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May 25, 2006

VIA HAND DELIVERY

Ms. Victoria Rutson
Chief
Section of Environmental Analysis
Surface Transportation Board
1925 K Street, N.W.
Washington, D.C. 20423

Re: **Tongue River Railroad Company, Inc. - Finance Docket 31086 (Sub-No. 3) - Construction and Operation of the Western Alignment**

Dear Ms. Rutson:

Please find enclosed a copy of the Revised Draft Section 404(b)(1) Showing of the Tongue River Railroad Company ("TRRC"). This copy of the Showing reflects the comments received from the U.S. Army Corps of Engineers on previous drafts of this document. It also reflects recent developments, notably the April 13, 2006 agreement reached between the Tongue River Railroad Company and the Montana Department of Fish, Wildlife & Parks concerning monitoring of vibration and noise impacts at the Miles City Fish Hatchery.

TRRC is agreeable to having the Revised Draft Showing incorporated into the Final Supplemental Environmental Impact Statement to be issued by SEA in this proceeding should you so decide. A final version of the Showing document will be submitted to the Corps at a later stage, following completion of the current STB process.

Please let us know if you have any questions.

Sincerely,

David H. Coburn
Sara Beth Watson
Attorneys for Tongue River Railroad Company, Inc.

cc: Mr. Ken Blodgett

Mr. Scott Steinwert
Ms. Mary Bean
Mr. Douglas Day
Mr. Rodney Schwartz
Ms. Karen L. Lawrence

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(b)(1) SHOWING

Prepared By:
The Tongue River Railroad Company, Inc.

Prepared For:
The United States Army Corps of Engineers
Omaha District-Regulatory Branch
Operations Division
North 17th Street
Omaha, Nebraska 68102-4978

May 2006

TABLE OF CONTENTS

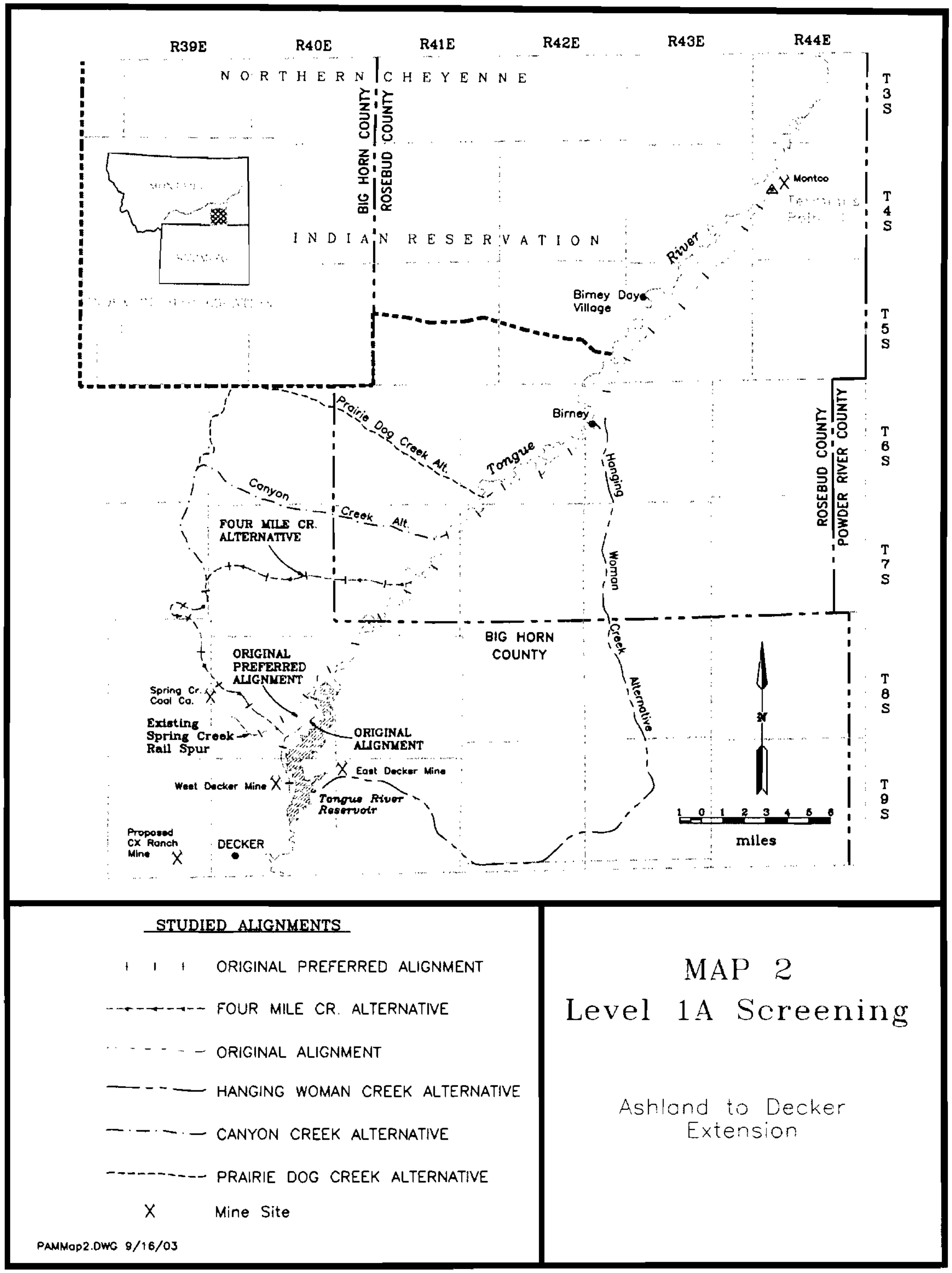
R39E
R40E
R41E
R42E
R43E
R44E
T 3 S
T 4 S
T 5 S
T 6 S
T 7 S
T 8 S
T 9 S
NORTHERN CHEYENNE
INDIAN RESERVATION
BIG HORN COUNTY
ROSEBUD COUNTY
POWDER RIVER COUNTY
Montco
Birney Day Village
Birney
Tongue River
Prairie Dog Creek Alt.
Canyon Creek Alt.
Hanging Woman Creek Alternative
FOUR MILE CR. ALTERNATIVE
BIG HORN COUNTY
ORIGINAL PREFERRED ALIGNMENT
ORIGINAL ALIGNMENT
Spring Cr. Coal Co.
Existing Spring Creek Rail Spur
West Decker Mine
East Decker Mine
Tongue River Reservoir
Proposed CX Ranch Mine
DECKER
N
miles
STUDIED ALIGNMENTS
ORIGINAL PREFERRED ALIGNMENT
FOUR MILE CR. ALTERNATIVE
ORIGINAL ALIGNMENT
HANGING WOMAN CREEK ALTERNATIVE
CANYON CREEK ALTERNATIVE
PRAIRIE DOG CREEK ALTERNATIVE
X Mine Site
PAMMap2.DWG 9/16/03
MAP 2
Level 1A Screening
Ashland to Decker Extension

TABLE OF TABLES

Page

LIST OF MAPS

APPENDICES

EXECUTIVE SUMMARY

The Tongue River Railroad Company, Inc. (TRRC) is applying for a Section 404 permit for an approximate 120 mile rail line in Custer, Powder River, Rosebud and Big Horn Counties, Montana. In 1986 the Interstate Commerce Commission (ICC) approved an 89 mile routing from Miles City to Ashland (TRRI). In 1996 the Surface Transportation Board (STB), the successor to the Interstate Commerce Commission, approved a 41-mile extension of the rail line from Ashland to Decker (TRRII).

In 1998 TRRC filed an application with the STB to construct and operate the railroad utilizing a different alignment, know as the Western Alignment, for the southernmost 17.3-miles of the extension approved by the STB in 1996 (TRRIII). In the 1998 application, TRRC also proposed minor refinements to the alignment between Miles City and Ashland to improve operations and reduce construction costs. The Western Alignment and the alignment modifications were analyzed in detail by the STB in the 2004 Draft Supplemental Environmental Impact Statement (2004 DSEIS).

