1.58	100.0	19.1	$2,870
3-31-M-1	A	$150.00	A	$150.00	$150	1.08	100.0	13.0	$1,955
3-31-M-2	A	$100.00	A	$100.00	$100	0.73	100.0	8.8	$879
3-31-M-3	A	$150.00	A	$150.00	$150	0.55	100.0	6.6	$995
3-32-M-1	A	$150.00	A	$150.00	$150	2.16	100.0	26.1	$3,919
3-33-M-1	A	$150.00	A	$150.00	$150	0.73	100.0	8.8	$1,318
3-33-M-2	A	$150.00	A	$150.00	$150	0.73	100.0	8.8	$1,318
3-33-M-3	A	$150.00	A	$150.00	$150	0.69	100.0	8.3	$1,246
3-34-M-1	A	$150.00	A	$150.00	$150	1.31	100.0	15.9	$2,385

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Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-34-M-2	A	$150.00	A	$150.00	$150	0.84	100.0	10.2	$1,533
3-35-M-1	A	$150.00	A	$150.00	$150	0.43	100.0	5.2	$780
3-35-M-2	A	$140.00	A	$140.00	$140	1.74	100.0	21.1	$2,954
3-36-M-1	A	$140.00	A	$140.00	$140	2.14	100.0	25.9	$3,624
3-37-M-1	A	$140.00	A	$140.00	$140	6.96	100.0	84.4	$11,811
3-38-M-1	A	$140.00	A	$140.00	$140	2.21	100.0	26.8	$3,758
3-39-M-1	A	$140.00	A	$140.00	$140	0.76	100.0	9.3	$1,297
3-39-M-2	A	$150.00	A	$150.00	$150	0.94	100.0	11.4	$1,704
3-39-M-3	A	$140.00	A	$140.00	$140	0.49	100.0	5.9	$829
3-40-M-1	A	$150.00	A	$150.00	$150	2.16	100.0	26.1	$3,919
3-41-M-1	A	$150.00	A	$150.00	$150	1.82	100.0	22.1	$3,309
3-41-M-2	A	$140.00	A	$140.00	$140	0.35	100.0	4.2	$594
3-42-M-1	A	$140.00	A	$140.00	$140	1.19	100.0	14.5	$2,025
3-42-M-2	A	$150.00	A	$150.00	$150	1.31	100.0	15.9	$2,385
3-43-M-1	A	$150.00	A	$150.00	$150	0.74	100.0	9.0	$1,354
3-43-M-2	A	$140.00	A	$140.00	$140	0.94	100.0	11.4	$1,590

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Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
3-43-M-3	A	$150.00	A	$150.00	$150	0.53	100.0	6.4	$960
3-44-M-1	A	$150.00	A	$150.00	$150	1.65	100.0	20.0	$2,995
3-44-M-2	A	$100.00	A	$100.00	$100	1.17	100.0	14.2	$1,423
3-45-M-1	A	$100.00	A	$100.00	$100	1.98	100.0	24.0	$2,397
3-46-M-1	A	$100.00	A	$100.00	$100	1.09	100.0	13.3	$1,327
3-46-M-2	A	$60.00	A	$60.00	$60	0.67	100.0	8.1	$484
3-46-M-3	A	$100.00	A	$60.00	$80	0.59	100.0	7.1	$569
3-46-M-4	A	$60.00	A	$60.00	$60	0.84	100.0	10.2	$613
3-46-M-5	A	$100.00	A	$60.00	$80	0.39	100.0	4.7	$378
3-47-M-1	A	$60.00	A	$60.00	$60	1.76	100.0	21.3	$1,281
3-47-M-2	A	$100.00	A	$100.00	$100	1.09	100.0	13.3	$1,327
3-47-M-3	A	$150.00	A	$150.00	$150	0.33	100.0	4.0	$601
3-48-M-1	A	$150.00	A	$150.00	$150	1.21	100.0	14.7	$2,206
3-48-M-2	A	$140.00	A	$140.00	$140	0.96	100.0	11.6	$1,624
3-48-E-1	A	$150.00	A	$150.00	$150	1.11	100.0	13.5	$2,018
Montana									

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1-1-A-1	A	$2,000.00	S	$0.15	$4,267	0.16	100.0	1.9	$8,100
1-1-A-2	A	$2,000.00	I	$0.15	$4,267	0.40	100.0	4.9	$20,792
1-1-A-3	A	$2,000.00	I	$0.10	$3,178	0.37	100.0	4.5	$14,250
1-1-B-1	A	$2,000.00	I	$0.10	$3,178	0.19	100.0	2.3	$7,363
1-1-B-2	A	$2,000.00	A	$2,000.00	$2,000	0.62	100.0	7.5	$14,977
1-1-M-1	A	$2,000.00	A	$2,000.00	$2,000	2.18	100.0	26.4	$52,729
1-2-M-1	A	$2,000.00	A	$2,000.00	$2,000	1.41	100.0	17.1	$34,196
1-2-M-2	A	$500.00	A	$2,000.00	$1,250	0.41	100.0	5.0	$6,203
1-2-M-3	A	$1,550.00	A	$2,000.00	$1,775	0.65	100.0	7.8	$13,901
1-2-M-4	A	$2,000.00	A	$2,600.00	$2,300	0.65	100.0	7.8	$18,013
1-2-M-5	A	$2,600.00	A	$2,600.00	$2,600	0.57	100.0	6.9	$17,875
1-3-M-1	A	$2,600.00	A	$2,600.00	$2,600	0.35	100.0	4.2	$11,036
1-3-M-2	A	$2,000.00	A	$2,000.00	$2,000	0.57	100.0	6.9	$13,750
1-3-A-1	A	$1,550.00	A	$2,600.00	$2,075	0.55	100.0	6.7	$13,802
1-3-A-2	A	$1,550.00	S	$0.10	$2,953	0.15	100.0	1.8	$5,429
1-3-A-3	A	$1,050.00	S	$0.10	$2,703	0.17	100.0	2.1	$5,616

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Val Unit Detail
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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-3-B-1	A	$1,050.00	S	$0.10	$2,703	0.33	100.0	4.0	$10,747
1-3-B-2	A	$1,050.00	A	$3,100.00	$2,075	0.53	93.9	6.1	$12,612
1-3-C-1	A	$1,050.00	A	$3,100.00	$2,075	0.14	75.0	1.3	$2,675
1-3-C-2	A	$1,050.00	A	$2,000.00	$1,525	0.09	75.0	0.8	$1,282
1-3-C-3	A	$1,050.00	A	$1,050.00	$1,050	0.21	75.0	2.0	$2,048
1-3-C-4	A	$2,000.00	A	$2,000.00	$2,000	0.38	75.0	3.4	$6,861
1-4-M-1	A	$2,000.00	A	$2,000.00	$2,000	1.09	87.7	11.6	$23,271
1-4-M-2	A	$1,550.00	A	$2,000.00	$1,775	0.88	100.0	10.6	$18,889
1-4-M-3	A	$1,050.00	A	$2,000.00	$1,525	0.63	100.0	7.6	$11,579
1-4-M-4	A	$1,250.00	A	$2,000.00	$1,625	0.88	100.0	10.6	$17,292
1-5-M-1	A	$1,250.00	A	$2,000.00	$1,625	0.80	100.0	9.7	$15,835
1-5-M-2	A	$1,550.00	A	$2,000.00	$1,775	0.21	100.0	2.6	$4,563
1-5-M-3	A	$1,050.00	A	$1,050.00	$1,050	0.45	100.0	5.4	$5,712
1-5-M-4	A	$500.00	X	$50.00	$275	0.65	100.0	7.8	$2,154
1-5-M-5	A	$500.00	A	$500.00	$500	0.39	100.0	4.7	$2,361
1-6-M-1	A	$500.00	A	$500.00	$500	0.92	100.0	11.1	$5,560

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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-6-M-2	A	$500.00	A	$750.00	$625	0.90	100.0	10.9	$6,800
1-7-M-1	A	$500.00	A	$750.00	$625	0.45	100.0	5.4	$3,400
1-7-M-2	A	$500.00	A	$750.00	$625	0.71	100.0	8.5	$5,343
1-7-M-3	A	$500.00	A	$750.00	$625	0.55	100.0	6.6	$4,147
1-7-M-4	A	$800.00	A	$800.00	$800	0.96	100.0	11.6	$9,278
1-8-M-1	A	$800.00	A	$800.00	$800	0.43	100.0	5.2	$4,161
1-8-M-2	A	$1,050.00	A	$800.00	$925	0.94	100.0	11.4	$10,507
1-8-M-3	A	$800.00	A	$800.00	$800	0.86	100.0	10.4	$8,322
1-9-M-1	A	$800.00	A	$800.00	$800	0.61	100.0	7.4	$5,883
1-9-M-2	A	$1,050.00	A	$800.00	$925	1.51	100.0	18.3	$16,922
1-10-M-1	A	$1,050.00	A	$800.00	$925	1.23	100.0	14.9	$13,825
1-10-M-2	A	$800.00	A	$800.00	$800	1.47	100.0	17.8	$14,252
1-11-M-1	A	$800.00	A	$800.00	$800	0.53	100.0	6.4	$5,117
1-11-M-2	A	$1,150.00	A	$1,150.00	$1,150	2.78	100.0	33.7	$38,776
1-12-M-1	A	$1,150.00	A	$1,150.00	$1,150	0.57	100.0	6.9	$7,906
1-12-M-2	A	$750.00	A	$950.00	$850	1.31	100.0	15.9	$13,517

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-12-M-3	A	$950.00	A	$950.00	$950	1.65	100.0	20.0	$18,969
1-13-M-1	A	$950.00	A	$950.00	$950	0.82	100.0	10.0	$9,485
1-13-M-2	A	$700.00	A	$700.00	$700	0.53	100.0	6.4	$4,478
1-13-M-3	A	$600.00	A	$700.00	$650	0.19	100.0	2.3	$1,516
1-13-M-4	A	$600.00	A	$1,050.00	$825	1.76	100.0	21.3	$17,608
1-14-M-1	A	$600.00	A	$1,050.00	$825	0.43	100.0	5.2	$4,291
1-14-M-2	A	$600.00	A	$250.00	$425	0.07	100.0	0.9	$381
1-14-M-3	A	$500.00	A	$250.00	$375	0.69	100.0	8.3	$3,116
1-14-M-4	A	$400.00	A	$250.00	$325	1.43	100.0	17.3	$5,635
1-14-M-5	A	$500.00	A	$250.00	$375	1.00	100.0	12.1	$4,529
1-15-M-1	A	$500.00	A	$250.00	$375	0.69	100.0	8.3	$3,116
1-15-M-2	A	$1,050.00	A	$1,050.00	$1,050	1.21	100.0	14.7	$15,442
1-15-A-1	A	$1,050.00	A	$1,050.00	$1,050	0.11	100.0	1.3	$1,365
1-15-A-2	A	$1,050.00	S	$0.05	$1,614	0.07	100.0	0.9	$1,423
1-15-A-3	A	$1,050.00	I	$0.05	$1,614	0.07	100.0	0.9	$1,423
1-15-A-4	I	$0.05	I	$0.05	$2,178	0.11	100.0	1.3	$2,832

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-15-A-5	I	$0.05	I	$0.05	$2,178	0.15	100.0	1.8	$4,004
1-15-A-6	I	$0.05	I	$0.05	$2,178	0.23	100.0	2.8	$6,055
1-15-A-7	I	$0.05	I	$0.06	$2,396	0.14	100.0	1.7	$3,975
1-15-B-1	I	$0.05	I	$0.10	$3,267	0.12	100.0	1.4	$4,639
1-15-B-2	I	$0.05	I	$0.10	$3,267	0.21	100.0	2.5	$8,155
1-15-B-3	I	$0.05	I	$0.15	$4,356	0.02	100.0	0.3	$1,237
1-15-B-4	I	$0.07	I	$0.15	$4,792	0.09	100.0	1.1	$5,372
1-15-B-5	I	$0.05	I	$0.15	$4,356	0.14	100.0	1.7	$7,487
1-15-B-6	I	$0.05	C	$0.15	$4,356	0.22	100.0	2.7	$11,589
1-15-B-7	I	$0.05	C	$0.10	$3,267	0.19	100.0	2.3	$7,569
1-16-A-1	I	$0.05	I	$0.05	$2,178	0.25	100.0	3.0	$6,576
1-16-A-2	I	$0.05	S	$0.05	$2,178	0.36	93.7	4.1	$8,847
1-16-A-3	A	$1,050.00	A	$1,050.00	$1,050	0.19	75.0	1.7	$1,824
1-16-M-1	A	$1,050.00	A	$1,050.00	$1,050	2.33	75.0	21.2	$22,269
1-16-M-2	A	$1,050.00	A	$750.00	$900	0.43	84.9	4.4	$3,972
1-17-M-1	A	$800.00	A	$750.00	$775	2.51	97.0	29.5	$22,879

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-18-M-1	A	$800.00	A	$750.00	$775	0.73	100.0	8.8	$6,811
1-18-M-2	A	$800.00	A	$800.00	$800	1.84	100.0	22.3	$17,839
1-19-M-1	A	$800.00	A	$800.00	$800	1.15	100.0	14.0	$11,191
1-19-M-2	A	$600.00	A	$800.00	$700	0.73	100.0	8.8	$6,152
1-19-M-3	A	$500.00	A	$700.00	$600	0.43	100.0	5.2	$3,121
1-20-M-1	A	$500.00	A	$700.00	$600	0.57	100.0	6.9	$4,125
1-20-M-2	A	$600.00	A	$800.00	$700	0.25	100.0	3.0	$2,134
1-20-A-1	I	$0.05	A	$800.00	$1,489	0.24	100.0	2.9	$4,318
1-20-A-2	S	$0.05	S	$0.05	$2,178	0.12	100.0	1.5	$3,223
1-20-A-3	S	$0.05	S	$0.05	$2,178	0.19	100.0	2.3	$4,916
1-20-B-1	S	$0.05	S	$0.06	$2,396	0.09	100.0	1.1	$2,543
1-20-B-2	C	$0.05	C	$0.15	$4,356	0.06	100.0	0.7	$3,060
1-20-B-3	C	$0.05	C	$0.15	$4,356	0.05	100.0	0.6	$2,800
1-20-B-4	C	$0.05	C	$0.15	$4,356	0.04	100.0	0.5	$2,279
1-20-B-5	S	$0.05	S	$0.05	$2,178	0.12	89.3	1.3	$2,763
1-20-B-6	S	$0.05	S	$0.05	$2,178	0.07	75.0	0.7	$1,441

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-20-B-7	S	$0.05	S	$0.05	$2,178	0.13	75.0	1.2	$2,612
1-20-B-8	A	$1,050.00	A	$1,550.00	$1,300	0.07	75.0	0.6	$802
1-20-C-1	A	$1,050.00	A	$1,550.00	$1,300	0.25	75.0	2.3	$2,944
1-21-M-1	A	$750.00	A	$1,550.00	$1,150	0.39	75.0	3.5	$4,073
1-21-M-2	A	$500.00	A	$1,250.00	$875	0.13	75.0	1.2	$1,059
1-21-M-3	A	$750.00	A	$1,250.00	$1,000	0.23	75.0	2.1	$2,107
1-21-M-4	A	$500.00	A	$500.00	$500	0.67	75.0	6.1	$3,027
1-21-M-5	A	$700.00	A	$700.00	$700	0.23	75.0	2.1	$1,475
1-21-A-1	A	$750.00	A	$750.00	$750	0.21	75.0	2.0	$1,463
1-21-A-2	A	$750.00	C	$0.05	$1,464	0.12	75.0	1.1	$1,625
1-21-A-3	A	$750.00	A	$750.00	$750	0.21	75.0	1.9	$1,404
1-22-M-1	A	$700.00	A	$700.00	$700	0.82	75.0	7.5	$5,242
1-22-M-2	A	$800.00	A	$800.00	$800	1.84	79.2	17.7	$14,130
1-23-M-1	A	$800.00	A	$800.00	$800	1.61	100.0	19.5	$15,592
1-23-M-2	A	$500.00	A	$800.00	$650	0.76	100.0	9.3	$6,023
1-23-M-3	A	$700.00	A	$800.00	$750	0.37	100.0	4.5	$3,363

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-24-M-1	A	$600.00	A	$600.00	$600	0.25	100.0	3.0	$1,829
1-24-M-2	A	$500.00	A	$500.00	$500	0.17	100.0	2.1	$1,046
1-24-M-3	A	$500.00	A	$500.00	$500	0.55	100.0	6.6	$3,318
1-24-M-4	A	$650.00	A	$500.00	$575	1.39	100.0	16.9	$9,694
1-25-M-1	A	$650.00	A	$500.00	$575	0.35	100.0	4.2	$2,441
1-25-M-2	A	$650.00	A	$400.00	$525	0.43	100.0	5.2	$2,731
1-25-M-3	A	$500.00	A	$350.00	$425	0.47	100.0	5.7	$2,414
1-25-M-4	A	$450.00	A	$300.00	$375	0.39	100.0	4.7	$1,771
1-25-M-5	A	$450.00	A	$450.00	$450	0.37	100.0	4.5	$2,018
1-25-M-6	A	$300.00	A	$300.00	$300	0.37	100.0	4.5	$1,345
1-26-M-1	A	$300.00	A	$300.00	$300	0.43	100.0	5.2	$1,560
1-26-M-2	A	$250.00	A	$250.00	$250	0.17	100.0	2.1	$523
1-26-M-3	A	$150.00	A	$250.00	$200	0.51	100.0	6.2	$1,232
1-26-M-4	A	$300.00	A	$400.00	$350	0.82	100.0	10.0	$3,494
1-26-M-5	A	$400.00	A	$400.00	$400	0.27	100.0	3.3	$1,315
1-27-M-1	A	$300.00	A	$400.00	$350	0.25	100.0	3.0	$1,067

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-27-M-2	A	$300.00	A	$300.00	$300	0.31	100.0	3.8	$1,130
1-27-M-3	A	$250.00	A	$300.00	$275	0.37	100.0	4.5	$1,233
1-27-M-4	A	$150.00	A	$250.00	$200	0.31	100.0	3.8	$753
1-27-M-5	A	$200.00	A	$250.00	$225	0.15	100.0	1.9	$417
1-27-M-6	A	$200.00	A	$300.00	$250	0.15	100.0	1.9	$463
1-27-M-7	A	$250.00	A	$300.00	$275	0.19	100.0	2.3	$641
1-27-M-8	A	$300.00	A	$300.00	$300	0.31	100.0	3.8	$1,130
1-27-M-9	A	$350.00	A	$350.00	$350	0.41	100.0	5.0	$1,737
1-28-M-1	A	$350.00	A	$400.00	$375	1.15	100.0	14.0	$5,246
1-28-M-2	A	$350.00	A	$350.00	$350	0.39	100.0	4.7	$1,653
1-28-M-3	A	$350.00	A	$250.00	$300	0.43	100.0	5.2	$1,560
1-28-M-4	A	$350.00	A	$350.00	$350	0.33	100.0	4.0	$1,402
1-29-M-1	A	$350.00	A	$350.00	$350	1.35	100.0	16.4	$5,733
1-29-M-2	A	$250.00	A	$350.00	$300	0.47	100.0	5.7	$1,704
1-29-A-1	I	$0.05	I	$0.05	$2,178	0.27	81.7	2.7	$5,907
1-29-A-2	I	$0.05	I	$0.05	$2,178	0.22	75.0	2.0	$4,444

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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-29-A-3	I	$0.05	S	$0.05	$2,178	0.08	75.0	0.7	$1,538
1-30-A-1	C	$0.06	S	$0.05	$2,396	0.03	75.0	0.3	$725
1-30-A-2	C	$0.05	S	$0.05	$2,178	0.05	75.0	0.5	$1,050
1-30-A-3	S	$0.05	S	$0.05	$2,178	0.04	75.0	0.3	$757
1-30-A-4	S	$0.05	S	$0.02	$1,525	0.23	75.0	2.1	$3,180
1-30-A-5	A	$250.00	A	$250.00	$250	0.20	75.0	1.8	$446
1-30-M-1	A	$250.00	A	$250.00	$250	0.49	75.0	4.4	$1,110
1-30-M-2	A	$350.00	A	$250.00	$300	0.35	93.6	4.0	$1,192
1-30-M-3	A	$350.00	A	$200.00	$275	0.96	100.0	11.6	$3,189
1-31-M-1	A	$350.00	A	$200.00	$275	0.67	100.0	8.1	$2,219
1-31-M-2	A	$250.00	A	$250.00	$250	0.37	100.0	4.5	$1,121
1-31-M-3	A	$350.00	A	$300.00	$325	0.53	100.0	6.4	$2,079
1-31-M-4	A	$350.00	A	$250.00	$300	0.25	100.0	3.0	$915
1-31-M-5	A	$200.00	A	$200.00	$200	0.35	100.0	4.2	$849
1-32-M-1	A	$300.00	A	$200.00	$250	0.27	100.0	3.3	$822
1-32-M-2	A	$200.00	A	$200.00	$200	0.27	100.0	3.3	$658

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1-32-M-3	A	$350.00	A	$250.00	$300	0.69	100.0	8.3	$2,493
1-32-M-4	A	$200.00	A	$200.00	$200	0.84	100.0	10.2	$2,045
1-33-M-1	A	$300.00	A	$200.00	$250	0.29	100.0	3.5	$882
1-33-M-2	A	$150.00	A	$150.00	$150	0.37	100.0	4.5	$673
1-33-M-3	X	$100.00	X	$100.00	$100	0.47	100.0	5.7	$568
1-33-M-4	A	$400.00	X	$100.00	$250	0.61	100.0	7.4	$1,838
1-33-M-5	A	$250.00	A	$200.00	$225	0.25	100.0	3.0	$686
1-33-M-6	A	$250.00	A	$250.00	$250	0.19	100.0	2.3	$583
1-34-M-1	X	$100.00	X	$100.00	$100	0.63	100.0	7.6	$759
1-34-M-2	X	$100.00	A	$200.00	$150	0.21	100.0	2.6	$386
1-34-M-3	X	$100.00	X	$100.00	$100	0.63	100.0	7.6	$759
1-34-M-4	X	$100.00	A	$200.00	$150	0.15	100.0	1.9	$278
1-34-M-5	A	$200.00	A	$200.00	$200	0.65	100.0	7.8	$1,566
1-35-M-1	X	$100.00	A	$200.00	$150	0.25	100.0	3.0	$457
1-35-M-2	X	$100.00	A	$150.00	$125	1.00	100.0	12.1	$1,510
1-35-M-3	X	$100.00	A	$200.00	$150	0.35	100.0	4.2	$637

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Re: OTRR ROW Appraised by Tesh