The purpose of the Tongue River Railroad is to provide for the transport of low-sulfur coal from existing and future coal mines in southeastern Montana and to provide an alternate routing for coal originating from Wyoming mines. The railroad would provide a more efficient means of transporting coal from existing mines and would enable the development of proposed mines in the Ashland and Otter Creek area to go forward.

The project must be evaluated by the US Army Corp of Engineers (USCOE) to determine its compliance with the 404 (b)(1) Guidelines for Specifications of Disposal Sites for Dredged or Fill Material (Guidelines). The purpose of this Showing Document is to demonstrate to the USCOE that the route approved by the ICC and the STB, modified as described in this Showing Document (the Proposed Action), fully complies with the Guidelines. TRRC believes that the Proposed Action is the least environmentally damaging practicable alternative and that this Showing Document and the material referenced herein provide sufficient information for such a determination. Therefore, the 404 permit should be granted.

This document presents the results of the evaluation conducted pursuant to USCOE's Practicable Alternatives Evaluation-Section 230.10A Guidelines. The alternatives evaluation includes the entire TRRC rail line from Miles City to Decker. Table 1 on page 3 summarizes the analyses conducted during the Level 1A, 1B and 2 Screening Analyses for the various alternatives considered in TRRI, TRRII and TRRIII.

The Proposed Action has the least impact on the total acreage of Waters of the U.S. The Environmental Impact Statement (EIS) in TRRI found that it was the only alternative that did not impact areas with significant aquatic habitat value and significant aquatic species value. While it has the potential to impact the Miles City Fish Hatchery, the identified impacts can be avoided or mitigated as discussed at pages 23 to 27 below. The Proposed Action also has the least impact on the Livestock and Range Research

Station (LARRS) as it follows the fence boundaries and would not cross research plots. Changes to the configuration of the LARRS research plots would impact the many years of baseline data making it difficult, if not impossible, to meaningfully relate the past data to future studies as discussed in more detail on pages 19 to 21. Map 1A on page 31 shows the impacts of the various alternatives on LARRS.

The Proposed Action meets the project's purpose and needs as well as the railroad's operational criteria. The Tongue River Road and Moon Creek Alternatives can be eliminated due to their substantial environmental impacts, including greater impacts to Waters of the U.S. Moreover, because of adverse grades, the Colstrip Alternative would have substantially higher long-term operational and maintenance costs, and result in greater fuel consumption and increased air emissions as compared to the Proposed Action. The Four Mile Creek Alternative has significant adverse grades resulting in operational and safety concerns that would severely impact the viability of the railroad. In addition, it would impact more acres of Waters of the US than the Proposed Action. Moreover, the Four Mile Creek Alternative is longer than the Proposed Action, has additional road crossings, requires reconstruction of State Highway 312 and is closer to more residences than the Proposed Action. The No Action Alternative using the existing BNSF lines provides no service to the proposed Ashland and Otter Creek area mines and no improvement in service to the Decker area mines.

Given all of the above factors, TRRC believes that the best practicable and least environmentally damaging alternative is the Proposed Action. The Proposed Action meets the design and the operational criteria for the railroad, provides for the economic transport of coal for the proposed Ashland/Otter Creek area mines and reduces the transportation distance for the Decker and some Wyoming area mines. The Proposed Action thus meets the purpose and need of the project. The Proposed Action also impacts the fewest acres of Waters of the US and has the least impacts to sensitive aquatic habitats.

Initial concerns were raised about the Proposed Action impacting the Miles City Fish Hatchery, including concerns about the impact of train vibrations. The Hatchery, which was constructed in the 1940's, is operated by the Montana Department of Fish, Wildlife & Parks ("FW&P"). Among other fish that are raised at the Hatchery, pallid sturgeon are raised there under a federally-funded program operated in coordination with the U.S. Army Corps of Engineers. The pallid sturgeon program is designed to restock the sturgeon population in the Yellowstone and Missouri Rivers. Various studies have shown, according to TRRC's consultants, that there is little to no likelihood of negative impacts to the Hatchery due to vibration and noise connected with the construction and operation of the line. Moreover, in April 2006, TRRC agreed to conduct a vibration monitoring study at the Hatchery and, if warranted by the outcome of that study, to conduct more detailed studies and assess if mitigation measures addressed to any possible vibration and noise impacts are needed. It is expected that the agreement between TRRC and FW&P on these matters will be incorporated by the STB as a condition to TRRC's right to construct and operate the line. TRRC has agreed to that condition. See Appendix 6. Other potential impacts regarding protection of the Hatchery's water supply lines, coal dust, and weed control management would be mitigated through measures the Applicant has developed in consultation with the Montana Department of Fish, Wildlife & Parks. It is expected that the mitigation will be reflected in conditions imposed by the STB to its approval of TRRC's construction and operation of the rail line. TRRC has agreed to such conditions. Thus with mitigation, the Proposed Action would have no significant impacts on the Hatchery. The Proposed Action also limits impacts to the research on sustainable development of rangeland resources at USDA Ft. Keogh Livestock and Range Research Station.

Table 1
Summary of Screening Analyses

Alternative[1]	Level 1A	Level 1B	Level 2
Miles City to Ashland			
Proposed Action	Pass	Pass	Pass/ Least Environmentally Damaging, Practicable Alternative
BN Option	Pass	Pass	Included in Proposed Action
Milwaukee Road	Fail	NA	NA
Custer County/LARRS Option	Fail	NA	NA
IntraSearch/LARRS Option	Fail	NA	NA
LARRS/Tongue River Option	Pass	Pass	Modified alignment consistent with ROW across LARRS; included in the Proposed Action.
Initial Option through LARRS	Fail	NA	NA
IntraSearch, East of Miles City	Fail	NA	NA
Option in T4N R47E	Fail	NA	NA
Ashland NW Alignment	Pass	Pass	Greater impacts on the Ashland community and the Tongue River than Ashland SE Alignment
Optional Route through Ashland	Fail	NA	NA
Ashland SE Alignment	Pass	Pass	Pass/ Least Environmentally Damaging, Practicable Alternative; included in Proposed Action
Decker Route	Fail	NA	NA
BLM Route	Fail	NA	NA
Tongue River Road Route	Pass	Pass	Fail
Moon Creek Route	Pass	Pass	Fail
Colstrip Route	Pass	Pass	Fail
Ashland to Decker Extension			
Four Mile Creek	Pass	Pass	Approved in TRR II
Original Preferred Alignment	Pass	Pass	Fail
Prairie Dog	Fail	NA	NA
Canyon Creek	Fail	NA	NA
Hanging Woman Creek	Fail	NA	NA
Western Alignment	Pass	Pass	Pass; Least Environmentally Damaging, Practicable Alternative; included in the Proposed Action

[1] These alternatives are shown on the map on page 30.

INTRODUCTION

The Tongue River Railroad Company, Inc.[2] (TRRC) has received approval from the Surface Transportation Board (STB) to construct approximately 120 miles of railroad in Custer, Powder River, Rosebud and Big Horn Counties, Montana. The STB's predecessor, the Interstate Commerce Commission (ICC), in 1986, approved an approximate 89-mile routing from Miles City to Ashland (TRRI).[3] The northern terminus of the proposed rail line originally included a tie-in through the abandoned Milwaukee Road Rail Yards near the center of Miles City. Subsequently, a Burlington Northern (BN) Option was developed which includes a direct tie-in with the BNSF line south and west of Miles City. The BN Option was analyzed in detail in the 1984 Supplement to the Draft Environmental Impact Statement[4] (1984 SDEIS) and became part of the Proposed Action approved by the ICC in 1986.

A 41-mile extension from Ashland to Decker was approved by the STB in 1996 (TRRII).[5] In 1998 TRRC filed an application with the STB to construct the railroad utilizing a different alignment for the southernmost 17.3-miles of the extension than the alignment previously approved by the STB in 1996 (TRRIII).[6] This new alignment is referred to as the Western Alignment. In addition to requiring STB authorization to construct and operate the Western Alignment, the project will require the issuance of a Section 404 Permit from the U.S. Army Corps of Engineers (USCOE) for actions along the entire route that involve the discharge of dredged and fill material into the waters of

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[2] All of the assets of Tongue River Railroad Company, a limited partnership, were acquired by TRRC, Inc., a corporation, in 1998. See Tongue River Railroad Company, Inc. – Acquisition and Operation Exemption – Tongue River Railroad Company, Finance Docket No. 33644 (served November 13, 1998). The STB approved substitution of TRRC, Inc. for the limited partnership as the applicant. Tongue River Railroad Company – Construction and Operation – Western Alignment, Finance Docket No. 30186 (Sub. No. 3) (served Aug. 28, 2003).

[3] See Tongue River Railroad Company – Rail Construction and Operation – In Custer, Powder River and Rosebud Counties, Montana, Finance Docket No. 30186 (Miles City to Ashland) (not printed) (served Sept.4, 1985), modified, (not printed) (served May 91, 1986).

[4] Supplement to Draft Environmental Impact Statement Finance Docket No. 30186 January 19, 1984.

[5] Tongue River Railroad Company – Rail Construction and Operation Of An Additional Line from Ashland to Decker, Montana, Finance Docket No. 30186 (Sub. No. 2) (not printed) (served Nov. 8, 1996).

[6] In March 2000, TRRC requested that the STB suspend further work on its application. In December 2002, TRRC advised the STB that it was in a position to move forward and asked the STB to resume its work. STB published an Amended Final Scope of the Supplemental Environmental Impact Statement on August 22, 2003. 68 Fed. Reg. 50,829 (2003).

the United States, including streams and wetlands.[7] The project also will require the issuance of Right of Way (ROW) easements from the U.S. Bureau of Land Management (BLM) to cross certain BLM administered lands, ROW easements from the Montana Department of Natural Resources and Conservation (MDNRC) to cross certain state lands including certain state school trust lands, an easement from the Montana Department of Fish, Wildlife and Parks (FW&P) to cross the Fish Hatchery at Miles City, as well as various state permits related to construction of the railroad. The U.S. Department of Agriculture (USDA), Agricultural Research Service, granted an easement deed for crossing the Livestock and Range Research Station (LARRS) facility to the TRRC in May 1989.

The purpose of this document is to demonstrate, from the Applicant's perspective, that the construction of the rail line from Miles City to Decker via the Western Alignment ("the Proposed Action") complies with the 404(b)(1) Guidelines and to facilitate the issuance of the Section 404 Permit to the TRRC for the construction of the Tongue River Railroad. It does not necessarily represent the USCOE's conclusions with regard to the project and should not be construed as the USCOE's 404(b)(1) evaluation.

In connection with the application for the Western Alignment, the STB is preparing a Supplemental Environmental Impact Statement (SEIS) that will address the impacts concerning the construction of the Western Alignment and also address impacts related to changed circumstances along the remainder of the Miles City to Decker line. The STB is the "lead Federal Agency" for the SEIS. The USCOE, the BLM, and the MDNRC, on behalf of all interested Montana state agencies, including FW&P, have been designated as "Cooperating Agencies" for the SEIS and are participating throughout the SEIS process. The USCOE also participated as a Cooperating Agency in the preparation of the 1985 EIS for the Miles City to Ashland routing. USCOE was not a Cooperating Agency for the 1996 EIS for the extension from Ashland to Decker; however, the STB's Section of Environmental Analysis requested and received input from USCOE on the 1996 EIS.

The 2004 DSEIS, the 1985 EIS and the 1996 EIS are intended to serve as the NEPA compliance decision documents for the USCOE Section 404 Permit for the Proposed Action. In addition to addressing the requirements of NEPA, the USCOE must evaluate whether the Proposed Action meets the requirements of Section 404 of the Clean Water Act (33 U.S.C. 1344) and the EPA Guidelines for Specification of Disposal Sites for Dredged or Fill Material (40 C.F.R. Part 230)(hereinafter EPA Guidelines). This document will address the latter requirements.

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[7] USCOE previously issued a Section 404 permit for the rail line from Miles City to Ashland; however, that permit has expired.

PRACTICABLE ALTERNATIVES EVALUATION – SECTION 230.10A

The following section describes the steps taken to identify and evaluate alternatives to the Proposed Action for the Miles City to Ashland line and the Ashland to Decker extension and explains how the steps were used to consider and evaluate various alternatives.

PRACTICABILITY SCREENING METHODOLOGY

The following sequential steps have been taken to evaluate potential alternatives including the Proposed Action, and to identify the practicable alternative that would reasonably have the least amount of impact to the Waters of the U.S. and aquatic resources. The 1985 EIS considered alternatives for the Miles City to Ashland routing and the 1996 EIS considered alternatives for the Ashland to Decker extension. In both cases the EISs considered alternatives that are deemed to be reasonable as required under NEPA; however this document addresses alternatives strictly on the basis of practicability as defined in 40 C.F.R. § 230.3 (q)[8].

Step 1. Define the Project's Purpose and Need.

Step 2. Identify a Range of Practicable Alternatives.

Step 3. Level 1 Screening.

Level 1A Screening

Identify and determine the practicability of routes based on the project's purpose and evaluate the routes using specified criteria regarding impact to land and water resources, railroad design and operation standards and costs. For this step the Miles City to Ashland line, approved by the ICC in 1986, and the Ashland to Decker extension, approved by the STB in 1996, are considered separately. At the time TRRC filed its original application seeking authorization to construct the Miles City to Ashland rail line, the construction of the Ashland to Decker extension was not envisioned. The ICC granted TRRC's original application in 1986 -- five years before TRRC filed its application to construct the Ashland to Decker extension. Thus, it was after TRRC received authorization from the ICC to construct the Miles City to Ashland rail line that TRRC decided to extend that rail line to Decker, Montana and began to identify potential routes for an Ashland to Decker extension.

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[8] The regulations define "practicable" as "available and capable of being done after taking into consideration costs, existing technology, and logistics in lights of overall project purpose." 40 C.F.R. § 230.3(q).

Level 1B Screening.

Perform practicability analysis on those alternatives that were reviewed in detail in the environmental documents from the prior two Tongue River proceedings. Consistent with the Level 1A screening, the Miles City to Ashland line is considered separately from the Ashland to Decker extension, as the alternatives for each were considered separately in the two prior Tongue River Proceedings.

Step 4. Level 2 Screening.

Identify environmental impacts of the practicable alternatives, compare impacts to the Waters of the U.S. among the identified practicable alternatives and determine whether any of the alternatives would have other significant adverse environmental impacts.[9] Identify those alternatives with very similar environmental consequences.

STEP 1 PROJECT PURPOSE AND NEED

The purpose of the Tongue River Railroad is to provide for the transport of coal from existing and future coal mines in southeastern Montana and to provide an alternate routing for coal originating from Wyoming mines. The Proposed Action would provide a more efficient means of transporting coal from existing mines in the region and would enable development of proposed mines in the Ashland area to go forward.

At its southernmost point, the TRRC will connect with the Burlington Northern Santa Fe Railway Company (BNSF) at Spring Creek/Decker. At the northernmost point, TRRC will connect with BNSF at Miles City. Use of TRRC's line will reduce the current transportation distance for coal mined in the upper Powder River Basin (both in Montana and Wyoming) by approximately 160 to 175 miles on 750 to 1,000 mile hauls to electric utilities in the upper Midwest and Great Lakes regions (or round-trip mileage savings of 320 to 350 miles). Significant savings in transportation, maintenance and equipment costs would result, as well as reductions in the use of diesel fuel.

Construction of the Tongue River Railroad also will provide, for the first time, rail service to the largest remaining undeveloped reserves of low sulfur, high Btu, sub-bituminous coal in the United States, which is located near Ashland, Montana. The U.S. Clean Air Act Amendments of 1990 have created a strong market for low-sulfur coal that can be burned in electric utility boilers without the need for costly flue gas desulphurization units. In addition, the increasing demand for electrical generating capacity in the U.S. continues to focus the utility generation industry on the availability of high quality, economic coal reserves. The Powder River Basin of Wyoming and

[9] In determining if there is a practicable alternative which would have less of an impact on the aquatic ecosystem, USCOE must consider whether the alternative has other significant adverse environmental consequences. 40 C.F.R. §230.10(a).