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1-35-M-4	X	$100.00	A	$200.00	$150	0.11	100.0	1.4	$206
1-35-M-5	A	$200.00	A	$200.00	$200	0.37	100.0	4.5	$897
1-35-M-6	S	$0.05	A	$200.00	$1,189	0.17	100.0	2.1	$2,488
1-36-A-1	S	$0.05	A	$200.00	$1,189	0.12	100.0	1.5	$1,759
1-36-A-2	S	$0.02	A	$200.00	$536	0.51	100.0	6.2	$3,341
1-36-M-1	A	$350.00	A	$350.00	$350	1.57	100.0	19.0	$6,654
1-37-M-1	A	$300.00	A	$300.00	$300	0.13	100.0	1.6	$484
1-37-M-2	A	$200.00	A	$300.00	$250	0.43	100.0	5.2	$1,300
1-37-M-3	A	$300.00	A	$350.00	$325	0.65	100.0	7.8	$2,545
1-37-M-4	A	$200.00	A	$300.00	$250	0.76	100.0	9.3	$2,317
1-37-M-5	A	$200.00	A	$200.00	$200	0.23	100.0	2.8	$562
1-37-M-6	X	$100.00	A	$250.00	$175	0.23	100.0	2.8	$492
1-38-M-1	X	$100.00	A	$250.00	$175	0.15	100.0	1.9	$324
1-38-M-2	A	$200.00	A	$250.00	$225	0.11	100.0	1.4	$309
1-38-M-3	A	$200.00	A	$200.00	$200	1.72	100.0	20.9	$4,173
1-38-M-4	X	$100.00	A	$200.00	$150	0.37	100.0	4.5	$673

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Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
1-39-M-1	X	$100.00	A	$200.00	$150	0.21	100.0	2.6	$386
1-39-M-2	A	$200.00	A	$150.00	$175	1.17	100.0	14.2	$2,490
1-39-M-3	A	$200.00	A	$200.00	$200	0.82	100.0	10.0	$1,997
1-39-M-4	A	$200.00	X	$100.00	$150	0.15	100.0	1.9	$278
1-40-M-1	A	$200.00	A	$200.00	$200	0.59	100.0	7.1	$1,423
North Dakota									
N.MO-14- -1	A	$1,500.00	A	$1,500.00	$1,500	0.44	100.0	5.3	$7,995
N.MO-14- -2	A	$1,500.00	I	$0.06	$2,000	0.34	100.0	4.1	$8,240
N.MO-14- -3	A	$1,200.00	I	$0.06	$1,850	0.26	100.0	3.2	$5,828
N.MO-14- -4	A	$1,500.00	I	$0.06	$2,000	0.37	100.0	4.5	$8,960
N.MO-14- -5	S	$0.05	A	$2,500.00	$2,339	0.24	100.0	2.9	$6,806
N.MO-14- -6	I	$0.10	A	$2,500.00	$3,428	0.26	100.0	3.2	$10,798
N.MO-14- -7	S	$0.15	A	$2,500.00	$4,517	0.16	100.0	1.9	$8,763
N.MO-14- -8	S	$0.15	A	$4,000.00	$5,267	0.21	100.0	2.6	$13,431
N.MO-14- -9	S	$0.07	A	$4,000.00	$3,525	0.18	100.0	2.2	$7,685
N.MO-14- -10	I	$0.10	A	$5,000.00	$4,678	0.24	100.0	2.9	$13,613

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$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.MO-14- -11	I	$0.05	A	$10,000.00	$6,089	0.26	100.0	3.2	$19,180
N.MO-14- -12	I	$0.05	A	$10,000.00	$6,089	0.19	100.0	2.3	$14,005
N.MO-15-A-1	I	$0.05	T	$10,000.00	$6,089	0.19	75.0	1.7	$10,534
N.MO-15-A-2	S	$1.60	I	$1.25	$62,073	0.31	75.0	2.8	$175,046
N.MO-15-A-3	S	$1.60	S	$2.50	$89,298	0.12	75.0	1.1	$97,335
N.MO-15-A-4	S	$1.40	S	$2.50	$84,942	0.06	75.0	0.6	$46,718
N.MO-15-A-5	S	$1.40	C	$3.00	$95,832	0.03	75.0	0.3	$25,875
N.MO-15-A-6	I	$1.50	C	$3.00	$98,010	0.04	75.0	0.4	$35,284
N.MO-15-A-7	S	$1.50	C	$4.25	$125,235	0.05	75.0	0.5	$56,356
N.MO-15-A-8	S	$1.50	C	$4.75	$136,125	0.11	75.0	1.0	$136,125
N.MO-15-A-9	S	$1.50	C	$5.00	$141,570	0.06	75.0	0.6	$77,864
N.MO-15-A-10	M	$2.00	C	$5.00	$152,460	0.05	75.0	0.5	$68,607
N.MO-15-A-11	S	$1.50	C	$5.00	$141,570	0.06	75.0	0.6	$77,864
N.MO-15-B-1	S	$0.85	C	$5.00	$127,413	0.03	75.0	0.3	$34,402
N.MO-15-B-2	S	$0.85	C	$4.75	$121,968	0.18	75.0	1.6	$200,028
N.MO-15-B-3	S	$0.85	C	$3.75	$100,188	0.08	75.0	0.7	$73,137

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.MO-15-B-4	S	$0.85	C	$4.00	$105,633	0.07	75.0	0.6	$67,605
N.MO-15-B-5	M	$1.75	C	$4.00	$125,235	0.08	75.0	0.7	$91,422
N.MO-15-B-6	C	$4.00	C	$4.00	$174,240	0.12	75.0	1.1	$189,922
N.MO-15-B-7	C	$3.00	C	$4.25	$157,905	0.09	75.0	0.8	$129,482
N.MO-15-B-8	S	$1.00	C	$4.25	$114,345	0.11	75.0	1.0	$114,345
N.MO-15-B-9	S	$1.10	C	$4.25	$116,523	0.04	75.0	0.4	$41,948
N.MO-15-B-10	S	$1.10	C	$3.25	$94,743	0.06	75.0	0.6	$52,109
N.MO-15-B-11	S	$1.10	C	$2.75	$83,853	0.10	75.0	0.9	$76,306
N.MO-15-B-12	S	$1.10	C	$2.25	$72,963	0.07	75.0	0.6	$46,696
N.MO-15-C-1	I	$1.50	I	$0.75	$49,005	0.48	75.0	4.4	$213,662
N.MO-15-C-2	I	$1.50	I	$0.75	$49,005	0.32	75.0	2.9	$142,605
N.MO-15-C-3	I	$1.60	I	$0.90	$54,450	0.08	75.0	0.7	$39,749
N.MO-15-C-4	I	$1.60	I	$1.10	$58,806	0.03	75.0	0.3	$15,878
N.MO-15-D-1	I	$1.60	I	$0.90	$54,450	0.10	75.0	0.9	$49,550
N.MO-15-D-2	I	$1.70	I	$0.90	$56,628	0.02	75.0	0.2	$10,193
N.MO-15-D-3	I	$1.70	I	$0.50	$47,916	0.12	75.0	1.1	$52,228

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.MO-15-D-4	I	$1.70	S	$1.00	$58,806	0.09	75.0	0.8	$48,221
N.MO-15-D-5	C	$1.80	S	$1.00	$60,984	0.24	75.0	2.2	$132,945
N.MO-15-D-6	C	$1.75	S	$1.00	$59,895	0.10	75.0	0.9	$54,504
N.MO-15-D-7	I	$1.50	S	$1.00	$54,450	0.06	75.0	0.6	$29,948
N.MO-15-D-8	I	$1.00	S	$1.00	$43,560	0.15	75.0	1.4	$59,242
N.BU-1-A-1	S	$2.50	T	$17,500.00	$63,200	0.60	100.0	7.3	$459,464
N.BU-1-A-2	S	$2.50	S	$4.50	$152,460	0.10	100.0	1.2	$184,477
N.BU-1-A-3	S	$2.00	S	$4.50	$141,570	0.06	100.0	0.7	$103,346
N.BU-1-A-4	S	$2.00	S	$3.00	$108,900	0.10	100.0	1.2	$131,769
N.BU-1-A-5	S	$2.00	S	$2.75	$103,455	0.08	100.0	1.0	$100,351
N.BU-1-A-6	C	$3.00	S	$2.75	$125,235	0.02	100.0	0.2	$30,056
N.BU-1-A-7	C	$3.00	S	$2.75	$125,235	0.04	100.0	0.5	$60,113
N.BU-1-A-8	C	$3.00	X	$21,780.00	$76,230	0.07	100.0	0.9	$64,796
N.BU-1-A-9	C	$2.50	X	$21,780.00	$65,340	0.03	100.0	0.4	$23,522
N.BU-1-A-10	C	$2.00	X	$21,780.00	$54,450	0.09	100.0	1.1	$59,351
N.BU-1-A-11	S	$2.10	S	$1.50	$78,408	0.36	75.0	3.3	$256,394

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.BU-1-B-1	S	$2.10	S	$1.50	$78,408	0.06	75.0	0.6	$43,124
N.BU-1-B-2	S	$2.10	S	$3.00	$111,078	0.09	75.0	0.8	$91,084
N.BU-1-B-3	S	$1.00	S	$3.00	$87,120	0.21	75.0	1.9	$166,399
N.BU-1-B-4	C	$3.00	S	$3.00	$130,680	0.08	75.0	0.7	$95,396
N.BU-1-B-5	C	$3.00	C	$2.50	$119,790	0.05	75.0	0.5	$53,906
N.BU-1-B-6	C	$3.00	C	$2.50	$119,790	0.02	75.0	0.2	$21,562
N.BU-1-B-7	C	$3.00	C	$4.50	$163,350	0.02	75.0	0.2	$29,403
N.BU-1-B-8	C	$4.50	C	$4.50	$196,020	0.10	75.0	0.9	$178,378
N.BU-1-B-9	C	$4.50	C	$5.25	$212,355	0.11	75.0	1.0	$212,355
N.BU-1-B-10	C	$4.50	C	$5.50	$217,800	0.02	75.0	0.2	$39,204
N.BU-1-B-11	C	$4.75	C	$5.50	$223,245	0.05	75.0	0.5	$100,460
N.BU-1-B-12	C	$4.75	C	$6.00	$234,135	0.02	75.0	0.2	$42,144
N.BU-1-B-13	C	$4.75	C	$6.00	$234,135	0.06	75.0	0.6	$128,774
N.BU-1-B-14	C	$5.00	C	$8.00	$283,140	0.21	75.0	1.9	$540,797
N.BU-1-C-1	I	$3.00	C	$4.25	$157,905	0.12	75.0	1.1	$172,116
N.BU-1-C-2	I	$3.00	C	$3.75	$147,015	0.06	75.0	0.6	$80,858

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.BU-1-C-3	I	$2.50	C	$3.75	$136,125	0.04	75.0	0.4	$49,005
N.BU-1-C-4	I	$2.25	C	$3.50	$125,235	0.13	75.0	1.2	$147,777
N.BU-1-C-5	I	$2.00	C	$3.50	$119,790	0.04	75.0	0.4	$43,124
N.BU-1-C-6	I	$2.00	I	$3.25	$114,345	0.24	75.0	2.2	$249,272
N.BU-1-C-7	I	$1.60	I	$3.75	$116,523	0.09	75.0	0.8	$95,549
N.BU-1-C-8	I	$1.60	C	$3.00	$100,188	0.09	75.0	0.8	$82,154
N.BU-1-C-9	I	$2.00	C	$3.00	$108,900	0.02	75.0	0.2	$19,602
N.BU-1-C-10	I	$2.00	C	$4.50	$141,570	0.04	75.0	0.4	$50,965
N.BU-1-D-1	C	$2.25	C	$3.50	$125,235	0.04	75.0	0.4	$45,085
N.BU-1-D-2	C	$2.25	C	$3.00	$114,345	0.02	75.0	0.2	$20,582
N.BU-1-D-3	I	$2.10	C	$3.00	$111,078	0.02	75.0	0.2	$19,994
N.BU-1-D-4	I	$2.00	C	$2.75	$103,455	0.07	75.0	0.6	$66,211
N.BU-1-D-5	I	$2.10	C	$2.50	$100,188	0.08	75.0	0.7	$73,137
N.BU-1-D-6	I	$2.10	C	$2.25	$94,743	0.06	75.0	0.6	$52,109
N.BU-1-D-7	I	$2.10	C	$2.75	$105,633	0.05	75.0	0.5	$47,535
N.BU-1-D-8	I	$2.10	I	$2.00	$89,298	0.25	75.0	2.3	$202,706

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Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.BU-1-D-9	I	$2.30	I	$2.25	$99,099	0.10	75.0	0.9	$90,180
N.BU-1-D-10	I	$1.95	I	$1.50	$75,141	0.06	75.0	0.6	$41,328
N.BU-1-D-11	I	$0.75	I	$0.50	$27,225	0.35	75.0	3.2	$86,576
N.BU-2-A-1	I	$0.50	I	$0.50	$21,780	0.13	100.0	1.6	$34,412
N.BU-2-A-2	X	$2,500.00	I	$0.50	$12,140	0.18	100.0	2.2	$26,465
N.BU-2-A-3	I	$0.50	I	$0.23	$15,899	0.15	100.0	1.8	$28,936
N.BU-2-A-4	I	$0.50	I	$0.70	$26,136	0.21	100.0	2.6	$66,647
N.BU-2-A-5	I	$0.65	I	$0.70	$29,403	0.04	100.0	0.5	$14,113
N.BU-2-A-6	I	$0.60	I	$0.35	$20,691	0.13	100.0	1.6	$32,692
N.BU-2-A-7	I	$0.40	I	$0.35	$16,335	0.12	100.0	1.5	$23,686
N.BU-2-B-1	I	$0.40	T	$10,000.00	$13,712	0.15	100.0	1.8	$24,956
N.BU-2-B-2	I	$0.35	T	$10,000.00	$12,623	0.17	100.0	2.1	$26,003
N.BU-2-B-3	I	$0.25	T	$10,000.00	$10,445	0.17	100.0	2.1	$21,517
N.BU-2-B-4	I	$0.17	T	$10,000.00	$8,703	0.41	100.0	5.0	$43,254
N.BU-2-B-5	I	$0.17	S	$0.23	$8,703	0.30	100.0	3.6	$31,679
N.BU-3--	I	$0.17	S	$0.23	$8,703	0.68	100.0	8.2	$71,713

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Val Unit Detail
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Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.CA-6--1	T	$4,000.00	T	$4,000.00	$4,000	1.05	100.0	12.7	$50,920
N.CA-6--2	T	$5,000.00	T	$5,000.00	$5,000	0.97	100.0	11.8	$58,800
N.CA-7--1	T	$4,500.00	T	$4,500.00	$4,500	1.21	100.0	14.7	$66,015
N.CA-7--2	T	$4,000.00	T	$4,000.00	$4,000	3.12	100.0	37.8	$151,280
N.CA-8--1	T	$4,000.00	T	$4,000.00	$4,000	1.90	100.0	23.0	$92,120
N.CA-8--2	T	$5,000.00	T	$5,000.00	$5,000	1.29	75.0	11.7	$58,650
N.CA-9--1	T	$5,000.00	T	$5,000.00	$5,000	3.11	100.0	37.7	$188,500
N.CA-9--2	T	$5,000.00	T	$5,000.00	$5,000	0.52	100.0	6.3	$31,500
N.CA-9--3	T	$6,000.00	T	$6,000.00	$6,000	0.51	100.0	6.2	$37,080
N.CA-10-A-1	I	$0.16	I	$0.16	$6,970	0.09	75.0	0.8	$5,715
N.CA-10-A-2	C	$0.35	C	$0.27	$13,504	0.23	75.0	2.1	$28,223
N.CA-10-B-1	I	$0.37	I	$0.30	$14,593	0.16	75.0	1.5	$21,160
N.CA-10-B-2	I	$0.40	I	$0.30	$15,246	0.15	75.0	1.4	$20,735
N.CA-10-B-3	M	$0.45	I	$0.30	$16,335	0.03	75.0	0.3	$4,410
N.CA-10-B-4	M	$1.00	I	$0.30	$28,314	0.13	75.0	1.2	$33,411
N.CA-10-B-5	S	$0.30	I	$0.30	$13,068	0.06	75.0	0.6	$7,187

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N.CA-10-B-6	I	$0.60	I	$0.50	$23,958	0.18	75.0	1.6	$39,291
N.CA-10-B-7	I	$0.40	I	$0.35	$16,335	0.10	75.0	0.9	$14,865
N.CA-10-B-8	S	$0.40	I	$0.35	$16,335	0.04	75.0	0.4	$5,881
N.CA-10-B-9	S	$0.40	I	$0.37	$16,771	0.13	75.0	1.2	$19,790
N.CA-10-C-1	S	$0.40	I	$0.37	$16,771	0.04	75.0	0.4	$6,038
N.CA-10-C-2	I	$0.70	I	$0.45	$25,047	0.51	75.0	4.6	$116,218
N.CA-10-C-3	I	$0.75	I	$0.50	$27,225	0.55	75.0	5.0	$136,125
N.CA-10-D-1	I	$0.75	I	$0.50	$27,225	0.22	75.0	2.0	$54,450
N.CA-10-D-2	I	$0.80	I	$0.50	$28,314	0.09	75.0	0.8	$23,217
N.CA-10-D-3	I	$0.85	I	$0.50	$29,403	0.12	75.0	1.1	$32,049
N.CA-10-D-4	I	$1.25	I	$0.50	$38,115	0.04	75.0	0.4	$13,721
N.CA-10-D-5	I	$0.10	I	$0.55	$14,157	0.08	75.0	0.7	$10,335
N.CA-10-D-6	I	$0.90	I	$0.55	$31,581	0.18	75.0	1.6	$51,793
N.CA-10-D-7	I	$1.00	I	$0.55	$33,759	0.12	75.0	1.1	$36,797
N.CA-10-D-8	I	$1.05	I	$0.55	$34,848	0.18	75.0	1.6	$57,151
N.CA-10-E-1	I	$1.05	I	$0.55	$34,848	0.20	75.0	1.8	$63,423

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$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.CA-10-E-2	C	$1.50	I	$0.55	$44,649	0.22	75.0	2.0	$89,298
N.CA-11-A-1	C	$3.50	I	$0.75	$92,565	0.08	75.0	0.7	$67,572
N.CA-11-A-2	C	$5.00	I	$0.75	$125,235	0.04	75.0	0.4	$45,085
N.CA-11-A-3	C	$4.50	I	$0.75	$114,345	0.06	75.0	0.6	$62,890
N.CA-11-A-4	C	$4.00	I	$0.75	$103,455	0.06	75.0	0.6	$56,900
N.CA-11-A-5	C	$3.50	I	$0.75	$92,565	0.23	75.0	2.1	$193,461
N.CA-11-A-6	C	$3.00	I	$0.75	$81,675	0.26	75.0	2.4	$192,753
N.CA-11-B-1	C	$3.00	I	$0.90	$84,942	0.05	75.0	0.5	$38,224
N.CA-11-B-2	C	$3.25	I	$0.90	$90,387	0.10	75.0	0.9	$82,252
N.CA-11-B-3	C	$3.50	I	$0.90	$95,832	0.05	75.0	0.5	$43,124
N.CA-11-B-4	C	$4.00	I	$1.10	$111,078	0.08	75.0	0.7	$81,087
N.CA-11-B-5	C	$3.75	I	$1.25	$108,900	0.06	75.0	0.6	$59,895
N.CA-11-B-6	C	$3.25	I	$1.25	$98,010	0.08	75.0	0.7	$71,547
N.CA-11-B-7	C	$3.00	I	$1.10	$89,298	0.16	75.0	1.5	$129,482
N.CA-11-B-8	C	$2.75	I	$1.10	$83,853	0.20	75.0	1.8	$152,612
N.CA-11-B-9	C	$2.50	I	$1.10	$78,408	0.10	75.0	0.9	$71,351

S: Single-Family M: Multi-Family
C: Commercial I : Industrial
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T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
N.CA-11-C-1	C	$2.90	I	$1.50	$95,832	0.13	75.0	1.2	$113,082
N.CA-11-C-2	C	$2.90	I	$2.25	$112,167	0.23	75.0	2.1	$234,429
N.CA-11-C-3	C	$2.90	I	$2.90	$126,324	0.08	75.0	0.7	$92,217
N.CA-11-C-4	C	$3.75	I	$2.90	$144,837	0.09	75.0	0.8	$118,766
N.CA-11-C-5	C	$3.75	I	$3.25	$152,460	0.10	75.0	0.9	$138,739
N.CA-11-C-6	C	$5.00	I	$3.50	$185,130	0.09	75.0	0.8	$151,807
N.CA-11-C-7	C	$7.00	I	$3.70	$233,046	0.06	75.0	0.6	$128,175
N.CA-11-C-8	C	$9.00	I	$3.70	$276,606	0.11	75.0	1.0	$276,606
N.CA-11-C-9	C	$9.00	C	$6.00	$326,700	0.02	75.0	0.2	$58,806
N.CA-11-D-1	C	$9.00	C	$6.00	$326,700	0.09	75.0	0.8	$267,894
N.CA-11-D-2	C	$9.00	C	$4.90	$302,742	0.06	75.0	0.6	$166,508
N.CA-11-D-3	C	$6.90	C	$4.90	$257,004	0.04	75.0	0.4	$92,521
N.CA-11-D-4	C	$5.00	C	$4.90	$215,622	0.38	75.0	3.5	$743,896
Minnesota									
M.CA-1-A-1	C	$10.00	C	$12.00	$479,160	0.10	75.0	0.9	$436,036
M.CA-1-A-2	C	$10.00	C	$15.00	$544,500	0.06	75.0	0.6	$299,475

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$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
M.CA-1-A-3	C	$10.00	C	$17.00	$588,060	0.07	75.0	0.6	$376,358
M.CA-1-A-4	C	$10.00	C	$19.00	$631,620	0.06	75.0	0.6	$347,391
M.CA-1-A-5	C	$10.00	C	$20.00	$653,400	0.02	75.0	0.2	$117,612
M.CA-1-A-6	C	$12.00	C	$20.00	$696,960	0.04	75.0	0.4	$250,906
M.CA-1-A-7	C	$13.00	C	$20.00	$718,740	0.02	75.0	0.2	$129,373
M.CA-1-A-8	C	$12.00	C	$15.00	$588,060	0.02	75.0	0.2	$105,851
M.CA-1-A-9	C	$6.00	C	$15.00	$457,380	0.04	75.0	0.4	$164,657
M.CA-1-A-10	C	$12.00	C	$12.00	$522,720	0.05	75.0	0.5	$235,224
M.CA-1-A-11	C	$12.00	C	$10.00	$479,160	0.04	75.0	0.4	$172,498
M.CA-1-A-12	C	$5.00	C	$10.00	$326,700	0.02	75.0	0.2	$58,806
M.CA-1-A-13	C	$5.00	C	$8.00	$283,140	0.07	75.0	0.6	$181,210
M.CA-1-A-14	C	$5.00	C	$6.00	$239,580	0.03	75.0	0.3	$64,687
M.CA-1-A-15	C	$4.00	C	$6.00	$217,800	0.02	75.0	0.2	$39,204
M.CA-1-A-16	C	$4.00	C	$5.00	$196,020	0.04	75.0	0.4	$70,567
M.CA-1-A-17	C	$4.00	C	$4.00	$174,240	0.04	75.0	0.4	$62,726
M.CA-1-A-18	C	$3.25	C	$3.50	$147,015	0.08	75.0	0.7	$107,321