Montana contains the great majority of the U.S. reserves of low-sulfur coal. Existing mines near Decker will yield less production as their resources dwindle, but this can be offset by new mine development in the Ashland area. The Tongue River Railroad is essential to the development of the Ashland area mines, which have no alternative means of economic transport without the railroad. The State of Montana has recently acquired an estimated 530 million tons of coal reserves from the federal government in the Otter Creek Tracts near Ashland and is actively pursuing the timely development of these coal assets.

Wyoming and Decker area mines also could use the Tongue River Railroad. The three existing low-sulfur coal mines in the Decker area (East and West Decker and Spring Creek) currently transport their production to Midwestern utilities by way of the BNSF line through Sheridan, Wyoming and Hardin, Forsyth and Miles City, Montana. The Tongue River Railroad would allow this coal to be shipped directly to Miles City saving up to 350 miles on each roundtrip coal train to the Midwest. In addition to Decker area coal, BNSF currently transports some Wyoming coal over the circuitous Sheridan-to-Miles City route to these upper Midwestern markets. At least some of this Wyoming coal is likely to move over the TRRC line.

Thus, the Tongue River Railroad is a critical element in the future of Montana coal production and will produce benefits that will accrue to the state and to local governments from the tax revenues associated with this production. The TRRC has attracted broad political support in Montana, as well as support from BNSF and from the utilities that would benefit from the coal transported by the Tongue River Railroad.

A more detailed discussion of the purpose and need for constructing the Tongue River Railroad is provided in Chapter 2 of the 2004 DSEIS.

STEP 2 IDENTIFY RANGE OF PRACTICABLE ALTERNATIVES

Potential routing alternatives were identified separately for the Miles City to Ashland line and for the Ashland to Decker extension. This occurred because, as stated above, at the time TRRC filed its original application seeking authorization to construct the Miles City to Ashland rail line it had not yet envisioned constructing the Ashland to Decker extension. Thus, it was after TRRC received authorization from the ICC to construct the Miles City to Ashland rail line that TRRC decided to extend that rail line to Decker, Montana and began to identify potential routes for an Ashland to Decker extension.

The initial TRRC line and the extension will therefore be addressed separately here and in the Level 1 screening discussions. The Level 2 screening analysis looks at the practicable alternatives for the Miles City to Ashland line and the Ashland to Decker extension and also considers the Western Alignment and proposed modifications to the Miles City to Ashland line.

Miles City to Ashland Line

The first step in the development of the Miles City to Ashland line was to identify routes to meet the project's objectives. Prior to the selection of any rail alignments certain design, operational and environmental criteria were developed. These criteria were:

- Identify and try to avoid to the extent practicable developed agricultural, residential and commercial properties;
- Minimize the encroachment of the railroad on the alluvial floor of the Tongue River Valley;
- Minimize the number of crossings of public and private roads, trails and other transportation features including water storage and transmission structures, such as irrigation reservoirs, canals and ditches;
- Avoid grades on main track in excess of 1.0 percent compensated for curve;
- Provide for maximum degree of curve for main tracks not in excess of 3 degrees;
- Allow for a rate of change for vertical curves of 0.05ft. /100 ft. in sags and 0.10ft/100ft. at summits;
- Minimize the distance of the coal haul;
- Maximize the operating characteristics of the rail line.

Ashland to Decker Extension

The Ashland to Decker Extension is an extension of the Miles City to Ashland alignment and the same criteria set forth above were used in developing and considering the alternatives for the extension.

STEP 3 LEVEL 1 SCREENING

Level 1A Screening

Miles City to Ashland Line

The topography of the region limits the number of feasible alignments meeting the criteria noted above. Initially TRRC attempted to develop and evaluate possible alignments into and out of both Miles City and Ashland as well as optional alignments to connect the approaches to the two cities considering various operational, construction and environmental factors. In addition, a no action alternative and alternative modes of transportation were considered.

The No Action Alternative would provide no rail service to the Ashland area, and, thus foreclose economic transport of new mine production of low-sulfur coal from the

Ashland area. The No Action Alternative is discussed in the 1985 EIS and in the Level 1B screening at page 37.[10] The alternative modes of transportation, all of which were ultimately rejected due to feasibility and/or environmental concerns, are summarized in Table 2. Six alternatives were considered in the Level 1A screening and the 1985 EIS. In addition, several options that generally followed the proposed route but provided alternatives to it are discussed on pages 18 to 26. These routings, which were variations on the routings around Miles City and Ashland, were developed in response to public and agency comments. Moreover, the 1984 SDEIS looked at impacts of a modification of the proposed routing near Miles City, including impacts to the Miles City Fish Hatchery and the USDA Livestock and Range Research Station, and is discussed below.

Alternative Modes of Transportation

The ICC's Section of Energy and Environment (SEE), the predecessor to the STB Section of Environmental Analysis, looked at four alternative modes of transportation: (1) coal slurry pipeline; (2) conveyor belt system; (3) hauling by truck: and (4) mine - mouth generation of electricity. The discussion from Appendix B of the 1983 draft EIS[11] on each of these alternatives is summarized briefly below and in Table 2 on page 13. Each of the alternative methods of transportation poses a number of engineering, legal and environmental problems and is not feasible.

A Coal Slurry Pipeline would require several components including: (1) a coal slurry preparation facility; (2) a water supply system; (3) a 24-inch pipeline; (4) pump stations; and (5) a dewatering plant and loading facility. Such a system would require a minimum 30-foot ROW and could consume an estimated 7,200 acre-feet of water per year. Appendix B at B-4. Appendix B concluded that a slurry pipeline would not be economically competitive with a unit train over the distances to be considered for the Miles City to Ashland segment. Moreover, there are numerous legal and environmental constraints on the construction of a slurry pipeline in Montana, including water rights. Water availability also is an important environmental concern given the relatively arid nature of southeastern Montana. Appendix B at B-11 and B-12.

A Conveyor System also would require several components including: (1) storage and loading facilities; (2) a series of sections of conveyor belts; and (3) unloading, storage and loading facilities at the railhead. The conveyor system would be covered and would contain a belt, 48 inches wide, on which the coal would be transported. Appendix B at B-5. The conveyor system was eliminated as not economical given the 89-mile distance. The additional costs of this mode of transportation would have a negative impact on the ability to market the coal. While Appendix B concluded that construction of a conveyor system would pose environmental problems similar to the building of a

[10] See Appendix B 1983 Draft Environmental Impact Statement, Finance Docket No. 30186 (hereinafter Appendix B.)

[11] A complete copy of the 1983 DEIS will be submitted to the USCOE with the final copy of the Showing. Copies of the pages referenced in this section are included in Appendix 1.

railroad, it also concluded that a conveyor belt would have significantly greater impacts on air quality. In addition, it would present a significant barrier to wildlife, and its operations would raise issues related to security of the system and maintenance of the system. Appendix B at B-12.

Hauling by Truck to an existing railhead would require approximately 300, 50-ton trucks and the construction of a separate, hard surface roadway and storage and loading facilities at the railhead and vehicle maintenance shops for the trucks. Appendix B at B-5. Hauling by truck was eliminated due to its higher costs and significant environmental impacts. Appendix B concluded that truck haulage of coal would impact air quality due to fugitive dust from the road and significant impacts from the trucks' diesel exhaust. In addition, Appendix B concluded that the large number of trucks that would be required could increase the number of vehicle accidents. Appendix B at B-12 through B-14.

Locating a Mine-Mouth Electrical-Generating Plant in the Ashland/Birney area would require the construction of the generating plant and high voltage transmission lines to a destination where they could join the existing transmission grids serving the same customers as would coal transported by the railroads. A large volume of water would be required for the operation of the power plant, typically 7 to 8 tons of water per ton of coal burned. Appendix B at B-5. This alternative was rejected due to the environmental difficulties with establishing a mine-mouth generating plant. The availability of the large amount of water needed for the plant would be questionable in the arid southeast Montana area, according to Appendix B at B-14.