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$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
M.CA-1-A-19	C	$4.00	C	$3.50	$163,350	0.03	75.0	0.3	$44,105
M.CA-1-B-1	C	$4.00	I	$2.75	$147,015	0.04	75.0	0.4	$52,925
M.CA-1-B-2	C	$3.75	I	$2.75	$141,570	0.09	75.0	0.8	$116,087
M.CA-1-B-3	C	$3.75	I	$2.75	$141,570	0.10	75.0	0.9	$128,829
M.CA-1-B-4	C	$3.00	I	$2.75	$125,235	0.08	75.0	0.7	$91,422
M.CA-1-B-5	S	$1.00	S	$1.25	$49,005	0.13	75.0	1.2	$57,826
M.CA-1-B-6	S	$1.00	I	$1.50	$54,450	0.10	75.0	0.9	$49,550
M.CA-1-B-7	C	$1.50	C	$2.00	$76,230	0.10	75.0	0.9	$69,369
M.CA-1-B-8	S	$2.75	I	$2.35	$111,078	0.26	75.0	2.4	$262,144
M.CA-1-C-1	S	$2.75	I	$2.00	$103,455	0.38	75.0	3.5	$356,920
M.CA-1-C-2	M	$3.60	I	$1.90	$119,790	0.28	75.0	2.6	$305,465
M.CA-1-D-1	M	$3.60	I	$1.90	$119,790	0.11	75.0	1.0	$119,790
M.CA-1-D-2	S	$3.00	I	$1.70	$102,366	0.10	75.0	0.9	$93,153
M.CA-1-D-3	S	$2.75	I	$1.70	$96,921	0.32	75.0	2.9	$282,040
M.CA-1-D-4	S	$2.75	I	$2.00	$103,455	0.11	75.0	1.0	$103,455
M.CA-1-E-1	C	$3.00	S	$3.00	$130,680	0.23	75.0	2.1	$273,121

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$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix B:
Val Unit Detail
Re: OTRR ROW Appraised by Tesh

Val Unit	S/W Typical Parcel: Use	S/W Typical Parcel: Unit Value	N/E Typical Parcel: Use	N/E Typical Parcel: Unit Value	Subject's Unit Cost ($/Acre)	Length (Miles)	Width (Feet)	Subject's Area (Acres)	Subject's Acquisition Cost
M.CA-1-E-2	M	$2.90	S	$3.00	$128,502	0.25	75.0	2.3	$291,700
M.CA-2--1	T	$25,000.00	T	$25,000.00	$25,000	1.05	100.0	12.7	$318,250
M.CA-2--2	T	$15,000.00	T	$15,000.00	$15,000	1.15	100.0	13.9	$209,100
M.CA-2--3	T	$7,500.00	T	$7,500.00	$7,500	0.47	100.0	5.7	$42,750
M.CA-3--1	T	$7,500.00	T	$7,500.00	$7,500	0.56	100.0	6.8	$50,925
M.CA-3--2	T	$5,000.00	T	$5,000.00	$5,000	2.10	100.0	25.5	$127,250
Averages					$7,138	0.54	97.62	6.4	$45,970
Totals						401.7		4,753.0	$33,925,539

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T: Transitional

Unit Value is Reported as:
$/Acre for A, T and X Uses
$/SF for All Other Uses

Appendix C
Value of Land for Certain Yards and Facilities Appraised Herein

Summary of Tesh Appraisal Conclusions
Re: Certain OTRR Yards & Facilities

Yard	Acres	Acquisition Cost per Acre	Acquisition Cost
Converse	14.97	$150	$ 2,250
Reno	0.63	$140	$ 90
Donkey Creek	245.10	$300	$ 73,530
Cambell	4.82	$360	$ 1,740
Dutch	2.46	$310	$ 760
Moran Jct.	3.49	$400	$ 1,400
Mandan	0.83	$34,080	$ 28,290
Fargo	8.41	$215,620	$ 1,813,360
	280.71		$ 1,921,420
MOW Facility	**Acres**	**Acquisition Cost per Acre**	**Acquisition Cost**
Lariat	0.39	$60	$ 20
Kendrick	0.39	$100	$ 40
Crow Agency	0.39	$2,396	$ 930
Parkman	0.39	$293	$ 110
Big Horn	0.39	$700	$ 270
Sheridan	1.02	$23,958	$ 24,440
	2.97		$ 25,810
Total Yards and MOW Facilities	**283.68**		**$ 1,947,000**

Appendix D
Value of Land for Certain Microwave Sites Appraised Herein

Summary of Tesh Appraisal Conclusions
Re: Certain OTRR Microwave Tower Sites

		Unit Cost per Acre	Acres	Acquisition Cost
Orin District				
1	Donkey Creek Jct. MP 0.0	$ 450	1.50	$ 680
2	Cordero Jct. MP 23	$ 100	1.50	$ 150
3	Reno Jct. MP 43.1	$ 140	1.50	$ 210
4	Converse Jct. MP 67.5	$ 100	1.50	$ 150
Black Hills District				
5	East Campbell MP 587.6	$ 34,020	1.50	$ 51,030
Black Hills District/Big Horn				
6	MP 620	$ 60	1.50	$ 90
7	MP 641	$ 100	1.50	$ 150
8	MP 662	$ 800	1.50	$ 1,200
9	MP 682	$ 1,239	1.50	$ 1,860
Dutch District				
10	Nerco Jct. MP 16	$ 100	1.50	$ 150
Big Horn District -Moran JCT				
12	MP 805	$ 800	1.50	$ 1,200
13	MP 781	$ 775	1.50	$ 1,160
14	MP 763	$ 575	1.50	$ 860
15	MP 739	$ 125	1.50	$ 190
16	MP 721	$ 250	1.50	$ 380
17	MP 696	$ 800	1.50	$ 1,200
Jamestown District				
44	Mandan MP 200.24	$ 62,073	1.50	$ 93,110
Prosper/Moorhead District				
52	OTV Jct. 21.21/42.69	$ 76,230	1.50	$ 114,350
Totals			**27.00**	**$ 268,000**

Appendix E
Partial List of
Sources of Land Sales

Partial List of Sources of Land Sales

Phyllis A. Brosz
Staff Appraiser
Bureau of Land Management
Montana State Office
U.S Department of the Interior
501 Southgate Drive
Billings MT 59107-6800
406.896.5051

Gary L Lay
Staff Appraiser
Bureau of Land Management
Montana State Office
U.S Department of the Interior
501 Southgate Drive
Billings MT 59107-6800
406.896.5066

Robert A. Brockman, ARA
Keyhole Land Co.
805 10th Street
Wheatland, WY
307.322.2220

Robert Zabel
Robert Zabel & Co., Appraisers
6409 Tassel Avenue
Gillette, WY
307.682.3021

John Brady
Associated Appraisers
3021 6th Avenue North
Billings, MT
406.245.2144

Charles Rutherford
Rutherford & Associates, Appraisers
2320 3rd Avenue North
Billings, MT
406.245.5400

Dr. Tom Thurow
Rangeland Ecology
University of Wyoming
Cheyenne, WY
307.766.5263

John Harju
Wyoming State Engineer's Office
Groundwater Division
Cheyenne, WY
307.777.6163

Dr. Stephen Horn
Dean
Wyoming Agricultural Extension Service
Cheyenne, WY
307.766.4133

Dennis Hays
City of Sheridan
55 Grinnell Plaza
Sheridan, WY82801
307.674.6483

Montana State Revenue
Yellowstone County
217 N 27th St # 103
Billings, MT 59101-1939
406.256.2750

Revenue Appraisal Assn Dept.
Big Horn County
121 3rd St W
Hardin, MT 59034-1905
406.665.9710

Fred Hawkins
Du Bray Land Services, Inc
1440 Grand Ave
Billings, MT 59102-3104
406.252.6842

Rob Walker
100 Everett
Big Timber, MT 59011
406.932.5517

Dennis Warren
1113 Custer Ave
Billings, MT 59102-5437
406.252.6559

Jerry Hauf
Hauf Appraising
645 Grand Ave
Billings, MT 59101-5851
406.252.7372

Jim Hastings
Hastings & Associates Appraisal Services
1520 Logan Ave
Cheyenne, WY 82001-5138
307.637.3930

Theodore B. Hirshfeld
TBH Appraisal Co
130 S Main St Fl 2,
Buffalo, WY 82834-1846
307.684.9556

Edward J. Holthouse
James E. Wren Company
341 East "E" Street
Suite 260
Casper, WY 82601
307.266.2610

Gary Beck
Assessor
City of Moorhead
Moorhead, MN

Dorene
City Assessor's Office
City of Jamestown
Jamestown, ND

Loren E. Johnson
Clay County Assessor
Moorhead, MN

Bob Aller
Assessor
City of Bismarck
Bismarck, ND

Jim Samuel
Dir. Of Tax Equalization
Moorhead county ND
Moorhead, ND

Kathy Meirs
Assessor
City of Bismarck
Bismarck, ND

John Bens
Assessor
City of Mandan
Mandan, ND

Fargo-Moorhead Area
Association of Realtors
Fargo, ND

Bismarck-Mandan
Board of Realtors
Bismarck, ND

Overall Summary Of Land Appraised by Tesh, Historic Figures, Adjusted Burris Figures, and Unadjusted Burris Figures

ROW	Appraised by Tesh	Historic Figures	Adjusted Burris Figures	Unadjusted Burris Figures	Total Miles with Conclusions
Acquisition Cost	$ 33,680,000	$ 4,205,000	$ 15,866,000	$ 13,006,322	$ 66,757,000
Miles	293	108	59	822	1,281
Acres	3,429	1,322	635	9,931	15,317
$/Mile	$ 115,000	$ 39,000	$ 270,000	$ 16,000	$ 52,000
$/Acre	$ 9,824	$ 3,181	$ 24,985	$ 1,310	$ 4,358

YARDS & FACILITIES	Appraised by Tesh		Adjusted Burris Figures	Unadjusted Burris Figures	Total
Acquisition Cost	$ 1,947,000		$ 9,625,000	$ 57,000	$ 11,629,000
Acres	284		320	5	609
No. of Yards	8		1	2	11
No. of MOW Facilities	6		16	0	22
$/Acre	$ 6,863		$ 30,097	$ 11,133	$ 19,108

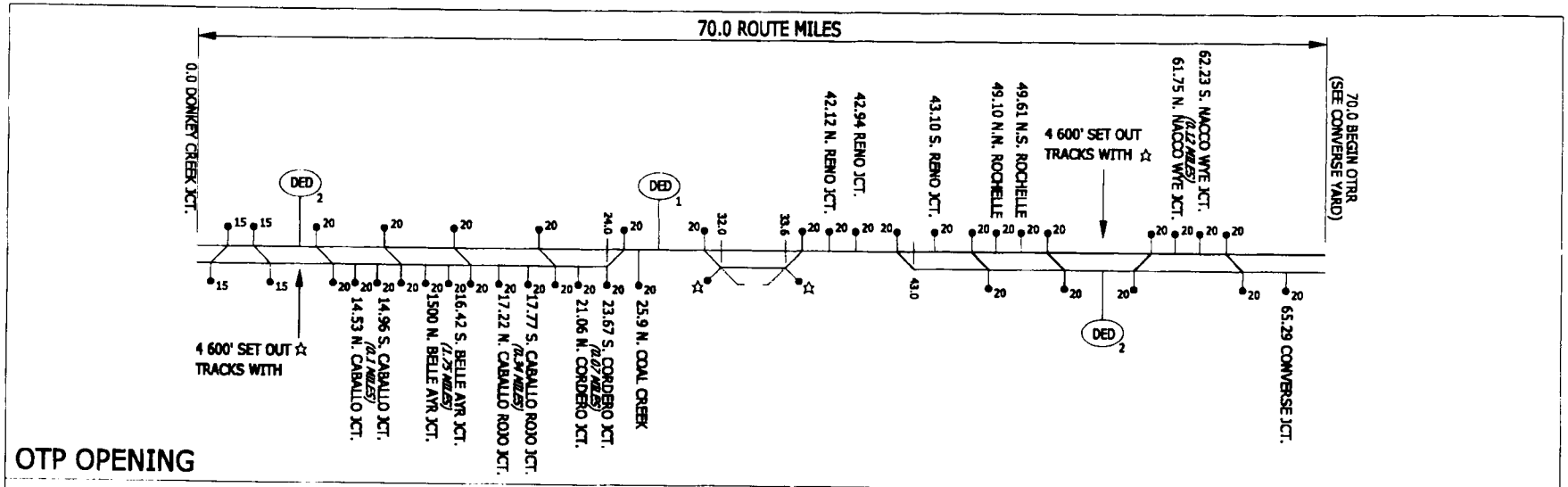
Microwave Sites	Land Appraised by Tesh		Unadjusted Values on Adjusted Locations		Total
Acquisition Cost	$ 268,000		$ 146,000		$ 414,000
Acres	27		60		87
No. of Sites	18		40		58
$/Acre	$ 9,926		$ 2,433		$ 4,759

Easements	Appraised by Tesh		Adjusted Burris Figures	Unadjusted Burris Figures	Total
Acquisition Cost	$ -		$ -	$ 57,910	$ 57,910
Acres	-		-	792	792
$/Acre	$ -		$ -	$ 73	$ 73

GRAND TOTAL	Appraised by Tesh	Historic Figures	Adjusted Burris Figures	Unadjusted Burris Figures	Total
Acquisition Cost	$ 35,900,000	$ 4,200,000	$ 25,637,000	$ 13,121,232	**$ 78,900,000**
Acres	3,739	1,322	1,015	9,936	**16,012**
$/Acre	$ 9,601	$ 3,177	$ 25,262	$ 1,321	**$ 4,928**

REDACTED

REDACTED



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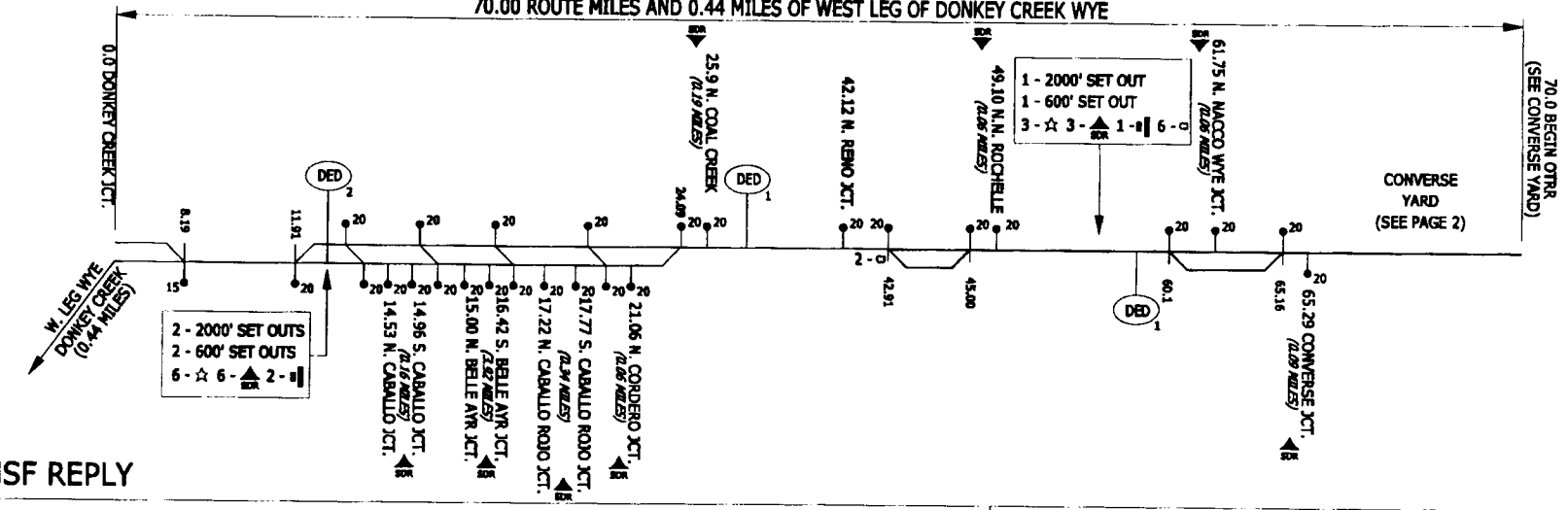


BNSF REPLY

DISTRICT:

ORIN

FROM: CONVERSE YARD MP: 70.00

TO: DONKEY CREEK JCT MP: 0.0

← N

NOT TO SCALE

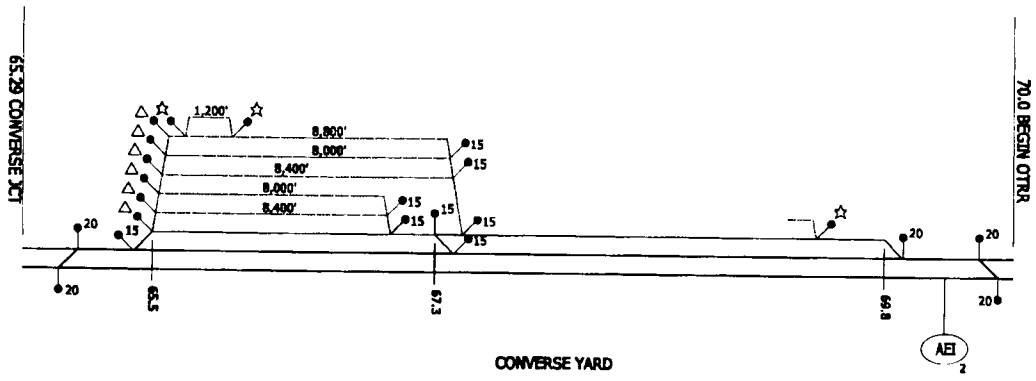
LEGEND:

- 136# RAIL
- 132# RAIL
- 132# RELAY RAIL
- (0.1 MILES) = RR-OWNED MINE TRACK
- DED 1 — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED
- AEI 1 — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED
- 20 TYPE TURNOUT

*TURNOUT TYPES
20 - #20 ELECTRIC
15 - #15 ELECTRIC
△ - #15 HAND-THROWN
☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL
- ▲ SDR - SWITCH POINT DERAIL
- ▲ HDR - HINGED DERAIL
- ▮ - WHEEL STOP
- ◻ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 1



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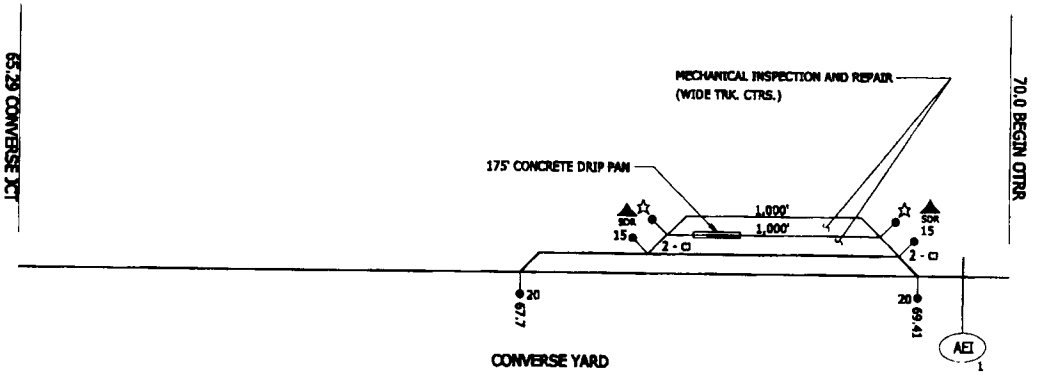


BNSF REPLY

DISTRICT:

ORIN

FROM: S. END CONVERSE YARD MP: 70.00

TO: CONVERSE JCT. MP: 65.29

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

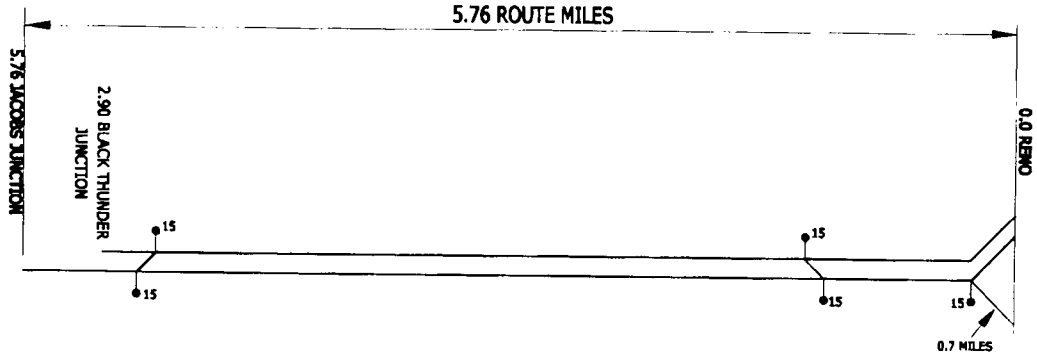
SDR - SWITCH POINT DERAIL

HD - HINGED DERAIL

WS - WHEEL STOP

□ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 2



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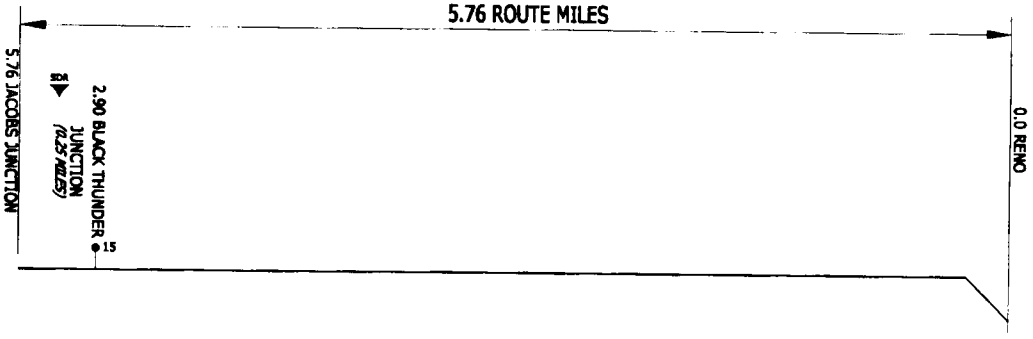


BNSF REPLY

DISTRICT:

RENO

FROM: RENO MP: 0.00

TO: JACOBS JUNCTION MP: 5.76

N

NOT TO SCALE

LEGEND:

- 136# RAIL
- 132# RAIL
- 132# RELAY RAIL
- (0.1 MILES) = RR-OWNED MINE TRACK
- DED 1 — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED
- AEI 1 — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED
- 20 TYPE TURNOUT