Table 2
Level 1A Screening Analysis
Comparison of Alternative Modes of Transportation

Alternative	Engineering, Cost and Environmental Factors	Results
Railroad	More economical than other transportation methods; less impact to water resources than coal slurry or mine-mouth generation; less air impacts than conveyor system or truck haulage.	Feasible; ICC approved construction of a line from Miles City to Ashland in 1986.
Coal Slurry	Higher cost than rail transportation; use of water for transport of coal outside of Montana is contrary to Montana state law; impacts to water availability and quality	Not Feasible
Conveyor	Higher cost than rail would have a negative impact on ability to market coal; concerns regarding the security of the system; right-of-way acquisition would be difficult; greater air impacts than rail; presents a significant barrier to wildlife	Not Feasible
Truck Haulage	Higher cost than rail; additional acreage disturbed; impacts to air quality; noise and vibration concerns; energy consumption; increase in vehicle accidents due to large number of trucks required	Not Feasible
Mine-mouth Generation	Issues with the construction of transmission lines including ROW issues; water quality and socioeconomic impacts	Not Feasible

Alternative Rail Alignments

TRRC developed and evaluated possible alignments into and out of Miles City and Ashland that met the criteria outlined in Step 2 and which considered the following factors.

- Impact on agricultural, residential and commercial properties;
- Impact to the USDA Livestock and Range Research Station (LARRS) (also known as the Fort Keogh Range Experimental Station);
- Number of crossings or conflicts with the Tongue River;
- Number of county or state highway crossings;
- Number and length of bridges;
- Total curvature;
- Total cut;
- Total fill;
- Ruling grade[12];
- Length of ruling grade;
- Total length;
- Total costs;
- Operating characteristics.

Taking into account the engineering constraints, environmental concerns and comments from private landowners, further refinements were developed.

Appendix B to the 1983 draft EIS discusses several alternatives that SEE identified. SEE solicited input and suggestions regarding possible alternatives from a number of sources including several federal, state and local agencies and groups which were designated as ("cooperating agencies"), and the public at large. The designated cooperating agencies were USCOE, the U.S. Department of Agriculture, the Federal Railroad Administration, the Montana Department of State Lands, the Custer County Planning Board, the Powder River County Commissioners and the Northern Cheyenne Indian Tribe.

In addition to the proposed alignment, five alternatives, summarized in Table 3, were considered. The five, which are identified on Map 1 on page 30, were:

- Decker Route
- Bureau of Land Management (BLM) Route

[12] "Ruling grade" is the maximum adverse grade that governs the amount of locomotive power required for a certain operating rail line. Some short-sections of grade may be steeper than the ruling grade, but because they are shorter than the length of the train (usually about 6,400 feet long for a unit coal train) they usually do not hinder the operational capacity of the locomotives. Ruling grades are usually the steepest grades that exceed the length of the loaded train.

- Tongue River Road Alternative
- Moon Creek Alternative
- Colstrip Alternative

Two of these alternatives, the Decker Route and the Bureau of Land Management Route, were eliminated as not meeting the operational and design criteria outlined above. Each is discussed briefly below. The three remaining alternatives: Tongue River Road, Moon Creek, and Colstrip, as well as the Preferred Alignment, are discussed in the Level 1B screening.

The Decker Route would originate at a point just west of the Tongue River Reservoir, where it would join the Burlington Northern Santa Fe (BNSF) spur now serving the Spring Creek Mine. The route heads north for approximately 10 miles from the BNSF line before turning due east for approximately 8 miles. At that point, the route would cross to the east side of the Tongue River and follow the river in a generally northeasterly direction to the site of the proposed Montco Mine, about 8.9 miles south of Ashland. From the Montco site, the route would continue north to an area near Ashland suitable to turn up the Otter Creek drainage and form a terminus some 7.7 miles southeast of Ashland. This route was rejected because it would result in increased operational costs, environmental concerns and potential negative impact to rail traffic in Sheridan, Wyoming. The number of locomotives needed to transport coal over the line due to the steep ruling grade raises the operational and maintenance costs significantly. Marketing problems for coal hauled over the Decker Route would be substantial. Coal traveling over this route would have an initial terminus in Sheridan, Wyoming. The coal would then have to be shipped via BNSF to Hardin, Montana, and then to Miles City for eventual transportation to markets in the Midwest. Finally, the direction of coal transport through the Sheridan, Wyoming, area could create a "bottleneck" at that point. Further concentration of coal shipment would not only affect the movement of coal and other commodities, but might have significant socioeconomic impacts on northern Wyoming communities. For these reasons SEE eliminated the Decker Route from further consideration as a reasonable alternative to the proposed rail line. Appendix B at B-16.

The Bureau of Land Management (BLM) Route is essentially a high ground route, starting at a juncture with the BNSF line west of Miles City and heading in a southwesterly direction across the hilly country west of the Tongue River valley. Generally, this route would parallel the Tongue River drainage for approximately 40 miles, at which point it would drop into the valley, cross the Tongue River, and continue south past Ashland via the route of the proposed rail line. This route would include a crossing of the Moon Creek drainage near the Tongue River/Yellowstone River divide. This route was rejected because of increased construction and operation costs and environmental problems. The suggested railroad route would have to climb approximately 400 feet from the valley before eventually dropping into the Moon Creek drainage. Extra locomotives would be required to pull a unit train up this grade, thereby adding to operating costs. Furthermore, this alignment would necessitate substantial amounts of cut and fill in order to cross the rougher terrain. The amount of cut and fill necessary to cope with the rough terrain would impact more acreage during the construction phase. The U.S. Fish and Wildlife Service expressed concern over the possible effects of this alignment to wildlife populations in the area. For these reasons, the BLM Route was eliminated by the SEE from further consideration as a reasonable alternative to the proposed rail line. Appendix B at B-16.

Table 3
Level 1A Screening
Rail Alternatives: Miles City to Ashland

Alternatives	Operating Characteristics	Issues	Results
Proposed Action	0.2% ruling grade against loads, 30-ft total rise against load, 15,000 ft total length of ruling grade, requires 3 locomotives for operations.[13]	Disturbance of research at LARRS	Included in Level 1B Screening and EIS.
Decker Alternative	1.0% ruling grade against loads, 1,000-ft total rise against load, 80,000 ft length of ruling grade against loads, requires 5 locomotives for operations.	Greatest rise against load of all the alternatives. Steep grades and additional locomotives substantially increase the long-term operating and maintenance costs of the alternative. Increased mileage and cost to markets in upper midwest	Eliminated from further consideration due to engineering, operating and environmental reasons.
BLM Alternative	1.0% ruling grade against loads, 450-ft total rise against load, 40,000 ft length of ruling grade against loads, requires 4 locomotives for operations.	Increased mileage, increased ROW acreage required, substantial cuts/fills, increased mileage to market place. Steep operating grades and additional locomotives result in high long-term operating and maintenance costs.	Eliminated from further consideration due to engineering and environmental reasons.

[13] The models in 1985 called for two locomotives; however in 1991 the model was changes to require three locomotives due to longer trains. The 2005 train performance model runs confirm that 3 locomotives will be required. See discussion below on page 39.

Alternatives	Operating Characteristics	Issues	Results
Tongue River Road Alternative	0.85% ruling grade against loads, 380-ft total rise against load, 18,500 ft length of ruling grade against loads, requires 4 locomotives for operations.	Substantial cuts & fills, rebuild Tongue River road, require right of way from County. Steep grades and added locomotives result in high long-term operating and maintenance costs.	Included in Level 1B Screening and EIS, potential reasonable alternative, uses existing transportation right-of-way,
Moon Creek Alternative	1.0% ruling grade against loads, 400-ft total rise against load, 40,000 ft length of ruling grade against loads, requires 5 locomotives for operations.	Substantial cuts & fills, additional rail mileage, impact to wildlife resources. Steep grades and additional locomotives result in high long-term operating and maintenance costs.	Included in Level 1B Screening and EIS, potential reasonable alternative, avoids LARRS.
Colstrip Alternative	0.85% ruling grade against loads, 600-ft total rise against load, 31,000 ft length of ruling grade against loads, requires 4 locomotives for operations.[14]	Substantial cuts & fills, additional rail mileage, significantly longer hauls to upper midwest market. Very high long term operating and maintenance costs. Also must factor in the additional mileage from Colstrip to Forsyth to Miles City.	Included in Level 1B Screening and EIS, potential reasonable alternative though longer hauls result.

[14] Note that the 2005 train performance model runs indicate that 5 to 6 locomotives will be required due to heavier loads.

Additional Options For Routings Around Miles City and Ashland

In addition, SEE also considered several options which generally followed the proposed route, but presented various alternatives to it. The alternatives were considered to address potential impacts to LARRS, the Miles City Fish Hatchery and the City of Ashland. These routes are briefly described below and in Table 4 on pages 27 to 29. In addition, Map 1 on page 30 also shows nine of these options. Map 1A on page 31 shows a more detail view of the area around LARRS and the Fish Hatchery. The eleven alternatives considered were (1) Custer County/LARRS Option; (2) IntraSearch/LARRS Option; (3) LARRS Tongue River Option; (4) Proposed Rail Line through LARRS; (5) IntraSearch, East of Miles City; (6) Option in Township 4 North/Range 47 East; (7) Ashland N.W. Alignment; (8) Optional Route through Ashland; (9) Ashland SE Alignment; (10) BN Option; (11) Milwaukee Road Option. Options 3, 7, 9 and 10 were incorporated into the Preferred Alternative considered in the 1985 EIS and are discussed in the Level 1B screening. The reasons for rejecting the other options are described briefly below.

Options Related to Potential Impacts to LARRS

Early in the consideration of the Proposed Action USDA raised concerns about potential impacts to LARRS. LARRS was originally established as an army cavalry post, Ft. Keogh, in 1876 and in 1924 jurisdiction of the Ft. Keogh Military Reservation was transferred to the U.S. Department of Agriculture for experiments in stock raising and growing of forage crops. LARRS now occupies approximately 55,357 acres near the Miles City Fish Hatchery, which was built on land donated from LARRS. Approximately 1,800 acres at LARRS are under irrigation in the Yellowstone River Valley west of the laboratory headquarters while approximately 625 acres are in cultivated crops and 1,150 acres are in irrigated pastures. The remainder of the laboratory is rough, broken, lands typical of range cattle producing areas of the Northern Great Plains. The research program focuses on improving efficiency of beef cattle production for range land in the Northern Great Plains. These range lands, approximately 150 million acres stretching through Montana, North Dakota, South Dakota and Wyoming, are both ecologically fragile and vital to the economic well-being of the region. The work at LARRS involves studies in genetics, reproductive physiology, nutrition and growth of beef cattle and in range pasture development improvements and management. The research emphasizes the efficient and sustainable use of rangeland resources for livestock production with an emphasis on basic research to meet the immediate and future needs of farmers and ranchers in the region. For example, nutrition studies conducted at LARRS have demonstrated the importance of proper winter supplementation regimes for optimum rates of subsequent conception, calve survival and cow and calf weight gains. The cattle and farming operations at LARRS serve to support the research work including husbandry practices to meet the specific research protocols and maintaining farming operations to provide quality feedstuffs for research livestock using proper conservation and agronomic practices.

The USDA was concerned that alignments that divided research plots or resulted in the loss of lands to non-research use could severely damage, and in some instances destroy, the research at LARRS. For example, an alignment that followed the Tongue River flood plain could eliminate most rangeland research. In addition, concerns were raised that changing the size, shape and livestock use patterns of large research pastures would make it impossible to compare new results with those obtained previously. A number of research projects at LARRS rely on the data base that has been collected over a period of many years. This enables researchers to statistically account for experimental results attributable to variables such as seasonal precipitation and pasture-stocking rate. The long-term consistency in the research plots is important to the overall research and cannot be mitigated except by avoidance of the plots.

Based on these concerns and other issues raised by the public and agency officials the following options were considered to minimize impacts to the research at LARRS.

The Custer County/LARRS Option is an approximately 10-mile link between the BNSF rail line in the Yellowstone Valley and the proposed rail line. It connects to the BNSF line about 5 miles southwest of Miles City and reaches the Tongue River bottom just north of Pumpkin Creek. The route would require more cuts and fills than other options and probably would create more environmental impacts to the research facility. In addition, the Custer County route bisects the LARRS and has more impact on research at the facility than would a route nearer the station's extremities. For these reasons, the SEE eliminated this option from further consideration. Appendix B at B-18.

The IntraSearch/LARRS Option is an approximately 4-mile line connecting the BNSF line in the Yellowstone Valley with the proposed rail line. Connections would be made with the BNSF about 3 miles southwest of Miles City and with the proposed rail line about 4 miles south of Miles City. This option would have a more adverse grade than other routes through the LARRS. As with the other alignments through the range station, it could affect activities at the facility and bisect research plots. However, this option could have a more serious impact to the station than other alignments in that it would cross several irrigated fields north of Interstate Highway 94. Therefore, SEE eliminated the option from further consideration. Appendix B at B-18.

The LARRS/Tongue River Option is an approximately 6-mile divergence from the proposed rail line route just south of Miles City. It follows the Tongue River more closely than the proposed rail line, remaining on the west side of the valley. It leaves the proposed rail line 1 mile south of the BNSF line just outside Miles City, rejoining the proposed route about 7 miles out of town. Selection of this option would dictate raising the grade above the Tongue River flood plain. The route's proximity to the river could present aquatic and hydrological problems. This option was initially retained for further study. Appendix B at B-18-19. After negotiations with the USDA for ROW across LARRS, a slightly different alignment was developed consistent with the LARRS ROW requirements, which is incorporated in the Proposed Action.

The Proposed Rail Line Through LARRS follows the west side of the Tongue River, through the LARRS, about a mile from the nearest river meanders. This option represents the best route from an engineering perspective. It is further from the Tongue River than the LARRS/Tongue River option, yet it has the same engineering characteristics (0.2 ruling grade against load). The main constraint to selection of this option is its significant impact to range research plots at the LARRS. Due to this consideration, this option was eliminated from further consideration. Appendix B at B-19.

The IntraSearch, East of Miles City is an approximately 10-mile line which would have connected with the abandoned Milwaukee Railroad just northeast of Miles City and with the proposed rail line about 6 miles south of Miles City. This alignment would require an additional crossing of the Tongue River. This option has significant engineering and environmental consequences associated with it. This route would bisect agricultural, commercial, and residential properties on the south and east side of Miles City. The city's future residential expansion to the east would directly conflict with the option. In addition, selection of this option would necessitate a second crossing of the Tongue River and two additional highway crossings. Greater socioeconomic, aquatic, and hydrological impacts are associated with this option than with other options or alternatives, and therefore, it was not retained for further study. Appendix B at B-19.

The Option in Township 4 North/Range 47 East route is an approximately 2-mile divergence from the route proposed by TRRC. The proposed rail line route curves to the southeast in this area, generally following the river's curve; this option would curve to the northwest, away from the river. This option presents some additional engineering constraints when compared to the proposed rail line. It would require more cuts and fills and would result in additional adverse grade. The possible benefits that might result from this option were not significant enough to warrant its retention for further consideration. Appendix B at B-19.

Potential Impacts to Miles City Fish Hatchery

The 1984 SDEIS[15] focused, among other things, on the impacts of the Proposed Action on the Miles City Fish Hatchery and looked at two options within the proposed action: the BN Option and the Milwaukee Road Option, which included a tie-in through the abandoned Milwaukee Road Rail Yards. The 1984 SDEIS concluded that the BN Option would (1) result in a reduction in overall traffic delays and the elimination of one at-grade crossing; (2) eliminate the need for a large cut through the "Camel's Back" and a large fill for a overpass of the Burlington Northern Line; (3) reduce air quality impacts to Miles City; (4) reduce noise impacts to Miles City; and, (5) reduce the numbers of acres of the hatchery impacted from approximately 15 to approximately 9. However, the 1984 SDEIS also recognized that vibrations from the operations of the trains as well as dust

[15] A copy of the 1984 SDEIS will be submitted to the COE with the final copy of the Showing document.

during construction could impact the fish hatchery. The 1986 FEIS[16] required mitigation measures to address these impacts. Rather than dictating specific measures, the ICC determined that the proper forum for detailed mitigation plans would be the process for acquiring the right of way across the Hatchery from the FW&P. The BN Option alternative was incorporated into the Proposed Action, recognizing that mitigation would be required. TRRC continued discussion with the FW&P regarding specific mitigation measures. As a result of those discussions several mitigation measures have been identified and are discussed below. These mitigation measures as well as the alignment modifications have been included in the 2004 Supplemental DEIS.