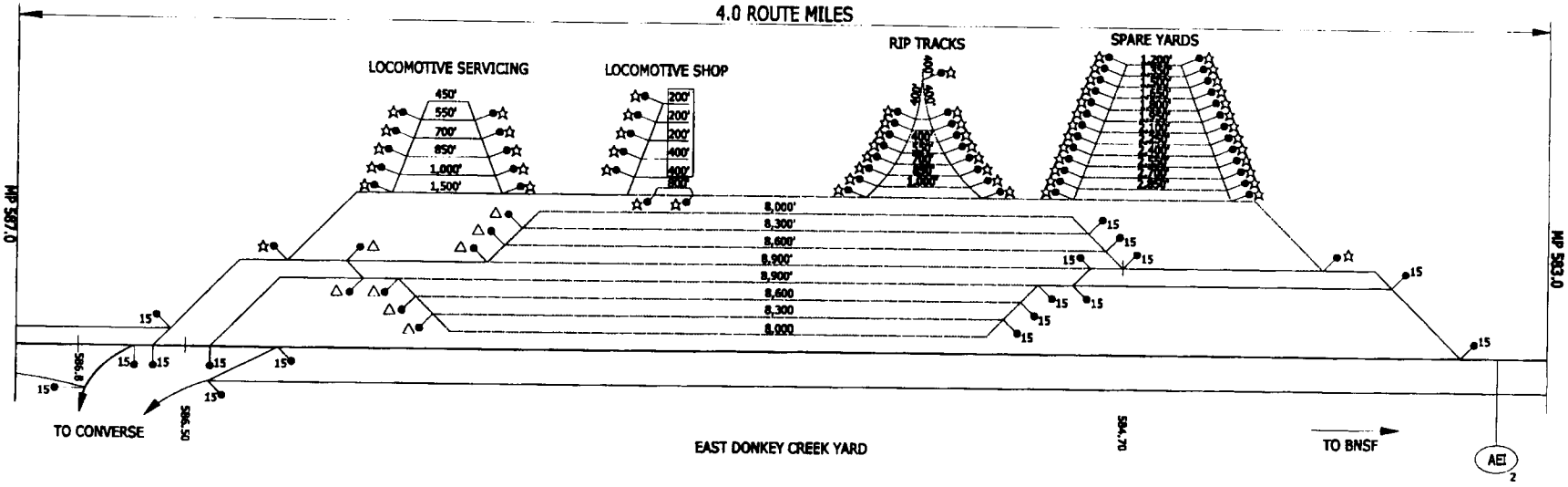
*TURNOUT TYPES

- 20 - #20 ELECTRIC
- 15 - #15 ELECTRIC
- △ - #13 HAND-THROWN
- ☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

- SDR - SWITCH POINT DERAIL
- DR - HINGED DERAIL
- WHEEL STOP
- CJ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 3



OTP OPENING

SHEET 1 OF 2

DISTRICT:

BLACK HILLS

FROM: EAST DONKEY CREEK MP: 583.0

TO: DONKEY CREEK JCT. MP: 587.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

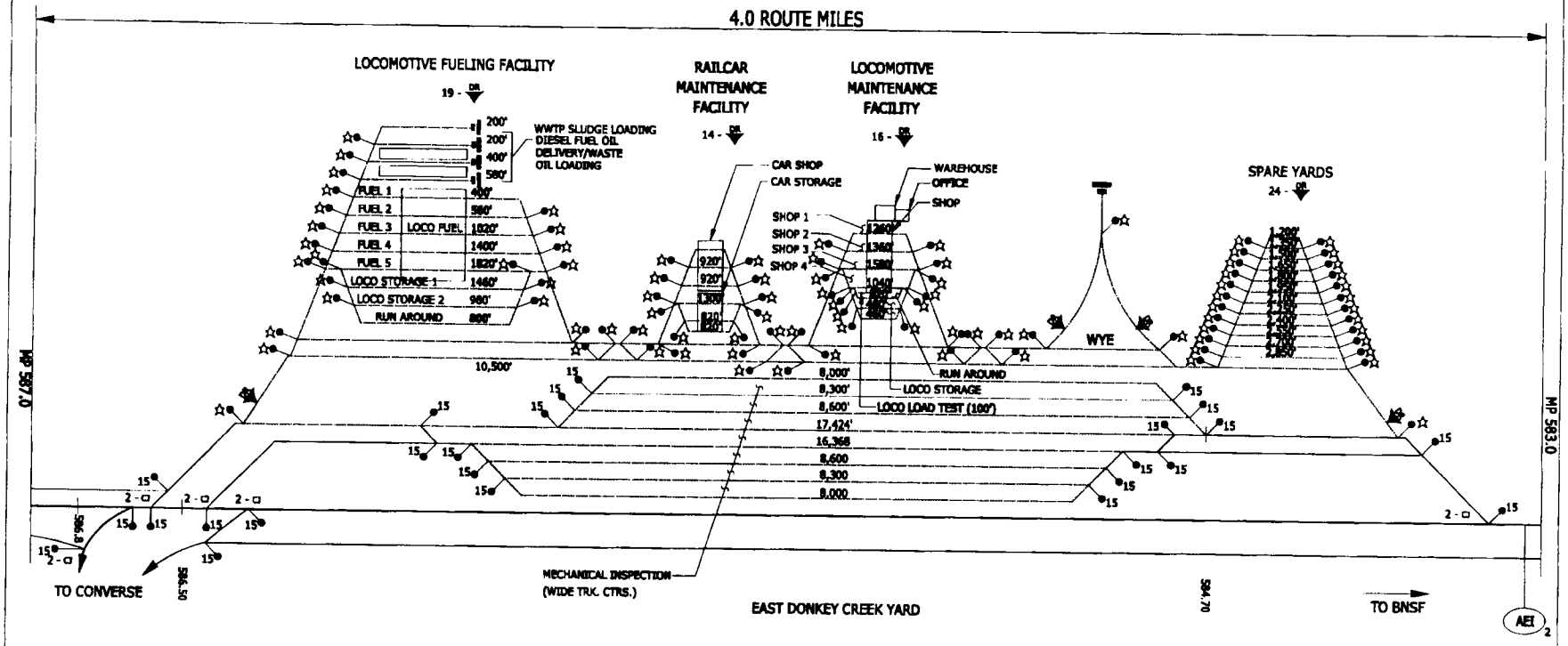
HD - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4

Page 4



BNSF REPLY

SHEET 2 OF 2

DISTRICT:

BLACK HILLS

FROM: EAST DONKEY CREEK MP: 583.0

TO: DONKEY CREEK JCT. MP: 587.0

N

NOT TO SCALE

LEGEND:

- 136# RAIL
- 132# RAIL
- 132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

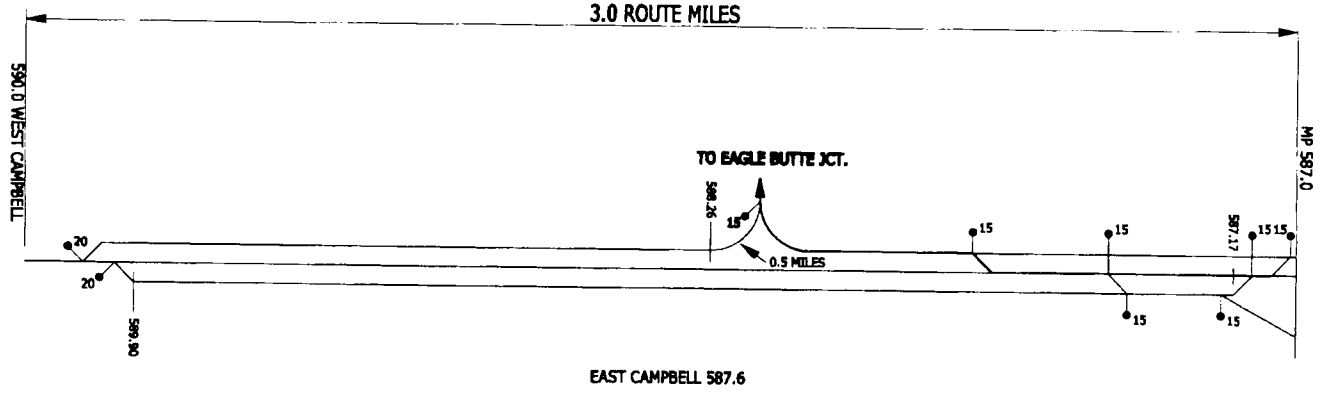
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

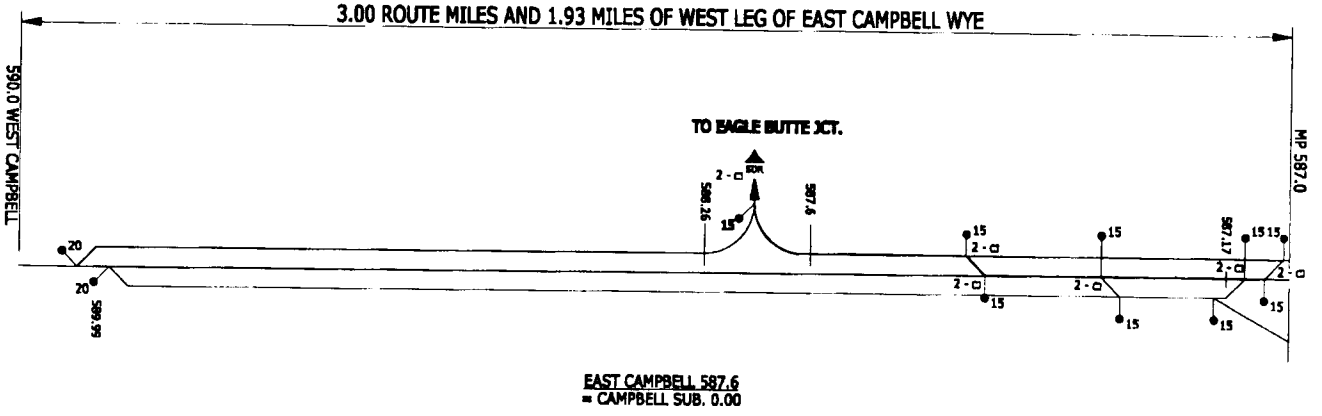
- COMPROMISE JOINT

EXHIBIT III.F-4
Page 4



EAST CAMPBELL 587.6

OTP OPENING



EAST CAMPBELL 587.6
= CAMPBELL SUB. 0.00

BNSF REPLY

DISTRICT:

BLACK HILLS

FROM: DONKEY CREEK JCT. MP: 587.0

TO: WEST CAMPBELL MP: 590.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

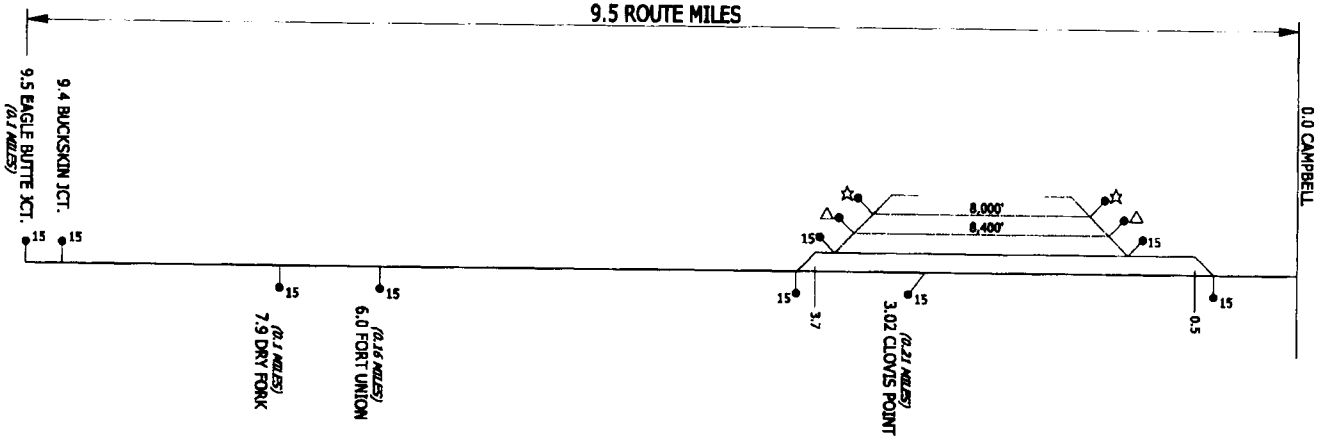
SSW - SWITCH POINT DERAIL

HD - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 5



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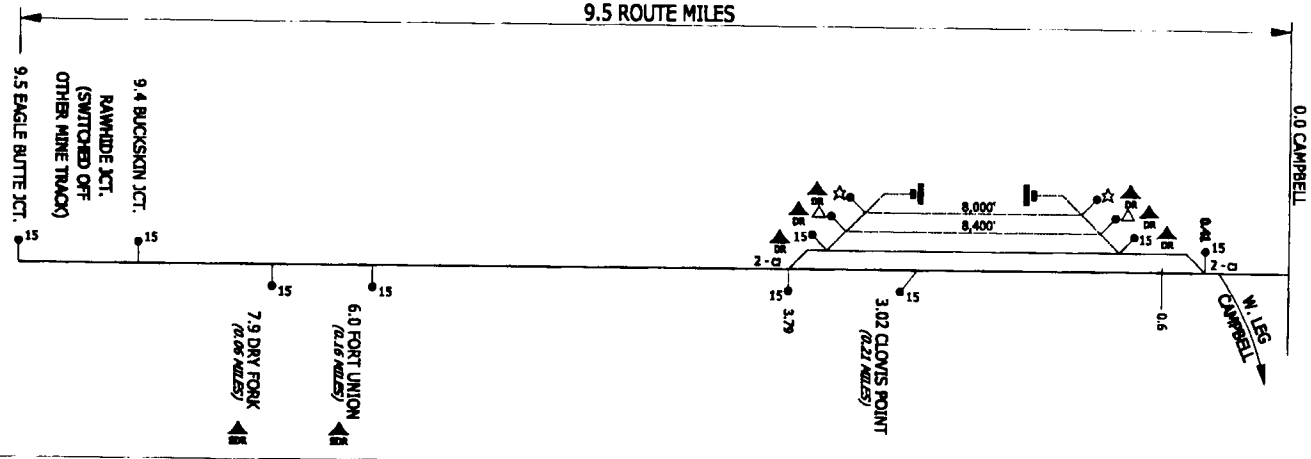


BNSF REPLY

DISTRICT:

CAMPBELL

← N

FROM: EAGLE BUTTE JCT. MP: 9.5

TO: CAMPBELL MP: 0.0

NOT TO SCALE

LEGEND:

- 136# RAIL
- 132# RAIL
- 132# RELAY RAIL
- (0.1 MILES) = RR-OWNED MINE TRACK
- DED 1 — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED
- AEI 1 — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED
- 20 TYPE TURNOUT

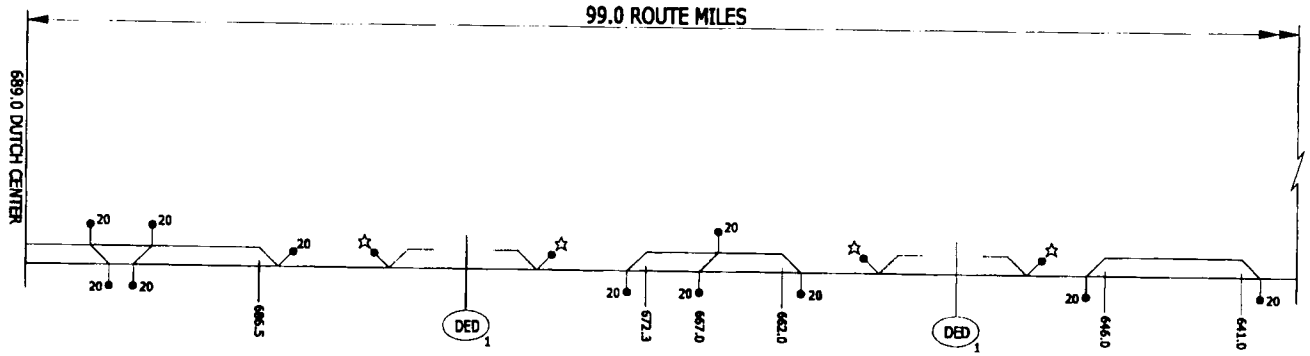
*TURNOUT TYPES

- 20 - #20 ELECTRIC
- 15 - #15 ELECTRIC
- △ - #15 HAND-THROWN
- ☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

- SDR - SWITCH POINT DERAIL
- DR - HINGED DERAIL
- WHEEL STOP
- □ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 6



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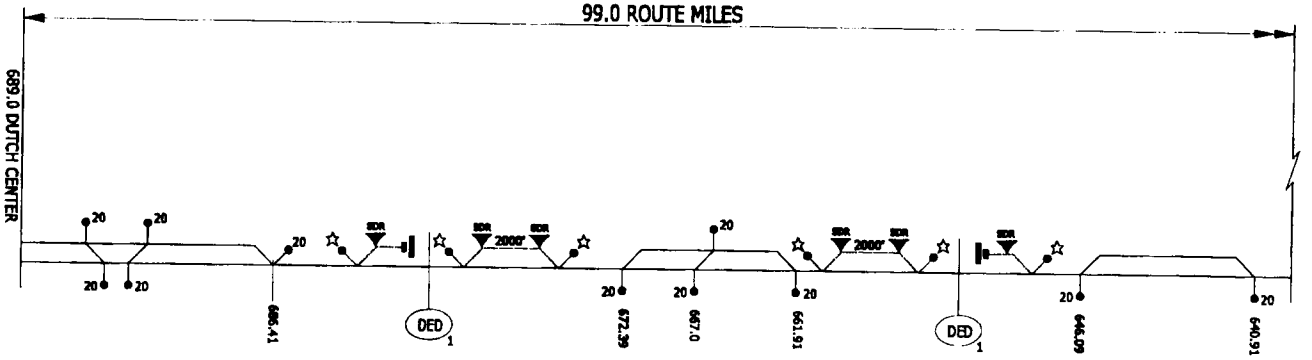


BNSF REPLY

DISTRICT:

BLACK HILLS/BIG HORN

FROM: WEST CAMPBELL MP: 590.0

TO: DUTCH CENTER MP: 689.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

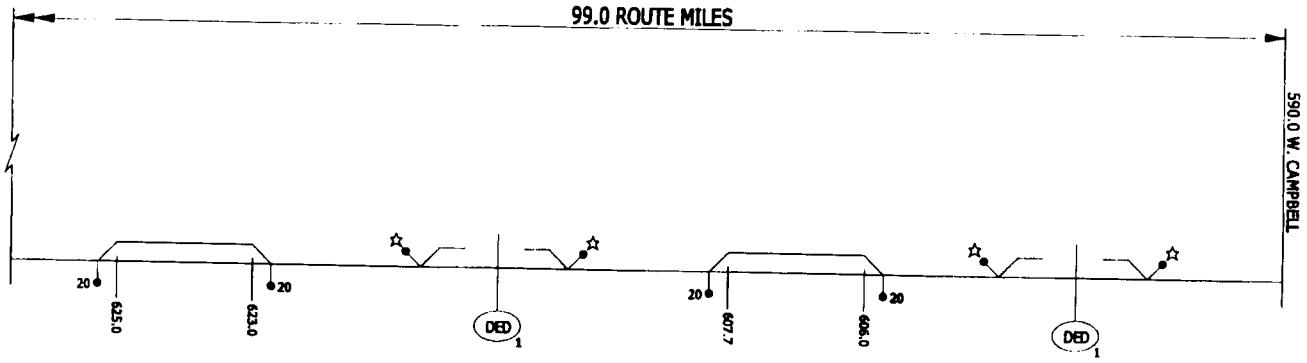
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

WHEEL STOP

CJ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 7



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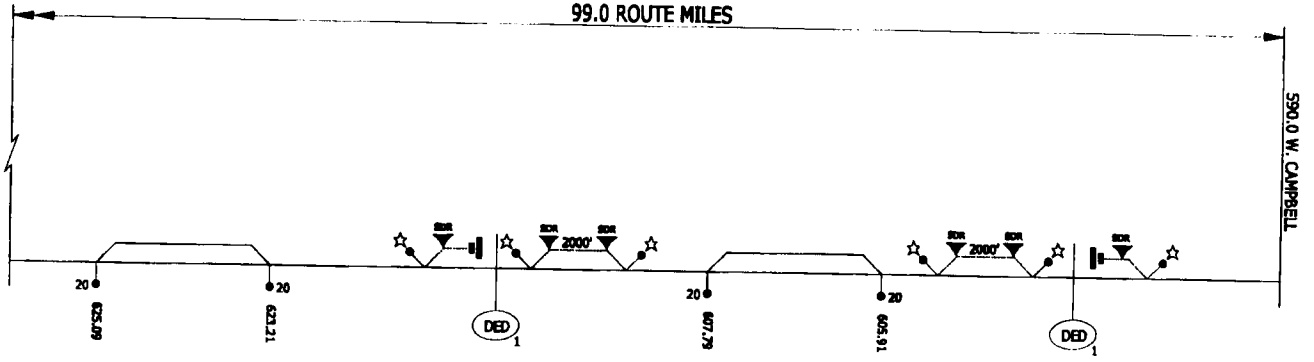


BNSF REPLY

DISTRICT:

BLACK HILLS/BIG HORN

FROM: WEST CAMPBELL MP: 590.0

TO: DUTCH CENTER MP: 689.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TURNOUT TYPE