As a result of the discussions between TRRC and the FW&P, TRRC commissioned in 1999 a study by Womack & Associates[17] based on a study plan that was developed in connection with and approved by FW&P. The study evaluated (1) the potential effects of vibration on the physical plant and the fish, (2) the potential for vibration to affect the stability of erosional remnant bedrock (hogback), which is between the east side of the Hatchery and the proposed alignment, (3) possible water pollution due to blowing coal dust and herbicides, (4) potential effects on fish reproduction from the construction and operation of the TRRC, and, (5) corrosive effects of soil chemistry on buried fish hatchery piping. An update to the report was prepared in May 2004 in response to additional questions from FW&P. The 2004 update also incorporated findings on the vibration analysis conducted for the proposed DM&E line in Minnesota, South Dakota and Wyoming.

Womack & Associates concluded in these reports concluded that there would be no structural damage to the Hatchery facilities from vibration resulting from the Proposed Action. Womack & Associates also concluded that the sounds produced by the vibrations would be heard by the fish but would be well below levels known to cause physiological damage to fish, eggs, and zooplankton and are also below the levels used to effect or influence fish. In its May 2004 Supplemental Report, Womack & Associates concluded that, "the predicted ground level vibrations at the Miles City Fish Hatchery from construction and operation of the TRR are extremely low and potential damage to the ponds and raceway from train vibration is not indicated by the models conducted for the TRR and analysis conducted for other rail projects, including the DM&E."

With regard to coal dust emissions, the 1999 report concluded that train speeds will be about 20 mph in the vicinity of the Hatchery, due to the connection with the BNSF, which is well-below the threshold velocity of 47 mph required to mobilize coal

[16] A copy of the 1986 FEIS will be submitted to the COE with the final copy of the Showing document.

[17] Womack & Associates received technical assistance from SK Geotechnical, Cooksley Geophysics, Radian International and James Anderson, Ph.D., Associate Professor, School of Fisheries, College of Ocean and Fisheries Sciences, University of Washington. A copy of the Womack Report and its 2004 Supplement will be submitted to the USCOE with the final Showing document. Selected pages referenced in this document are in Appendix 2.

dust from the unit coal trains. Moreover, several studies have indicated that coal dust settles to the bottom of the rail car during the first few miles of transport and the coal will have traveled at least 80 miles by the time it is near the Hatchery. The study concluded that coal dust emissions are not anticipated. The report concluded that the herbicides planned for use were not likely to harm the fish. Nevertheless, the report recommended that mechanical weed control methods should be used near the Hatchery. If mechanical means did not control the weeds, then any use of herbicides should be pursuant to a specific plan that addresses potential drift. Finally, the data collected showed that the soil is corrosive in areas and is likely to affect iron valves and concrete structures.

The 2004 DSEIS included additional analyses related to the potential impacts to the Hatchery of proposed changes in the alignment near the Hatchery and changes at the Hatchery since the initial approval for the rail line. Changes at the Hatchery include the construction of additional ponds, a second intake line and the new recovery program for the pallid sturgeon. The proposed alignment changes include moving the staging sidings to a location south of Interstate 94 and constructing a modified "Wye" connection with the existing BNSF line.

TRRC also proposed certain mitigation measures regarding protection of the Hatchery's water supply lines and weed control, which were identified in the report as areas of potential adverse impacts. It is expected that these mitigation conditions will be imposed by the STB as conditions to TRRC's ability to construct and operate its rail line.

The TRRC will be responsible for all costs associated with implementing the following mitigation measures to protect the water supply lines:

1. Relocating, as necessary, portions of the Yellowstone River and Tongue River Water Supply Pipelines so that each pipeline crosses the rail right of way at a right angle or perpendicular to the rail alignment, which is considered to be the most protective of the pipelines.

2. Each portion of the water supply line lying perpendicular beneath the rail alignment will be encased in a reinforced concrete pipe, to ensure the structural integrity of the water supply pipelines. The reinforced concrete pipe will be of sufficient size to allow for inspection and maintenance of the water supply pipelines.

3. Access to the pipelines beneath the rail alignment will be provided by installation of reinforced concrete manholes located on each side of the rail alignment. The reinforced concrete pipe and the manholes will meet or exceed the American Railway Engineering Association's standard specification for installation of utilities underneath railway embankments.

4. In those locations where the water supply lines will be relocated to cross the rail alignment perpendicularly, new pipe and connectors will be installed that meet or exceed the diameter and pressure requirements of the existing water supply pipeline.

5. The final design plans for the relocation of sections of the water supply pipelines and the installation of the concrete pipe and manhole components will be prepared by the railroad during the final engineering and design and submitted to FW&P for approval prior to construction.

6. All features will be designed to meet or exceed the American Railway Engineering Association Standard Specifications and the Montana Public Works Standard Specifications.

More detailed information regarding the mitigation for the water supply lines is in Appendix 3.

In addition, TRRC has agreed to provide similar protection to outflow pipes at the Hatchery.

In response to concerns about impact from herbicides used for weed control management, Radian Corporation performed an evaluation on the use of herbicides along the railway as part of the Womack Report. The report found that while it was unlikely that herbicides could reach and impact the Hatchery that certain mitigation measures should be implemented. As a result of these recommendations, TRRC intends to use only mechanical means of weed control in the right-of-way adjacent to the Hatchery between the point the rail alignment crosses Interstate 94 North and the connection with the BNSF mainline. This area is shown on Map 1B on page 32. If it becomes necessary to utilize herbicide applications to control noxious weed infestation along the right-of-way between Interstate 94 North and the BNSF mainline, any herbicide application would be subject to prior approval from FW&P and the use of the herbicide would be under controlled means of applications such as by hand sprayer. FW&P's prior approval will include the type of herbicide to be applied, the application rate and means of application, and will take into consideration wind speed and wind direction at the time of herbicide application. More detailed information on the weed control plan is in Appendix 4. The specific conditions relating to TRRC's weed control program at the Hatchery are expected to be set forth by the STB as mitigation conditions on TRRC's ability to construct and operating the rail line, and TRRC has agreed to such mitigation.

As a result of discussions between the TRRC and FW&P in 2004-2005, agreement has been reached on several matters that had been raised by FW&P. FW&P has been supplied with all available information on alternative routes that were studied in the vicinity of the Hatchery and has not further raised the consideration of alternative routes as an issue. Other issues that have been addressed and resolved are as follows:

- Stability analysis of the hogback has determined that slope failure will not occur due to rail construction and operations

- Concerns for the Hatchery's water supply pipelines from the Yellowstone and Tongue Rivers have been resolved with an accepted mitigation plan

- The proposed weed control plan has been accepted to address concerns raised about the use of herbicides in the right-of-way proximate to the Hatchery

- Concerns over coal dust emissions from rail cars have been resolved in light of coal dust emission analyses which address the settling of dust in rail cars during transport and the low train speeds planned for the vicinity of the Hatchery

Further, TRRC has agreed to implement various measures to address concerns about the potential for a derailment to adversely impact the Hatchery. Specifically, trains will operate at a slow speed of 20 mph or less in the vicinity of the Hatchery. More detailed information on train speed and dust emissions is in Appendix 5. TRRC will implement an Emergency Response Plan as required by state law; TRRC will maintain a Spill Prevention Plan in cooperation with federal, state and local authorities, and TRRC will adhere to federal rail safety rules and the safety requirements concerning the transportation of hazardous materials, should any such materials be transported.

In April 2006 FW&P and TRRC reached an agreement with FW&P regarding a monitoring plan to assess the potential impacts on Hatchery fish, including the pallid sturgeon, of noise and vibration from the rail line. The noise and vibration program will include measurements and analysis to:

- Measure baseline conditions at the Hatchery including existing noise and vibrations from operation on a nearby BNSF line.
- Predict and assess future sound pressure levels from construction and operation of the TRR near the Hatchery and compare to baseline conditions.
- Measure actual noise and vibration during the construction and operation of the TRR to compare actual levels to predicted levels.
- If the predicted or measured levels of noise and vibration show an increase over baseline conditions, then determine acceptability criteria for increased noise and vibration associated with the TRR line in association with the US Fish and Wildlife Service (USFWS) and the FW&P.
- If necessary, recommend mitigation measures to be incorporated into the engineering design phase of TRR rail construction.