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

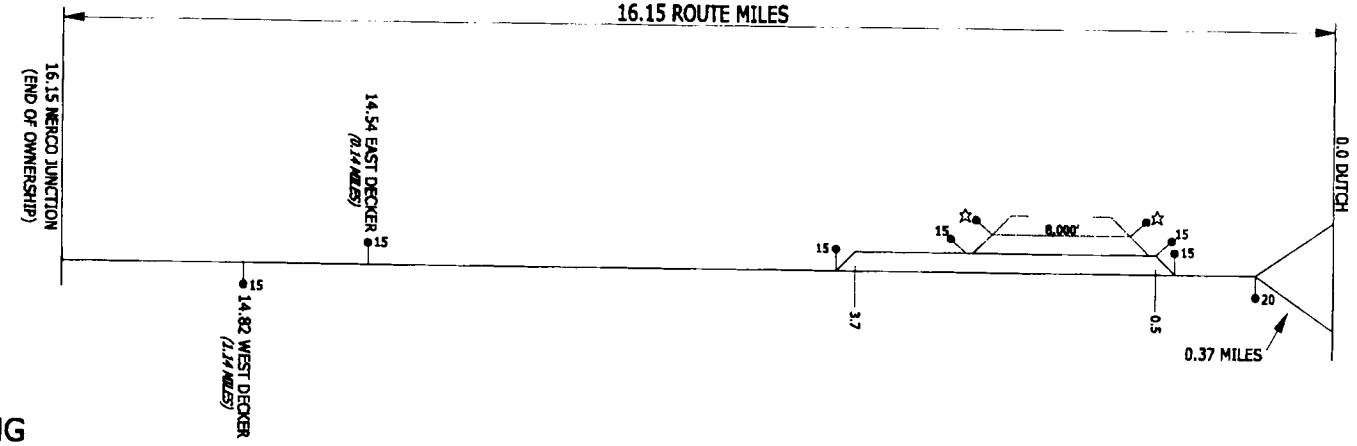
*OTHER TRACK MATERIAL

BDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

WHEEL STOP

COMPROMISE JOINT



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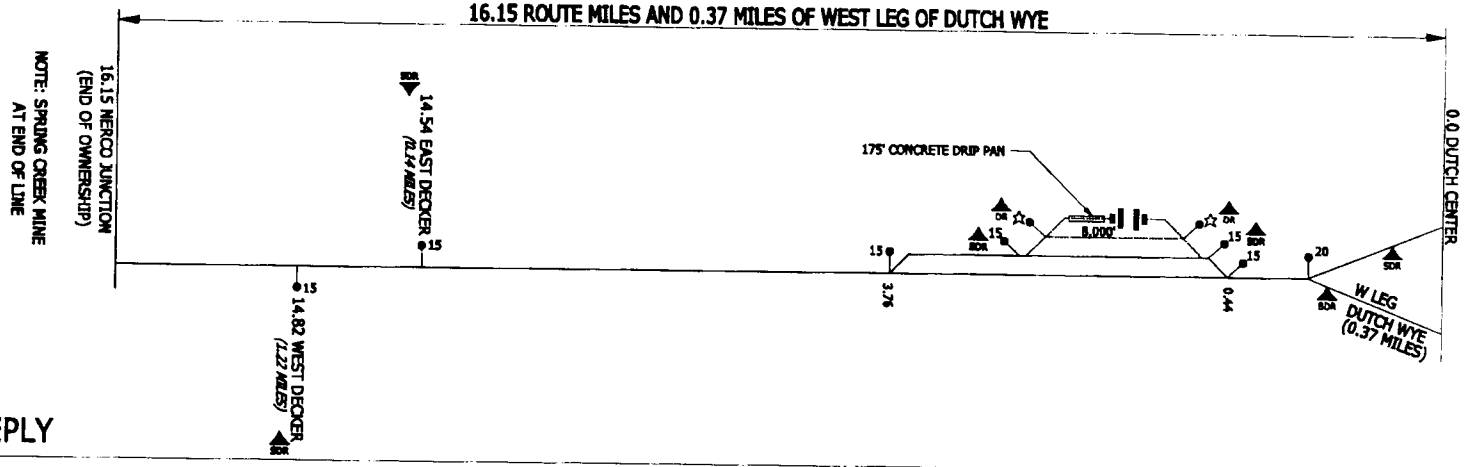


BNSF REPLY

DISTRICT:

DUTCH

← N

FROM: DUTCH CENTER MP: 0

TO: NERCO JCT. MP: 16.15 NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

(0.1 MILES) = RR-OWNED MINE TRACK

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

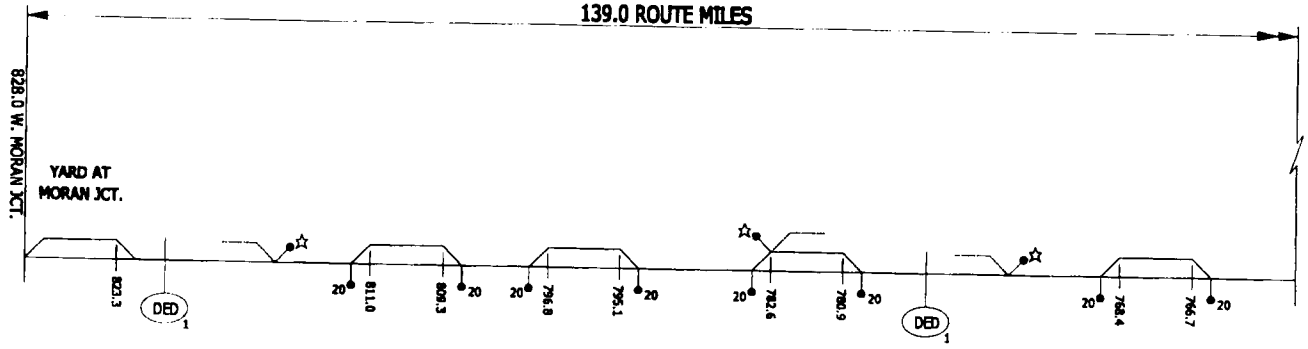
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



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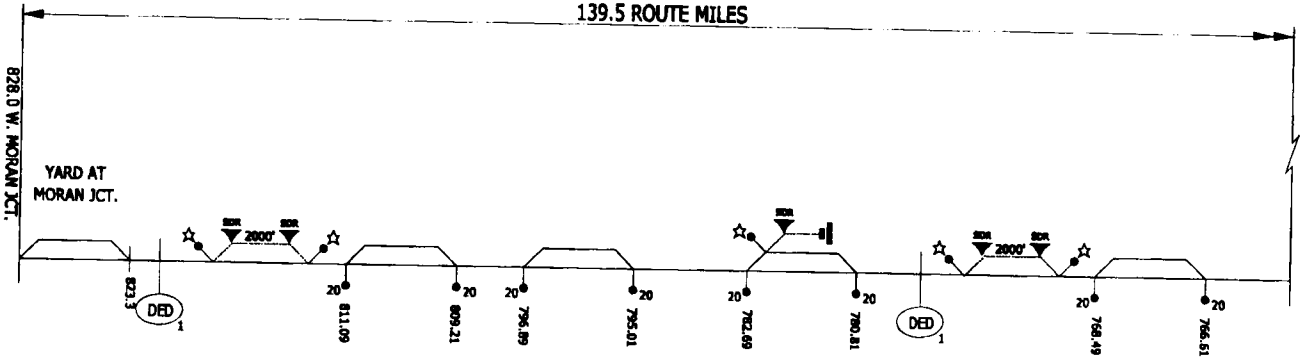


BNSF REPLY

DISTRICT:

BIG HORN

FROM: DUTCH CENTER MP: 689.0

TO: W. MORAN JCT. MP: 828.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

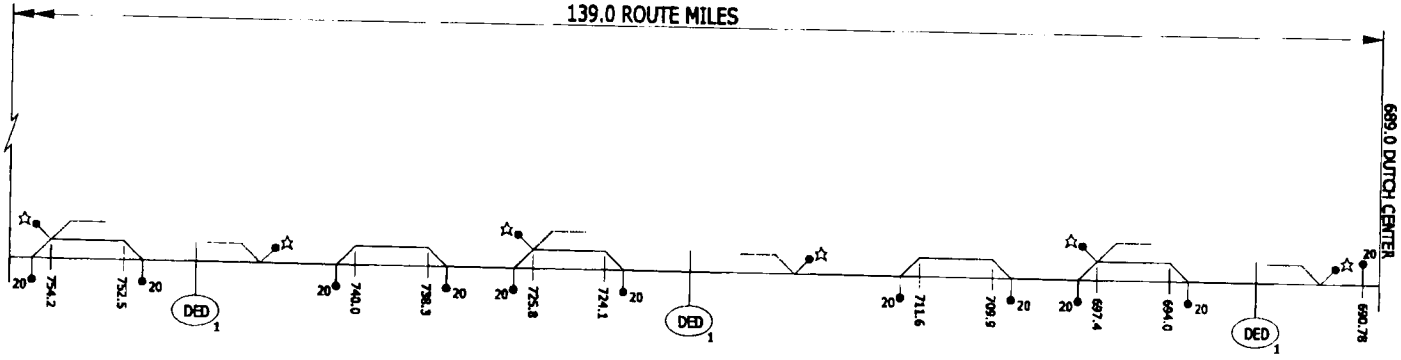
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



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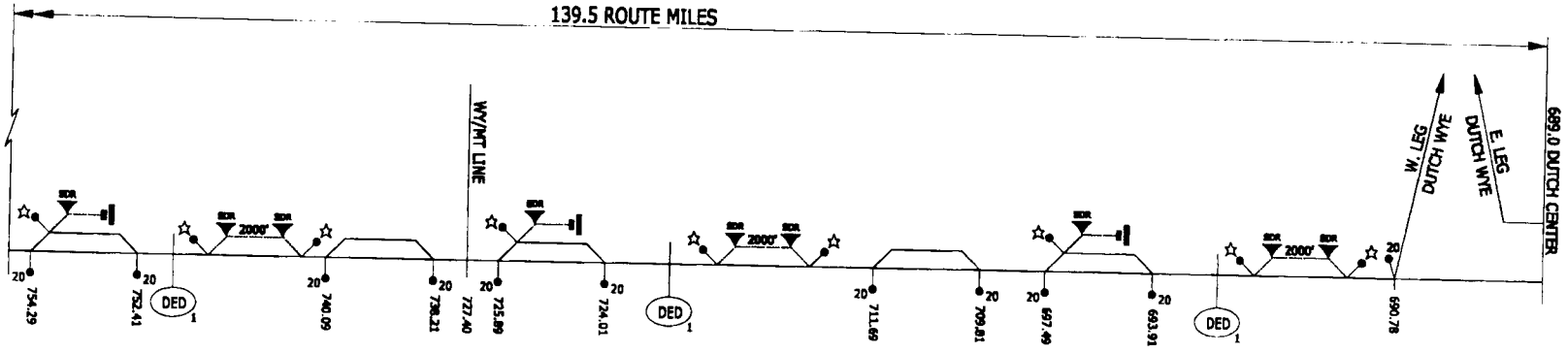


BNSF REPLY

DISTRICT:

BIG HORN

FROM: DUTCH CENTER MP: 689.0

TO: W. MORAN JCT. MP: 828.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

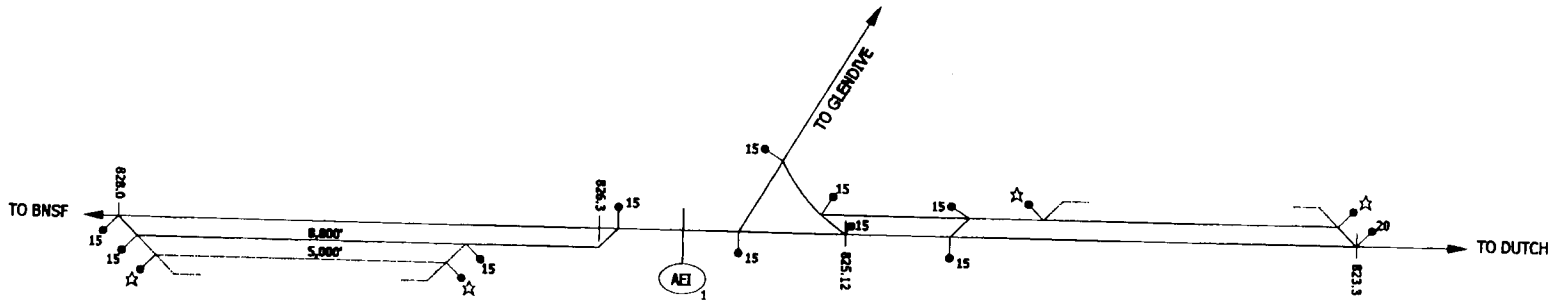
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

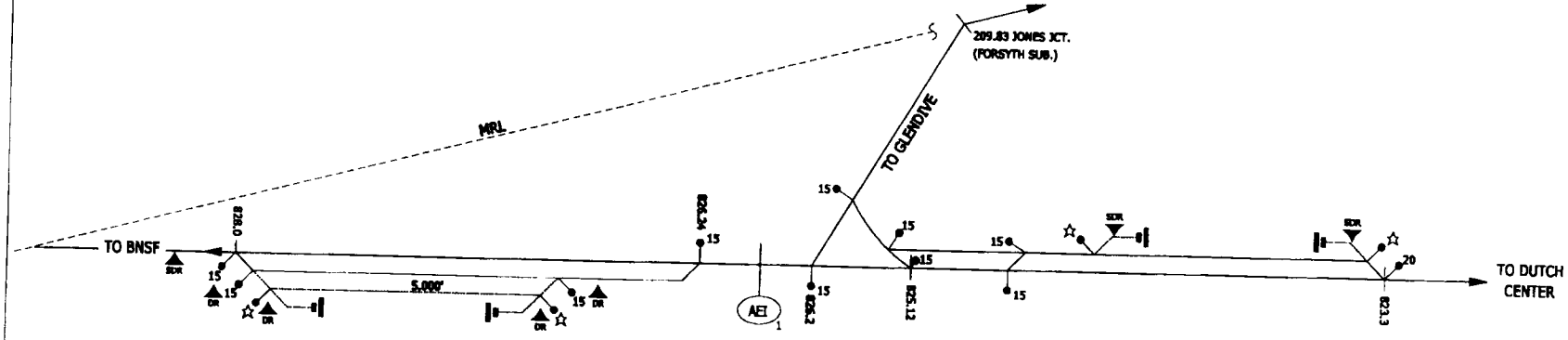
- WHEEL STOP

□ - COMPROMISE JOINT



OTP OPENING

MORAN JCT. YARD



BNSF REPLY

MORAN JCT. YARD

DISTRICT:

BIG HORN

MORGAN JCT. YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

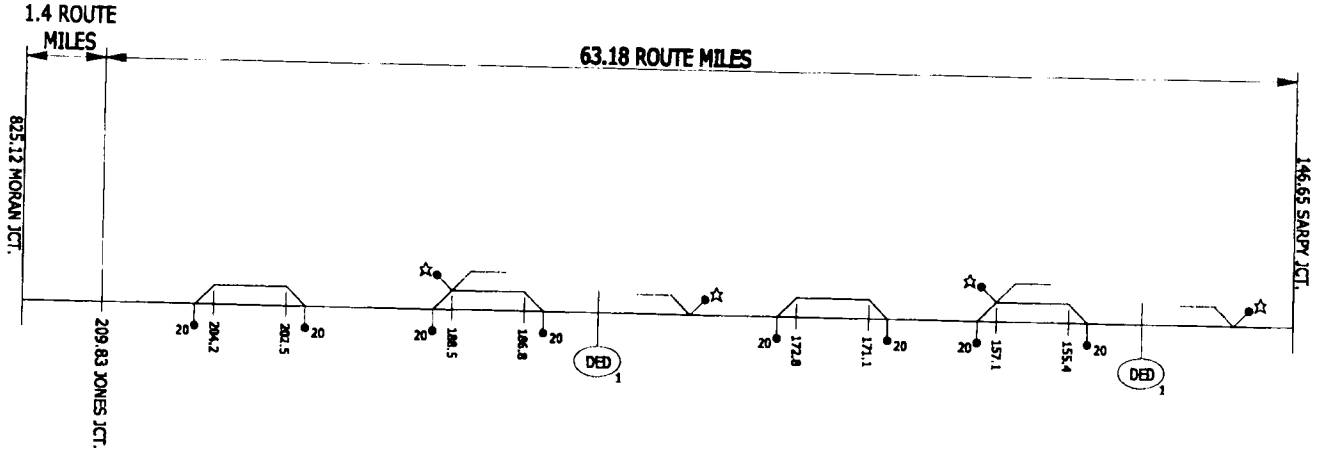
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4
Page 10



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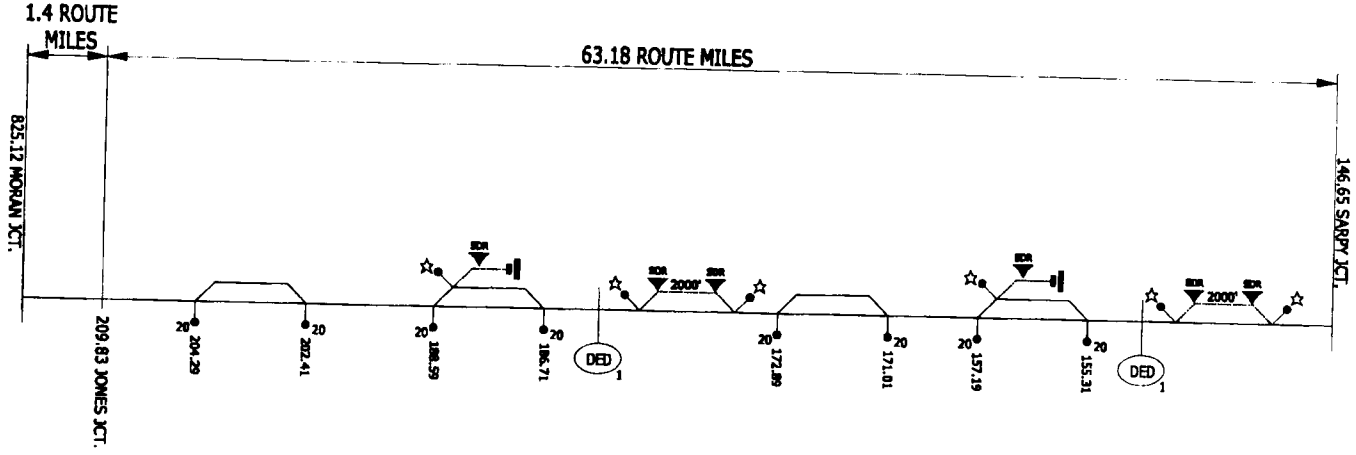


BNSF REPLY

DISTRICT:

FORSYTH

FROM: MORAN JCT. MP: 825.12

TO: SARPY JCT. MP: 146.65

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

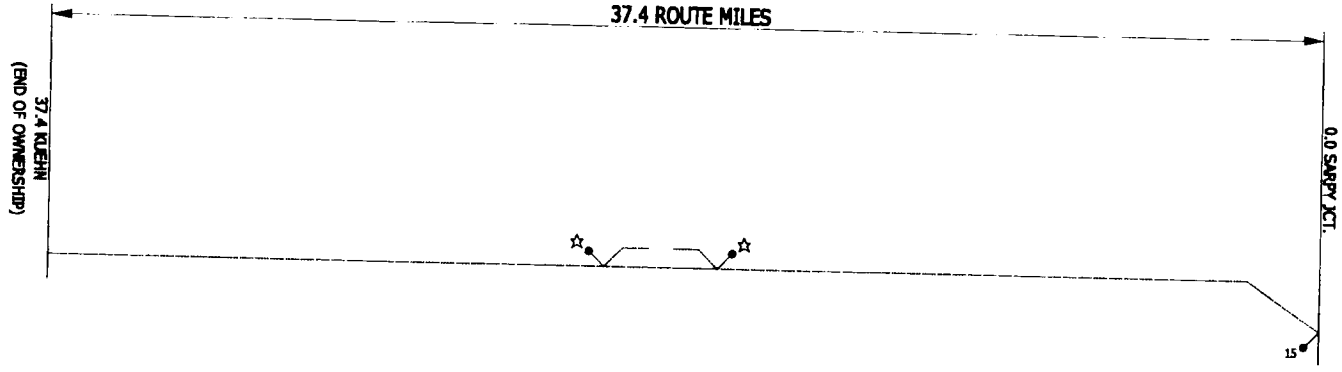
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4

Page 11



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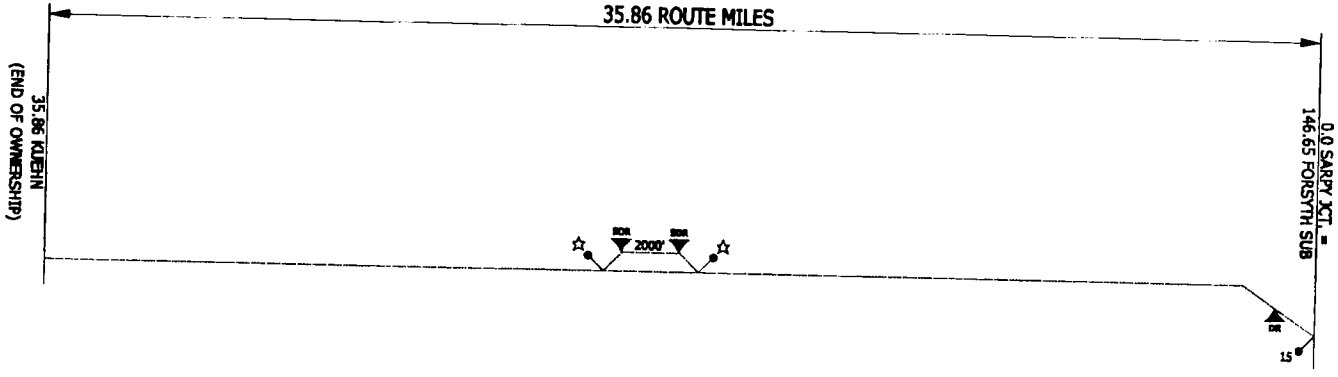


BNSF REPLY

DISTRICT:

SARPY

N →

FROM: SARPY JCT. MP: 0.0

TO: KUEHN (End of Ownership) MP: 35.86

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

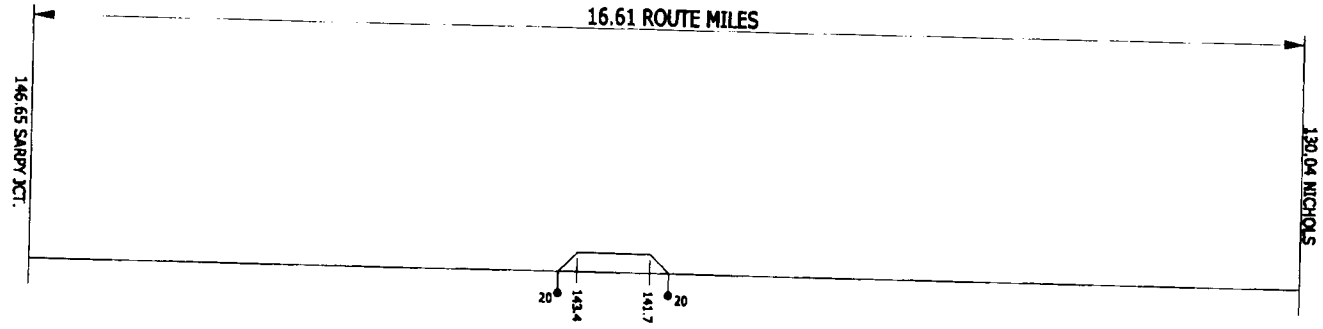
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4

Page 12



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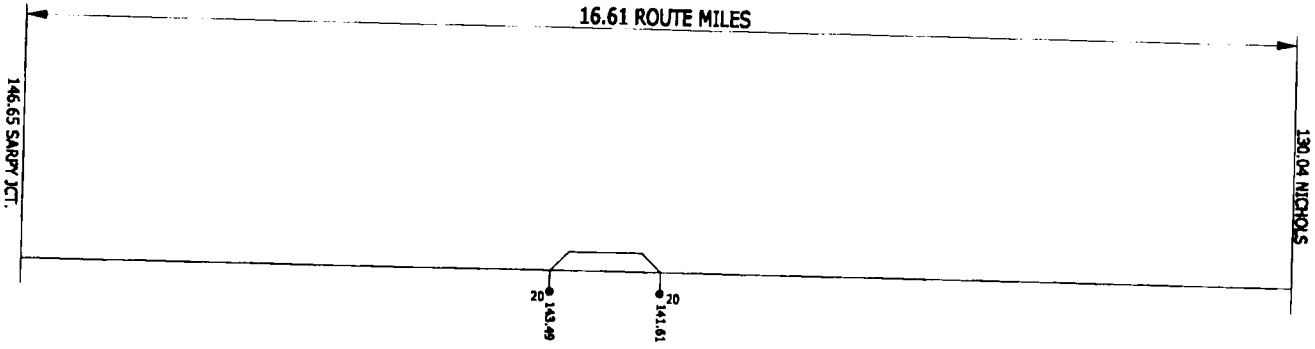


BNSF REPLY

DISTRICT:

FORSYTH

FROM: SARPY JCT. MP: 146.55

TO: NICHOLS MP: 130.04

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

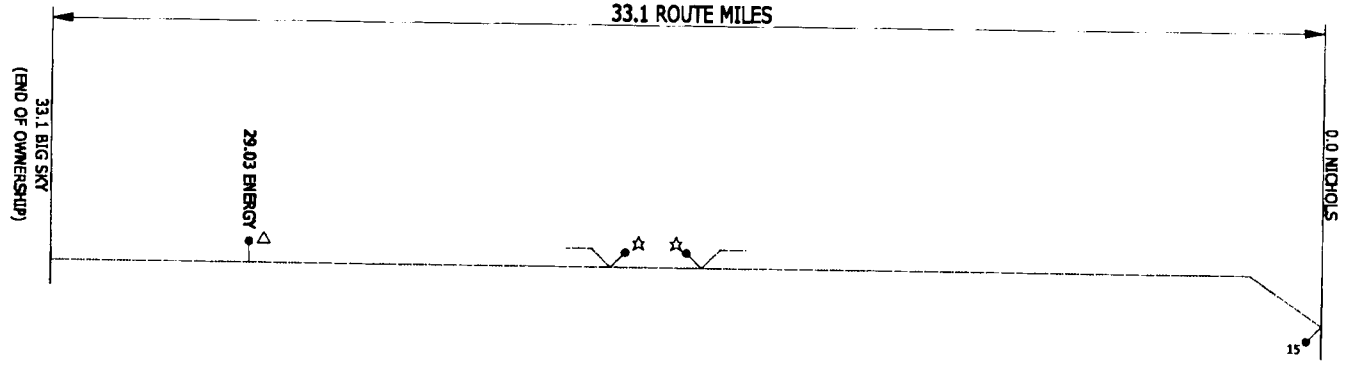
*OTHER TRACK MATERIAL

SSR - SWITCH POINT DERAIL

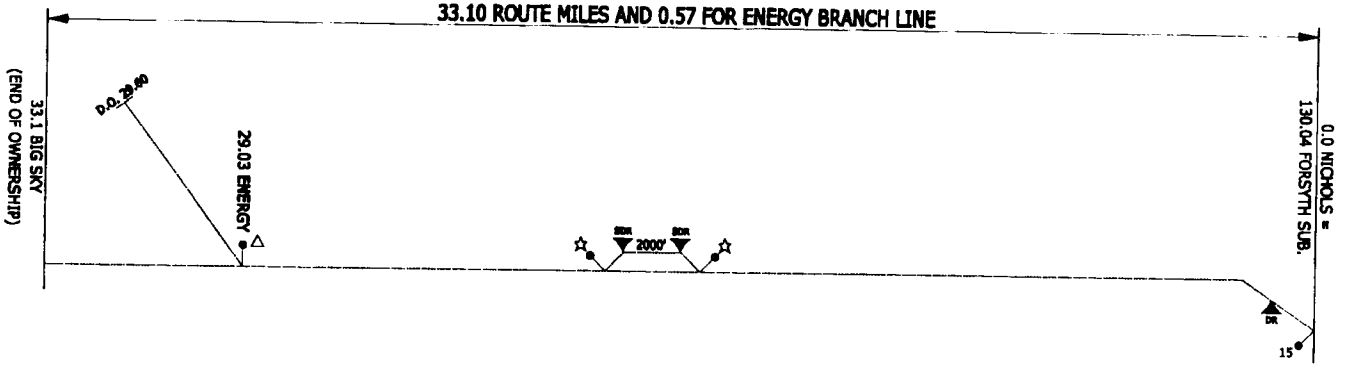
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT



OTP OPENING



BNSF REPLY

DISTRICT:

SARPY

N

FROM: NICHOLS MP: 0.0

TO: BIG SKY (End of Ownership) MP: 33.1

NOT TO SCALE

LEGEND:

1360 RAIL

1320 RAIL

1320 RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

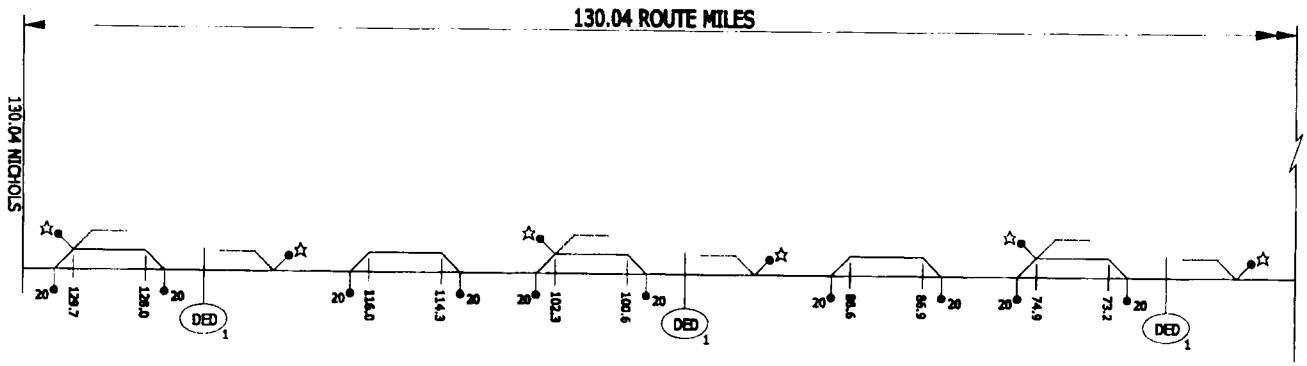
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4
Page 14



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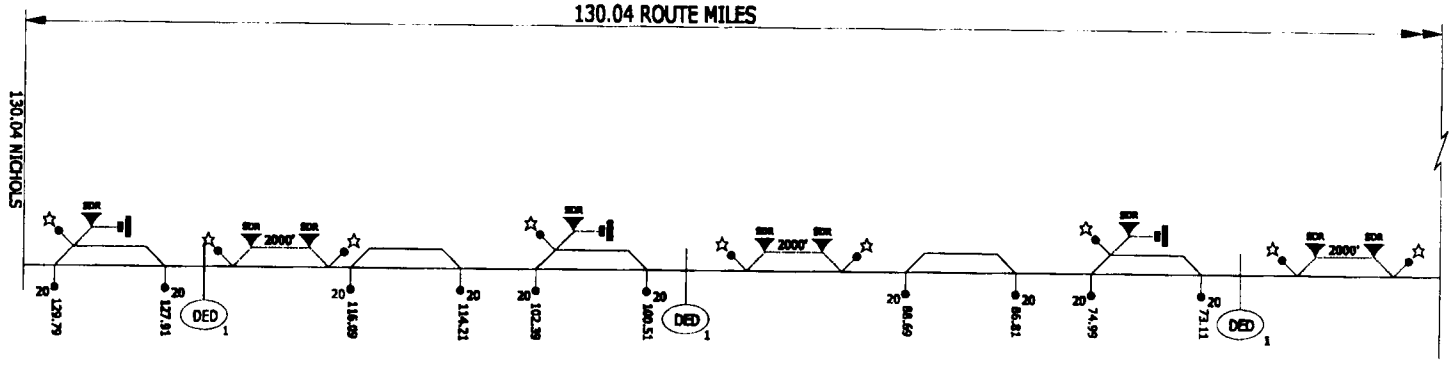


BNSF REPLY

SHEET 1 OF 2

DISTRICT:

FORSYTH

FROM: NICHOLS MP: 130.04

TO: GLENDIVE MP: 0.00

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

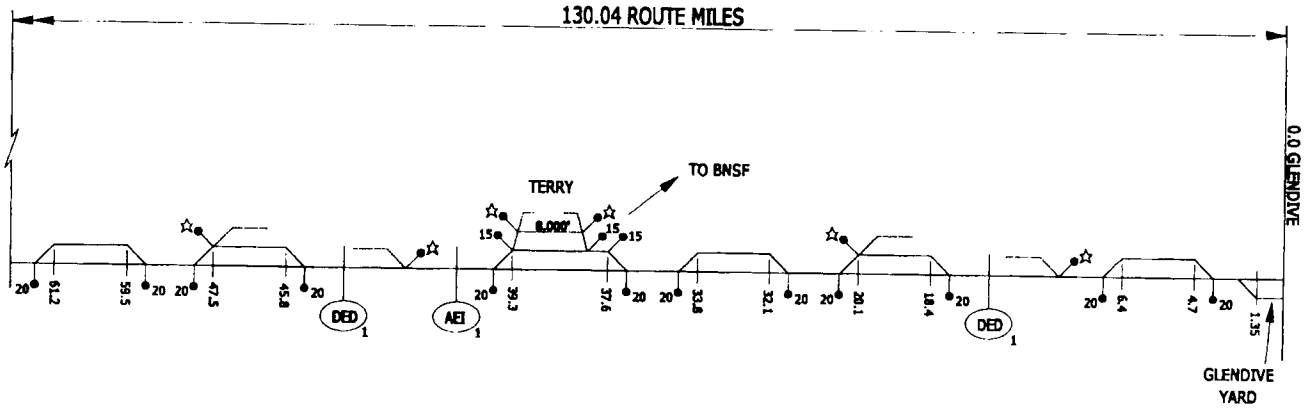
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

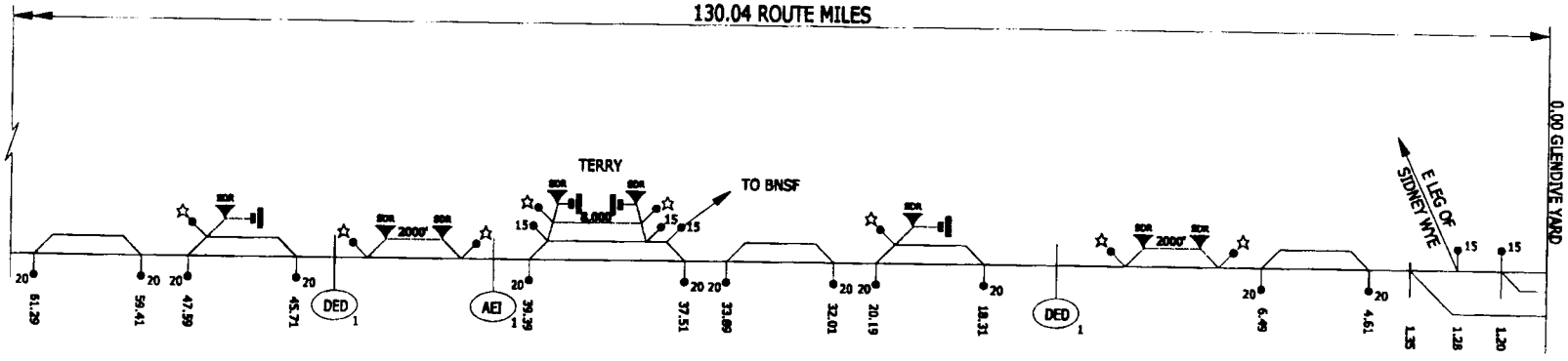
- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4
Page 15



OTP OPENING



BNSF REPLY

SHEET 2 OF 2

DISTRICT:

FORSYTH

FROM: NICHOLS MP: 130.04

TO: GLENDIVE MP: 0.00

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

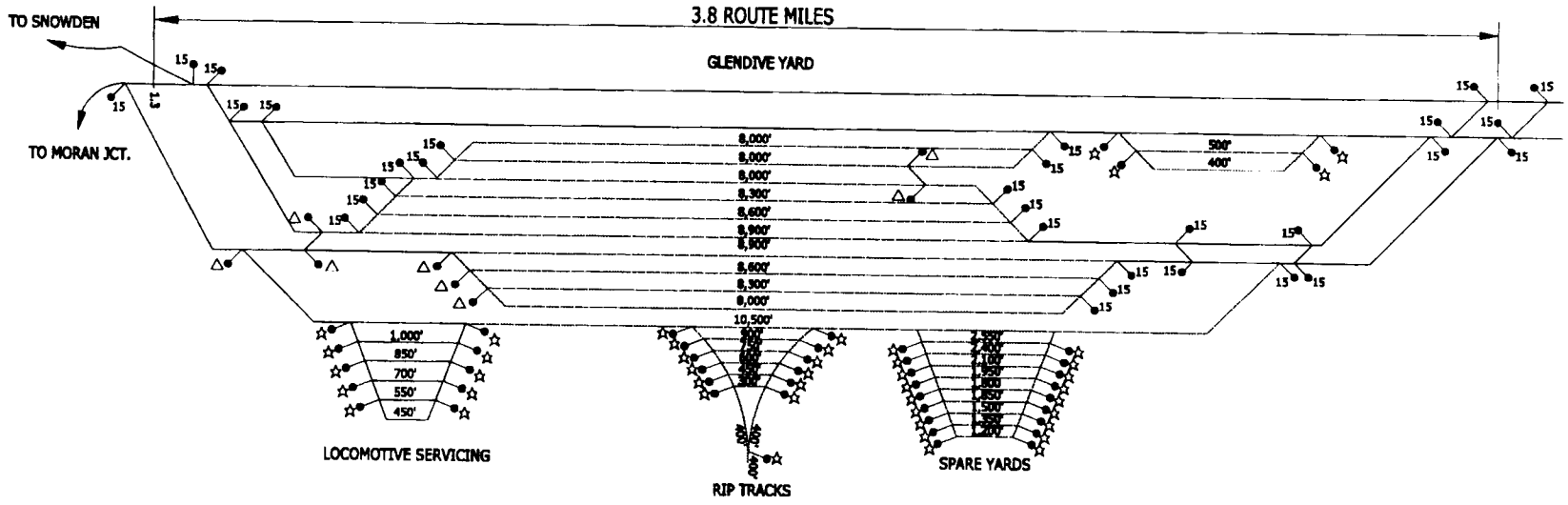
SDR - SWITCH POINT DERAIL

HD - HINGED DERAIL

WS - WHEEL STOP

CI - COMPROMISE JOINT

EXHIBIT III.F-4
Page 15



OTP OPENING

SHEET 1 OF 2

DISTRICT:

GLENDIVE YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 — DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE — TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SWR - SWITCH POINT DERAIL

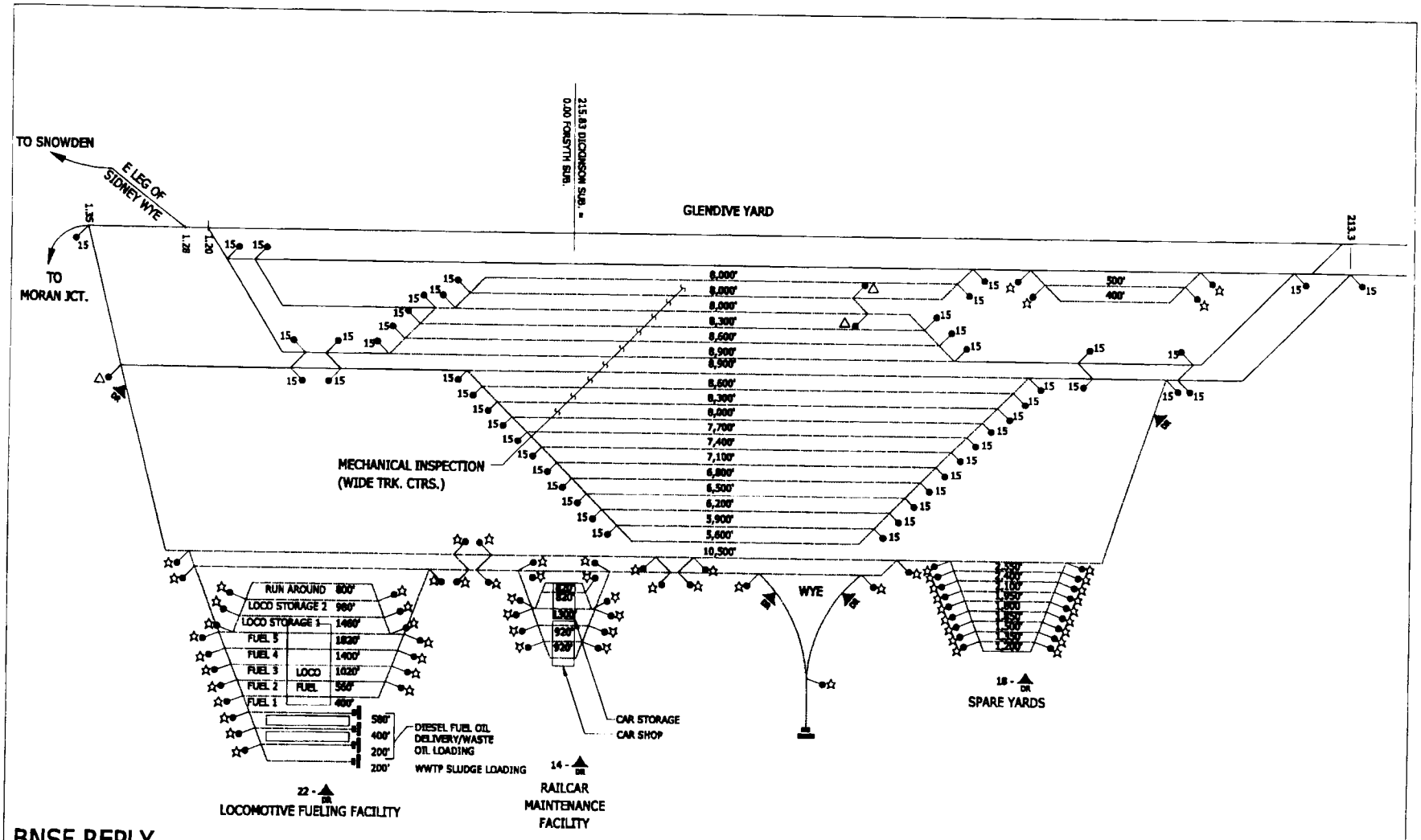
HR - HINGED DERAIL

WS - WHEEL STOP

CJ - COMPROMISE JOINT

EXHIBIT III.F-4

Page 16



BNSF REPLY

SHEET 2 OF 2

DISTRICT:

GLENDIVE YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

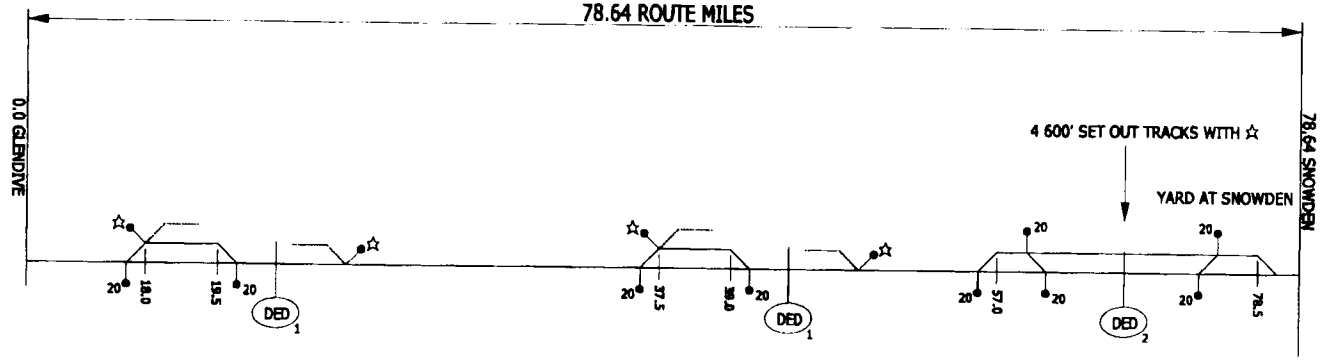
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4
Page 16



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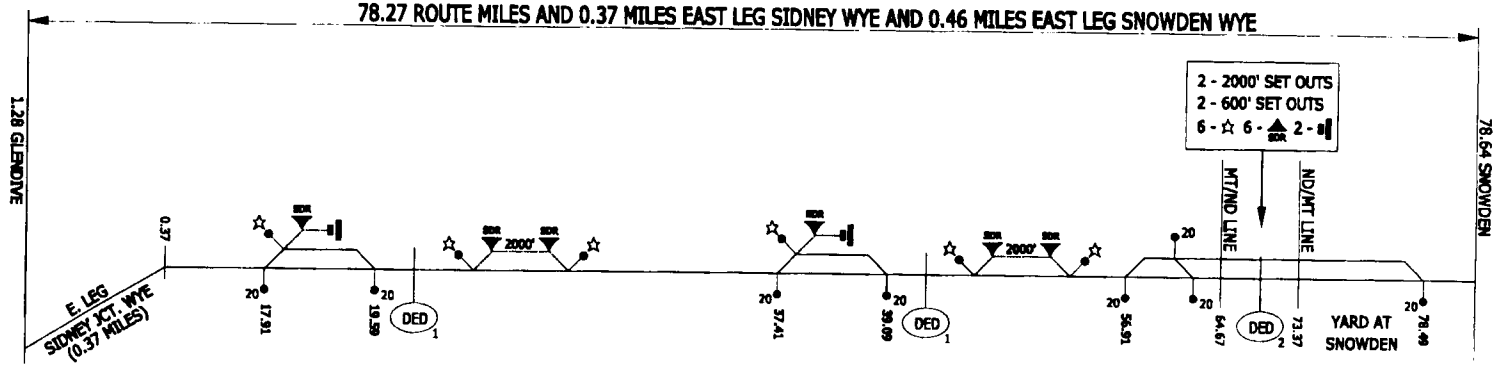


BNSF REPLY

DISTRICT:

SIDNEY

FROM: GLENDIVE MP: 1.28

TO: SNOWDEN MP: 78.64

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

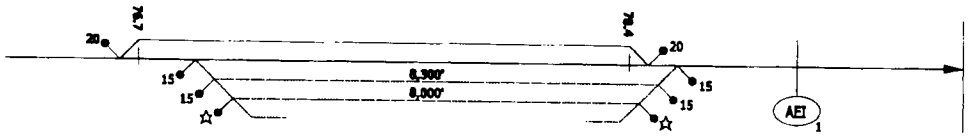
SSR - SWITCH POINT DERAIL

DR - HINGED DERAIL

■ - WHEEL STOP

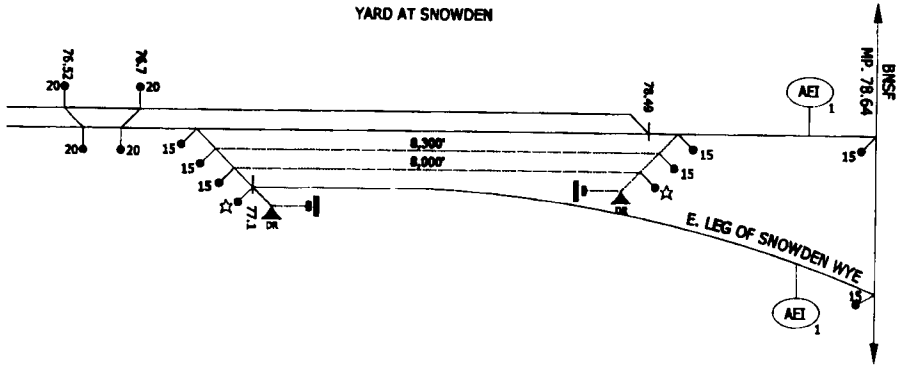
CJ - COMPROMISE JOINT

YARD AT SNOWDEN



OTP OPENING

YARD AT SNOWDEN



BNSF REPLY

DISTRICT:

SIDNEY

SNOWDEN YARD

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

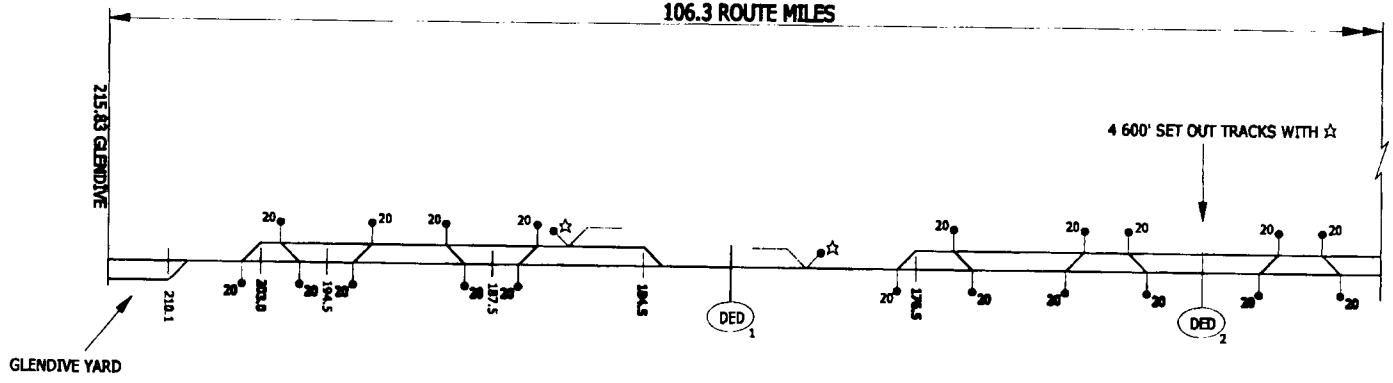
SCR - SWITCH POINT DERAIL

DR - HINGED DERAIL

▮ - WHEEL STOP

○ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 18



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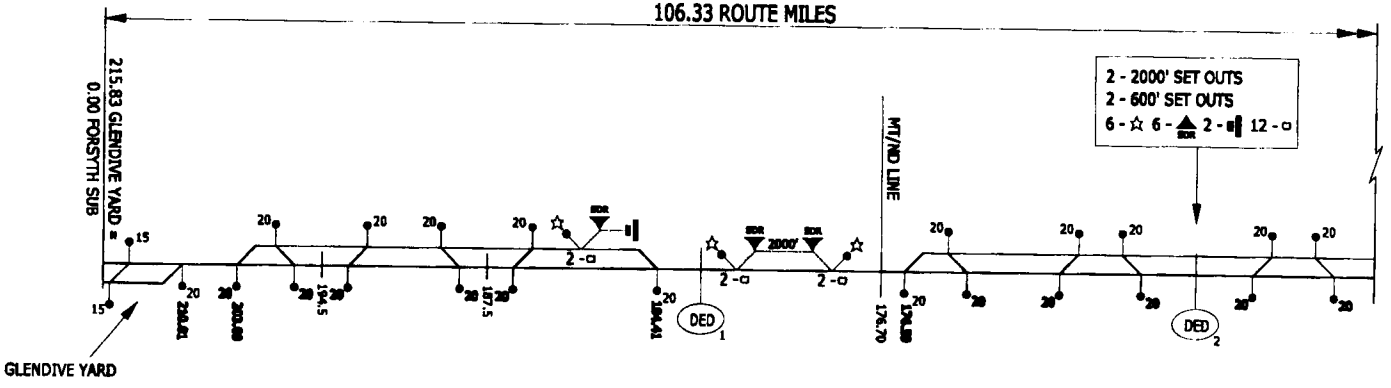


BNSF REPLY

DISTRICT:

DICKINSON

FROM: GLENDIVE MP: 215.83

TO: DICKINSON MP: 109.50

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

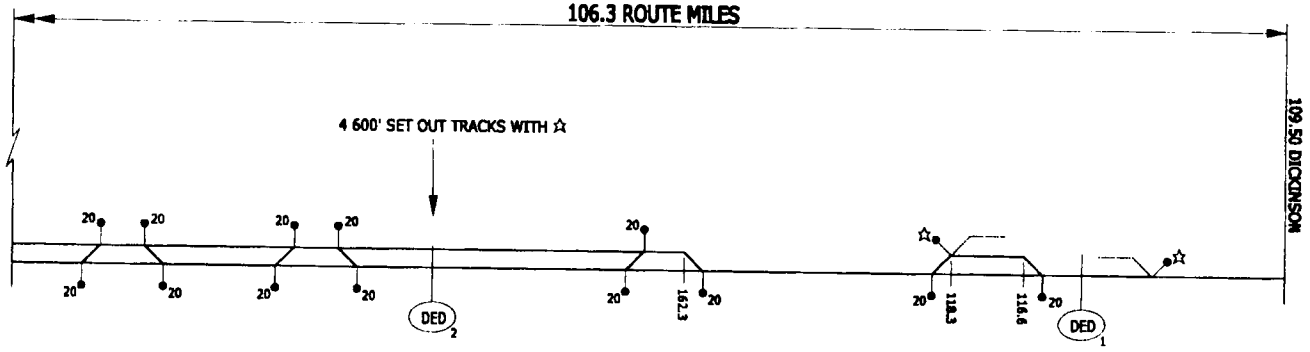
*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

OR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT



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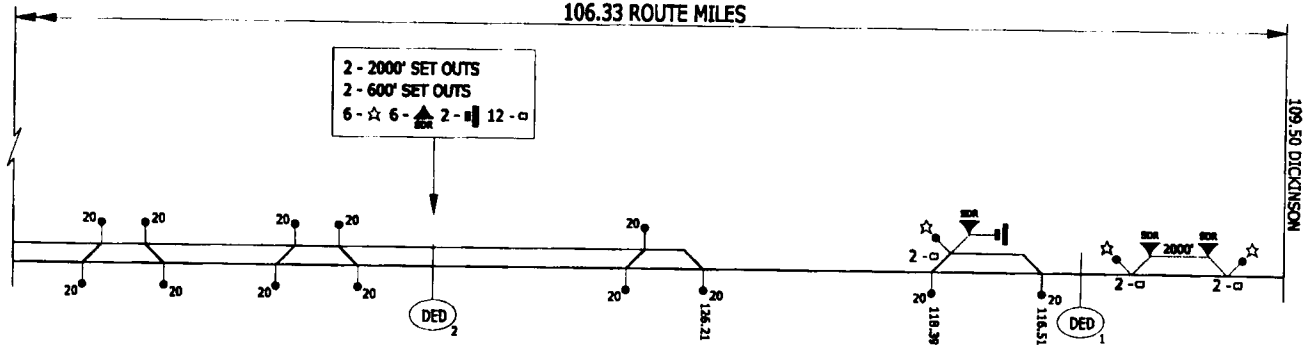


BNSF REPLY

SHEET 2 OF 2

DISTRICT:

DICKINSON

FROM: GLENDIVE MP: 215.83

TO: DICKINSON MP: 109.50

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

BDR - SWITCH POINT DERAIL

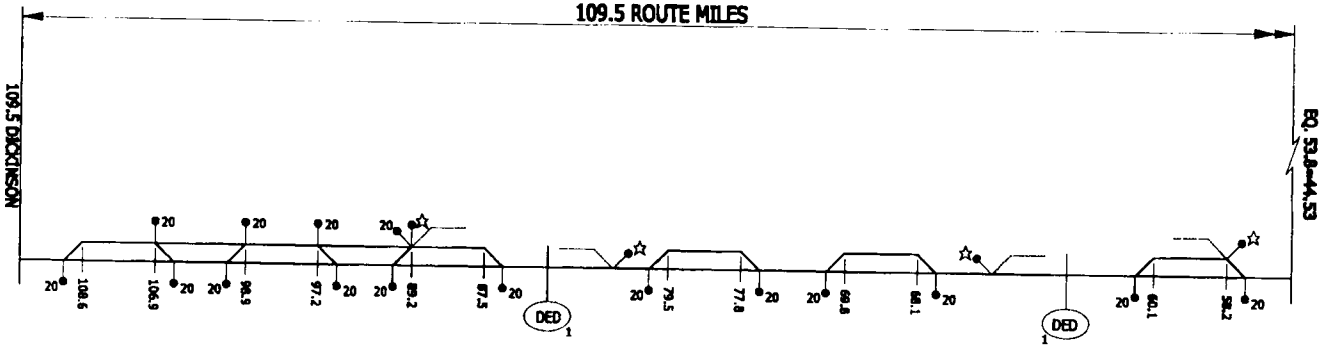
HR - HINGED DERAIL

WHEEL STOP

□ - COMPROMISE JOINT

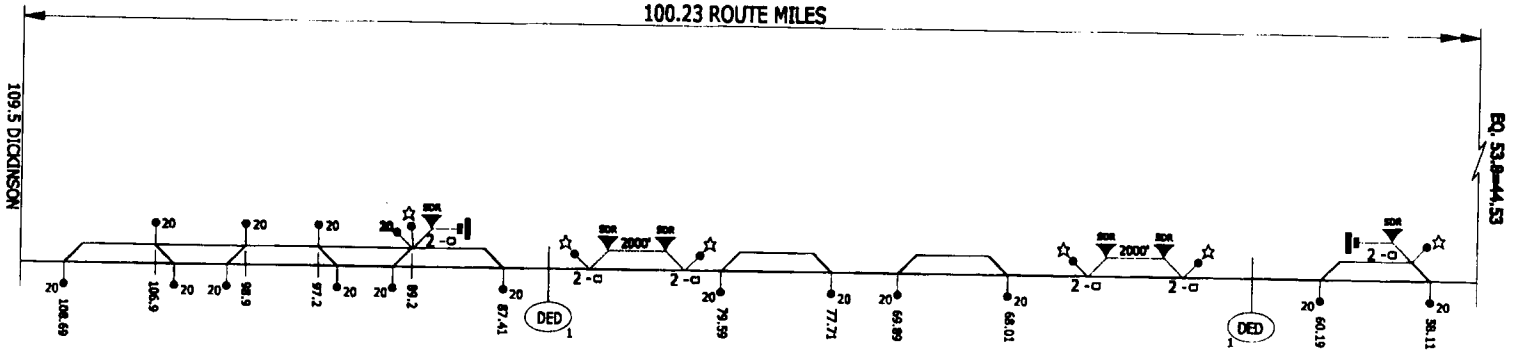
EXHIBIT III.F-4

Page 19



OTP OPENING

NOTE: OTP ERRATA EXHIBIT III-B-1 PAGE 20 OMITTED DOUBLE TRACK BETWEEN 106.9-98.9 AND 97.2-89.2.



BNSF REPLY

SHEET 1 OF 2

DISTRICT:

DICKINSON

FROM: DICKINSON MP: 109.5

TO: MANDAN MP: 0.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

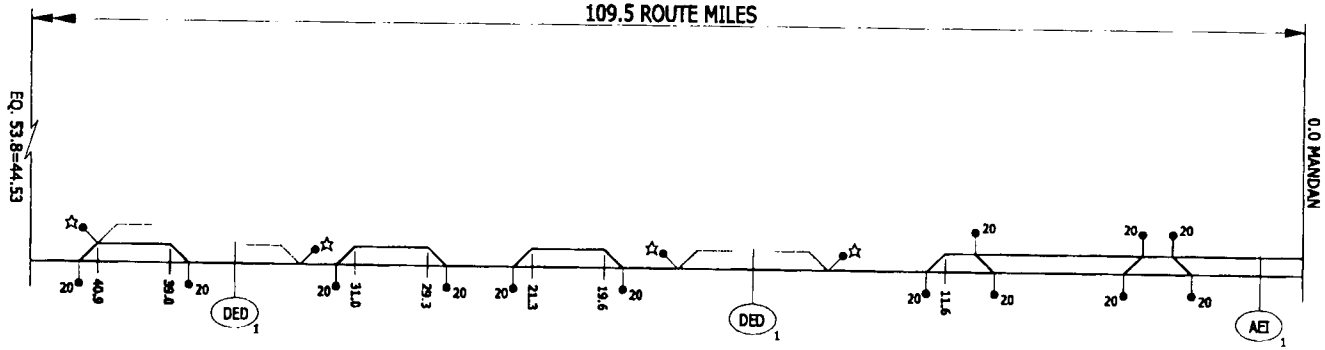
SDR - SWITCH POINT DERAIL

15 - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4
Page 20



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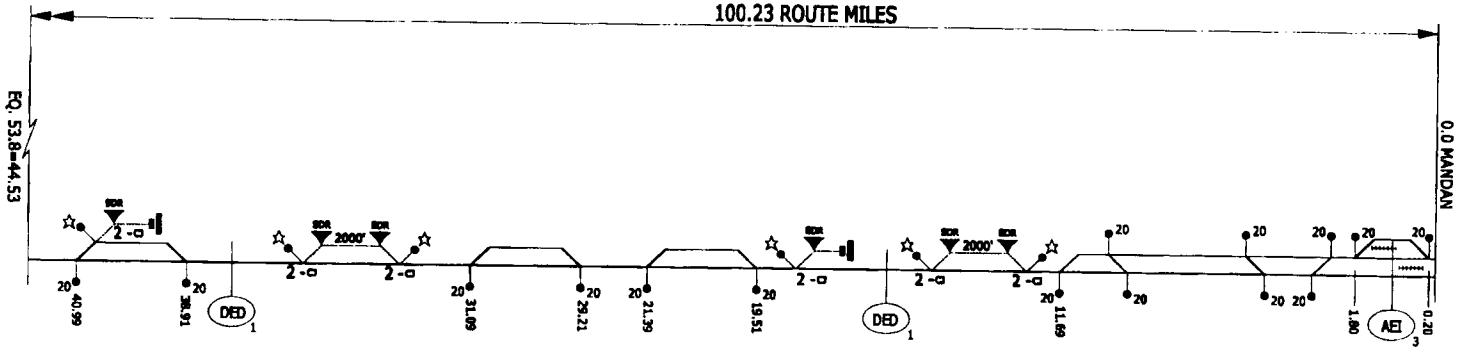


BNSF REPLY

SHEET 2 OF 2

DISTRICT:

DICKINSON

FROM: DICKINSON MP: 109.5

TO: MANDAN MP: 0.0

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

FUEL RACKS

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

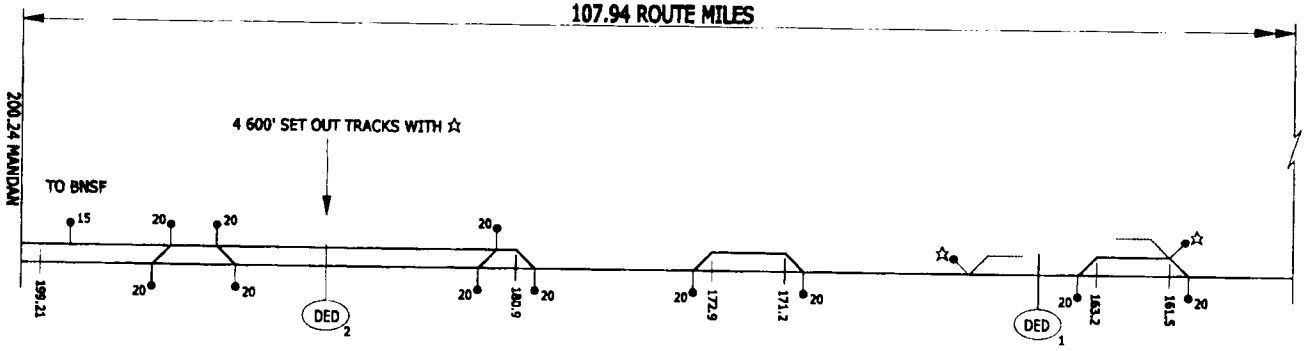
DR - HINGED DERAIL

- WHEEL STOP

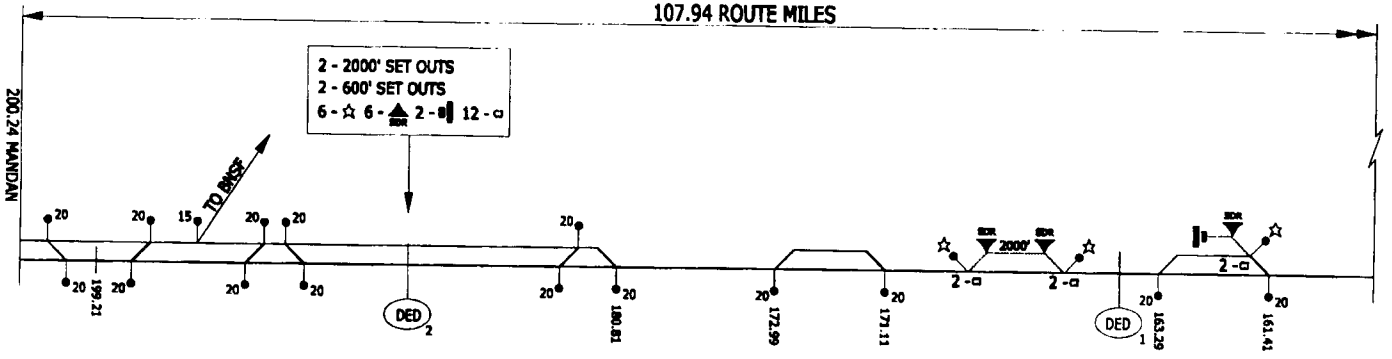
- COMPROMISE JOINT

EXHIBIT III.F-4

Page 20



OTP OPENING



BNSF REPLY

SHEET 1 OF 2

DISTRICT:

JAMESTOWN

FROM: MANDAN MP: 200.24

TO: JAMESTOWN MP: 92.30

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

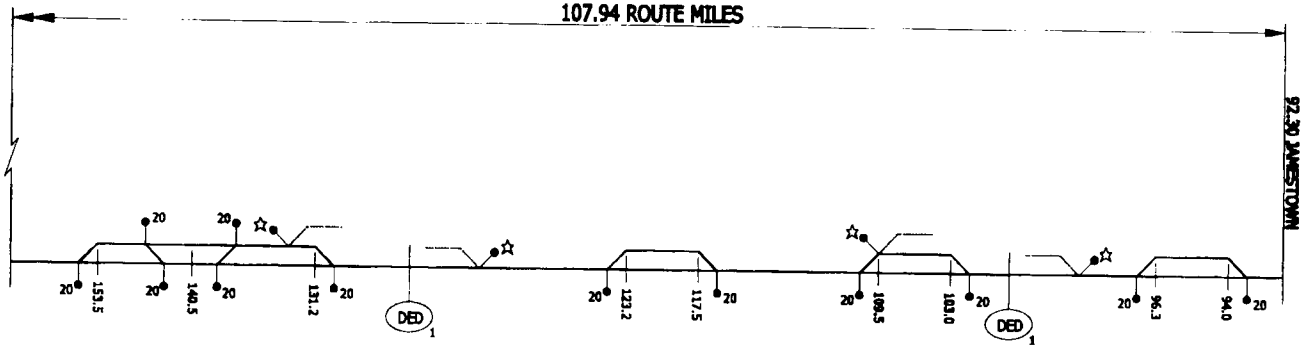
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

▪ - WHEEL STOP

□ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 21



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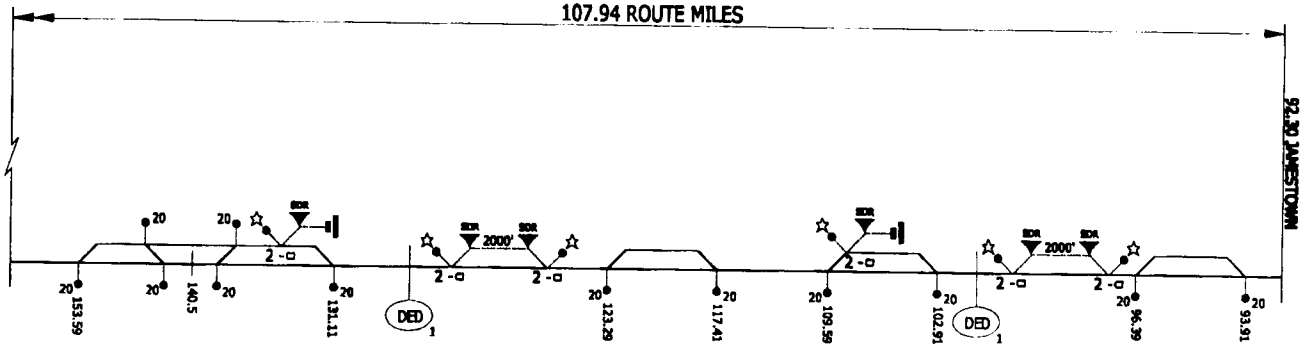


BNSF REPLY

DISTRICT:

JAMESTOWN

FROM: MANDAN MP: 200.24

TO: JAMESTOWN MP: 92.30

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

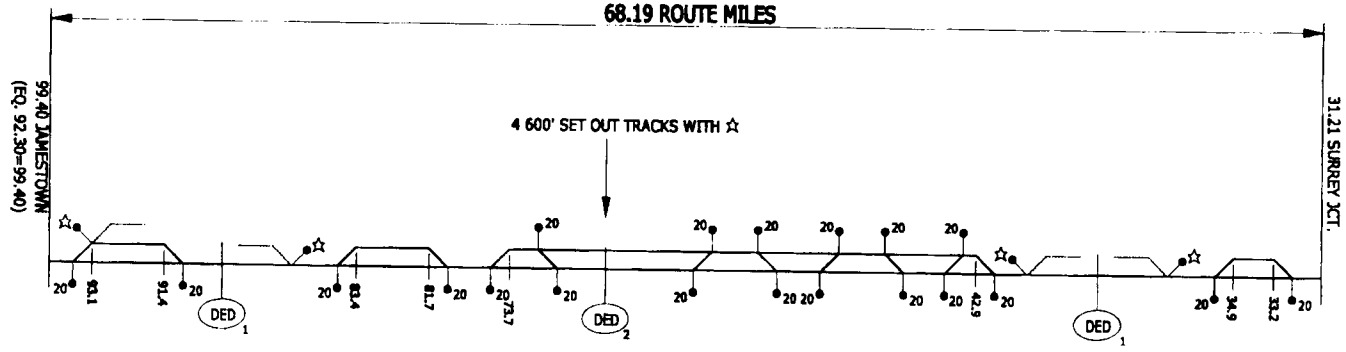
*OTHER TRACK MATERIAL

BDR - SWITCH POINT DERAIL

HBR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT



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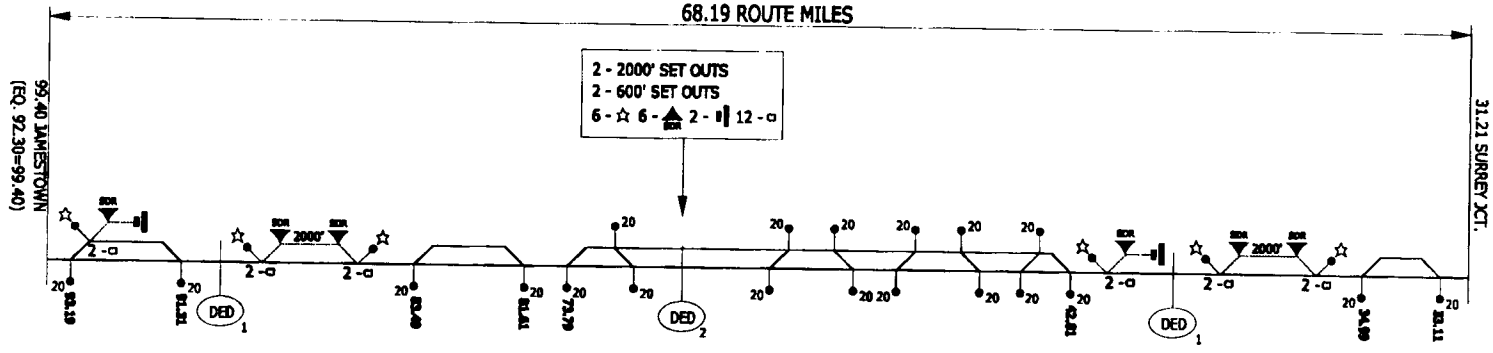


BNSF REPLY

DISTRICT:

JAMESTOWN

FROM: JAMESTOWN MP: 99.40

TO: SURREY JCT. MP: 31.21

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SDR - SWITCH POINT DERAIL

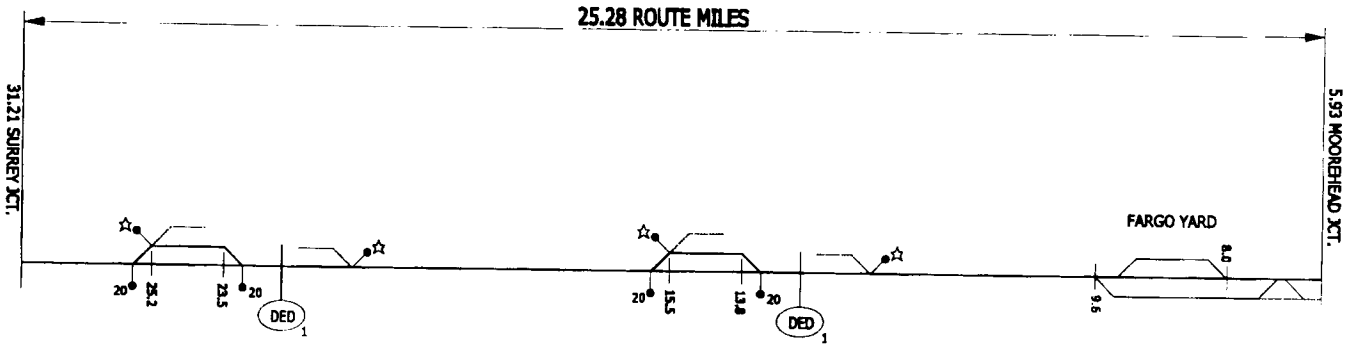
DR - HINGED DERAIL

- WHEEL STOP

- COMPROMISE JOINT

EXHIBIT III.F-4

Page 22



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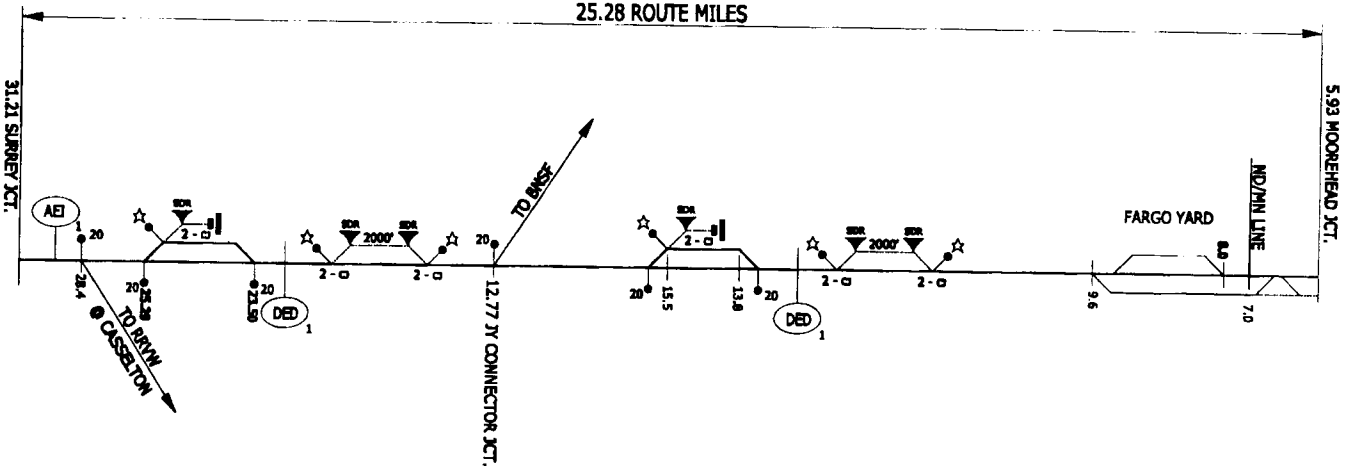


BNSF REPLY

DISTRICT:

KO

FROM: SURREY JCT. MP: 31.21

TO: MOORHEAD JCT. MP: 5.93

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED — DEFECTIVE EQUIPMENT DETECTOR, NUMBER OF TRACKS COVERED

AEI — AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

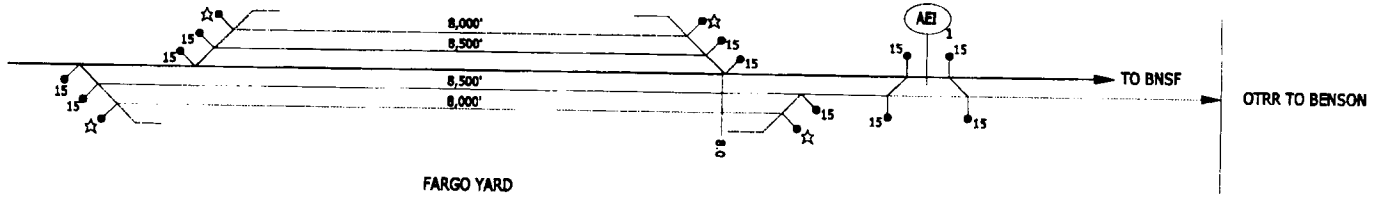
SDR - SWITCH POINT DERAIL

HD - HINGED DERAIL

WS - WHEEL STOP

CJ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 23



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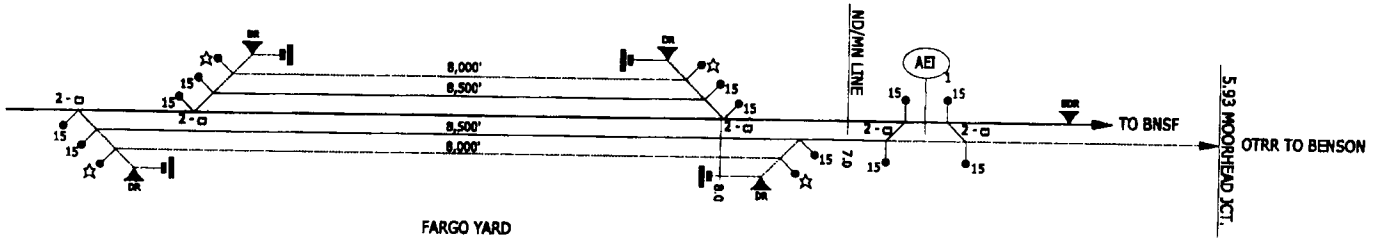


BNSF REPLY

DISTRICT:

KO

FARGO YARD

N

NOT TO SCALE

LEGEND:

136# RAIL
132# RAIL
132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

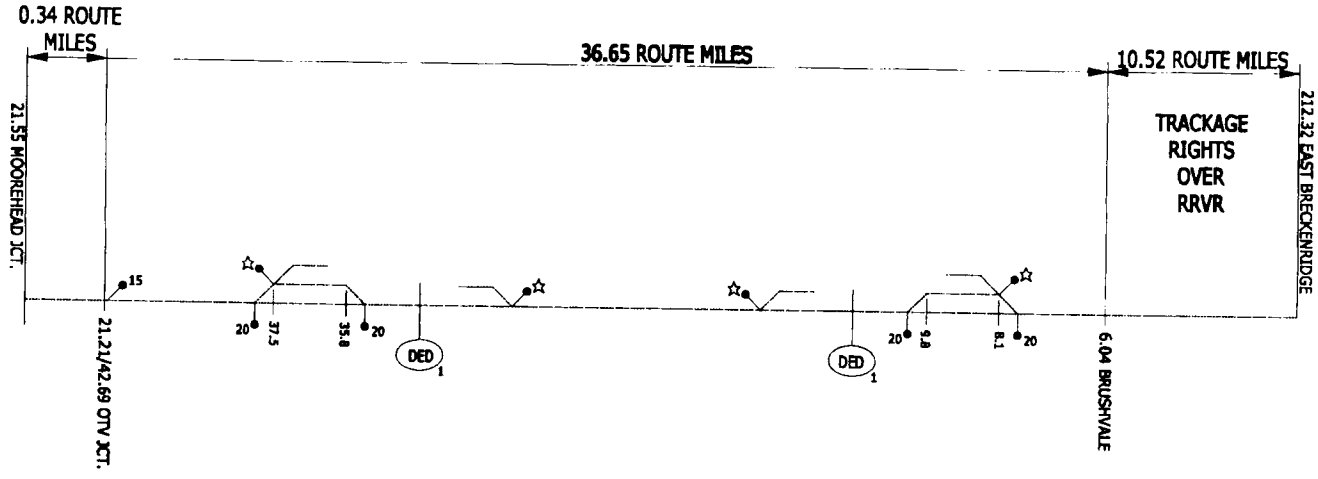
AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES
20 - #20 ELECTRIC
15 - #15 ELECTRIC
△ - #15 HAND-THROWN
☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL
SPR - SWITCH POINT DERAIL
DR - HINGED DERAIL
WHEEL STOP
COMPROMISE JOINT

EXHIBIT III.F-4
Page 24



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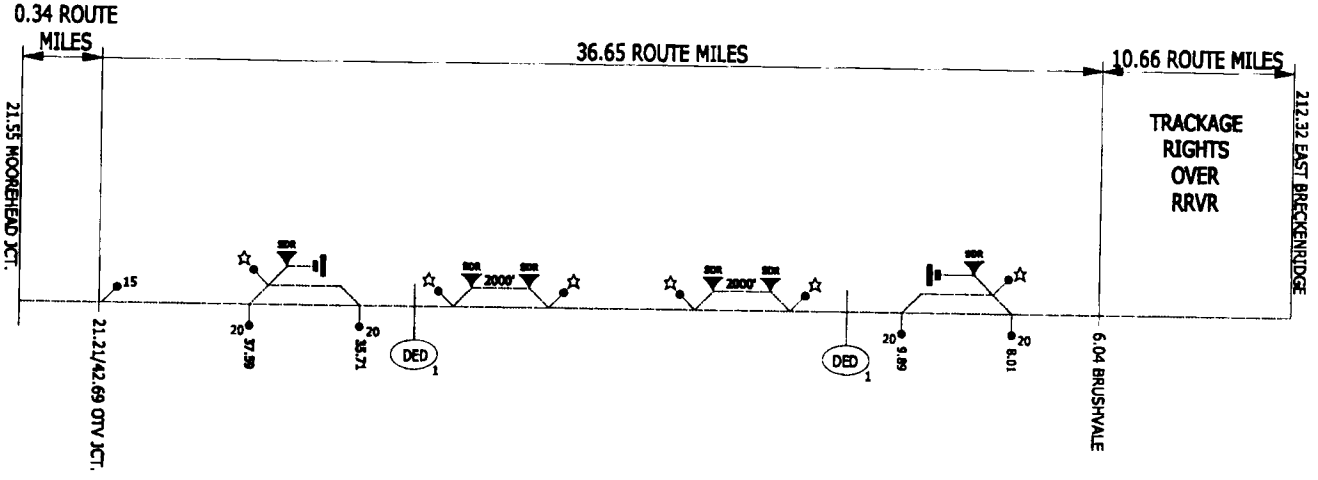


BNSF REPLY

DISTRICT:

PROSPER/MOORHEAD

← N

FROM: MOORHEAD JCT. MP: 21.55

TO: EAST BRECKENRIDGE MP: 212.32

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

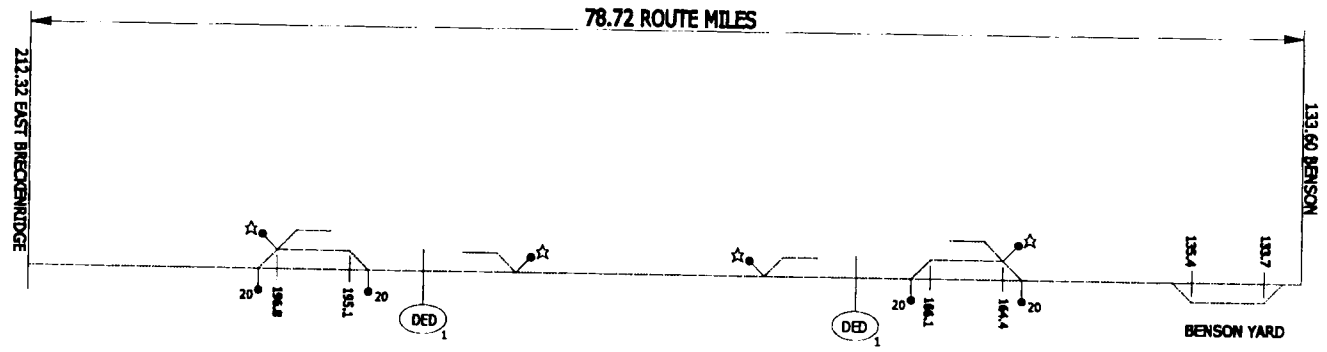
*OTHER TRACK MATERIAL

SSR - SWITCH POINT DERAIL

15 - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT



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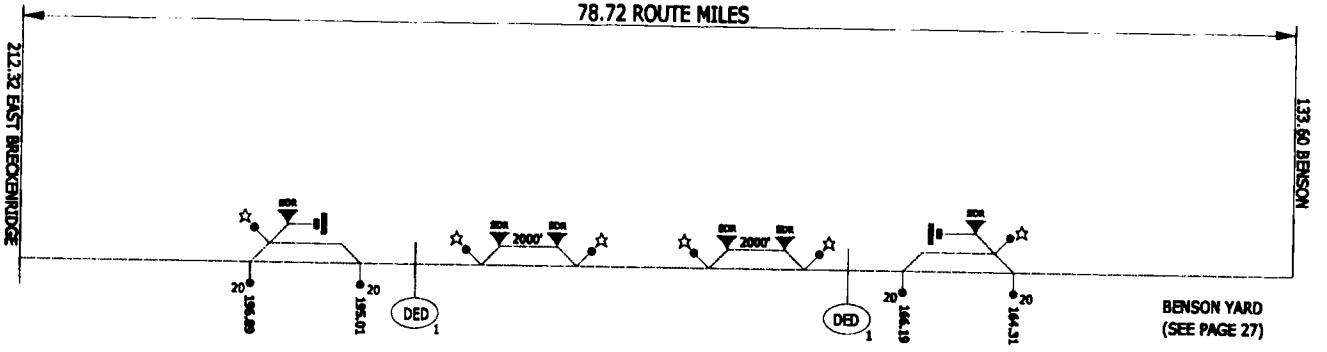


BNSF REPLY

DISTRICT:

MORRIS

← N

FROM: EAST BRECKENRIDGE MP: 212.32

TO: BENSON (APPLETON JCT.) MP: 133.60

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

SPR - SWITCH POINT DERAIL

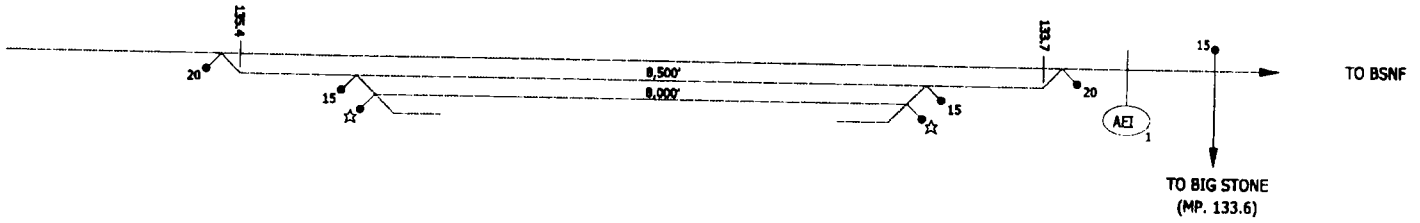
HDR - HINGED DERAIL

- WHEEL STOP

□ - COMPROMISE JOINT

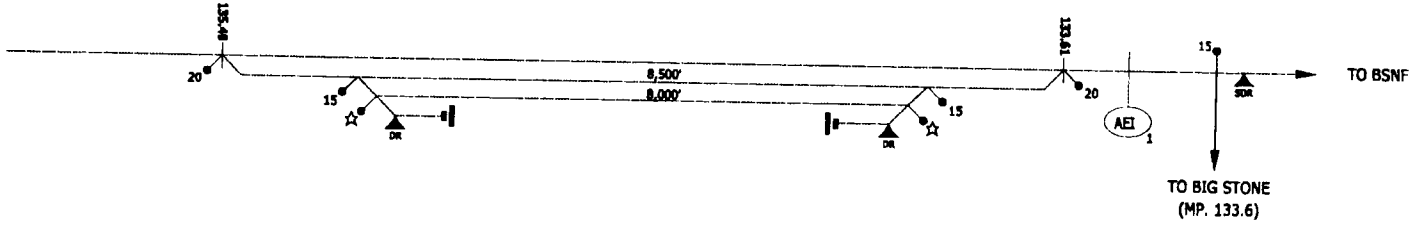
EXHIBIT III.F-4

BENSON YARD



OTP OPENING

BENSON YARD



BNSF REPLY

DISTRICT:

MORRIS

BENSON YARD

← N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

AEI 1 AUTOMATIC EQUIPMENT IDENTIFICATION SCANNER NUMBER OF TRACKS COVERED

20 TYPE TURNOUT

*TURNOUT TYPES

20 - #20 ELECTRIC

15 - #15 ELECTRIC

△ - #15 HAND-THROWN

☆ - #11 HAND-THROWN

*OTHER TRACK MATERIAL

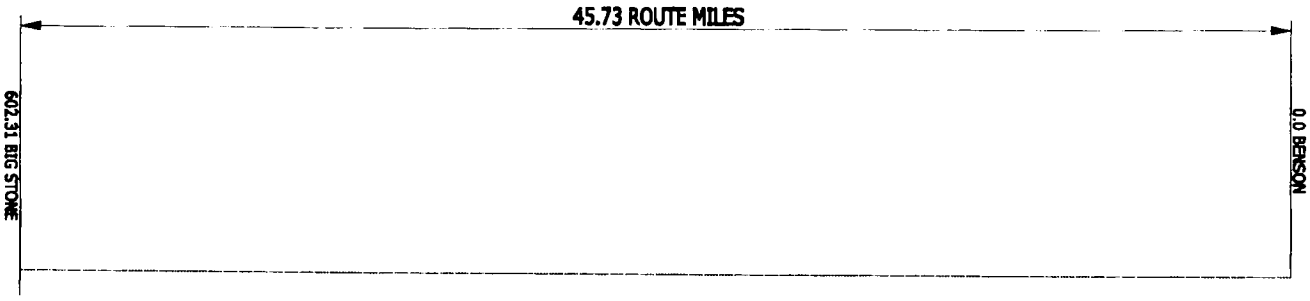
SDR - SWITCH POINT DERAIL

DR - HINGED DERAIL

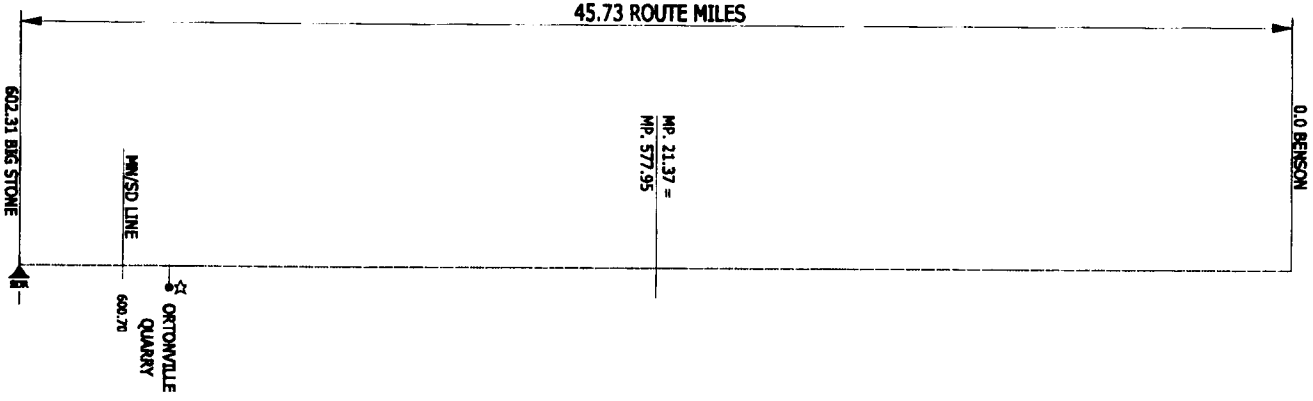
▮▮ - WHEEL STOP

⊏ - COMPROMISE JOINT

EXHIBIT III.F-4
Page 27



OTP OPENING



BNSF REPLY

DISTRICT:

APPLETON

FROM: BENSON MP: 0.0/577.95

TO: BIG STONE MP: 21.37/602.31

N

NOT TO SCALE

LEGEND:

136# RAIL

132# RAIL

132# RELAY RAIL

DED 1 DEFECTIVE EQUIPMENT DETECTOR NUMBER OF TRACKS COVERED

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EXHIBIT III.F-4
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REDACTED