A copy of the vibration monitoring plan and letters from the Director of the FW&P and TRRC regarding the plan are in Appendix 6. It is anticipated that the monitoring plan will be included as a mitigation measure in the final Supplemental EIS and as a condition to the STB's approval of the construction and operation of the rail line. TRRC has agreed to such a condition.

FW&P also had initially raised concerns about impacts of the rail line on river access. However, there are relatively few points where the Proposed Alternative would be between the Tongue River and the roads that provide public access to the river and the land in those instances is privately owned. FW&P has agreed that this issue is best addressed during the right of way acquisition process with the individual private landowner.

Potential Impacts to Ashland

Based on issues raised by the public, three options were considered regarding the connections in Ashland.

The Optional Route Through Ashland is an approximately 3-mile divergence from the route around Ashland proposed by TRRC. The proposed rail line is west of Ashland; this option would swing east of Ashland about a mile north of town, cross Highway 212 about a mile east of town, then swing back near the river about 2 miles south of town. The principal difficulty in constructing a rail line along this optional route is the amount of earthwork that would be required. Conceivably, a substantial amount of fill would be needed through the Otter Creek drainage. This work might increase sedimentation to the creek and impact water quality and aquatic resources. This option was eliminated since it did not appreciably differ from the rail line proposed by TRRC. Appendix B at B-19.

The Ashland Northwest Alignment presents the best engineering route around Ashland. However, it might affect some residential areas of Ashland and could isolate the community from the fire station. However, it was retained for further consideration in the DEIS.

The Ashland Southeast Alignment provides a more direct access to the Otter Creek Terminus and minimizes direct flood plain encroachment near the Tongue River/Otter Creek confluence. However, a large quantity of fill would be needed to cross the Otter Creek drainage, which could impact to water quality and aquatic resources. The route was retained for further evaluation and ultimately became part of the Proposed Action.

Table 4
Level 1A Screening
Additional Options Miles City to Ashland[18]

Alternative	Operational and Construction	Environmental Factors	Result
Proposed Action (including BN Option)	Ruling grade against load is 0.2%; total length of ruling grade of 15,000 ft; total rise against load 30-ft; estimated construction cost $129.2 mm* adjusted to 2004 dollars as $226.8mm[19].	Reduces impact on research at LARRS, impacts fewer acres of Hatchery	Included in EIS
Custer County/LARRS Option	Ruling grade against load is 1.0%; total rise against loads is 400 ft; length of ruling grade against loads is 40,000 ft; estimated construction cost $132.5 mm* adjusted to 2004 dollars as $232.6 mm.	requires more cuts/fills and right-of-way acreage; bisects LARRS impacting research at the facility	Eliminated from further consideration
IntraSearch/LARRS Option	Ruling grade against loads is 0.83%; total rise against loads is 78-ft; length of ruling grade against loads is 9,000 ft; higher adverse grade than other routes through LARRS; estimated construction cost $132.3 mm* adjusted to 2004 dollars as $232.3 mm.	Crosses several irrigated fields north of Interstate 94; severely impacting research at LARRS	Eliminated from further consideration
LARRS/Tongue River Option	Ruling grade against loads is 0.2%; total rise against loads is 30-ft; length of ruling grade against loads is 15,000 ft; option requires raising grade above Tongue River flood plain; estimated construction cost $129.2 mm* adjusted to 2004 dollars as $226.8 mm.	Proximity of river necessitates rip-rap; may avoid impact to research but proximity to river presents aquatic and hydrologic problems	Retained for further study because of limited impact on LARRS; route was modified to be consistent with USDA ROW requirements across LARRS and modified version is incorporated in Proposed Action

[18] This table presents various options, which generally followed the proposed route and were developed in response to comments from the public and various agencies. Due to the relatively short length of the lines, the number of locomotives was not calculated. Ruling grade against load was used to compare the operational criteria for each alternative.

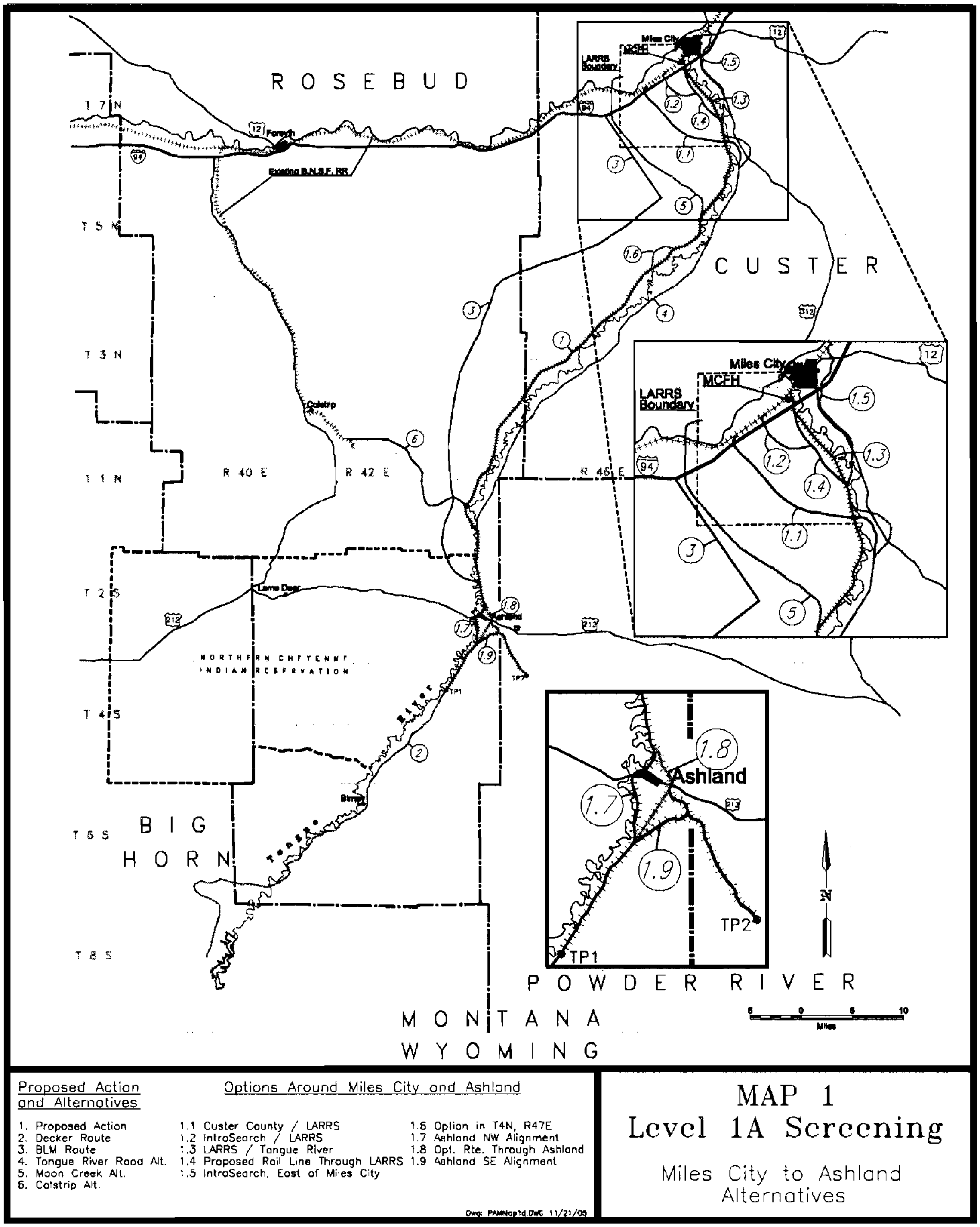
[19] This figure has been adjusted to account for inflation using the Consumer Price Index published by the Department of Labor, Bureau of Labor Statistics. The calculation is as follows and is available at http://minneapolisfed.org/Research/data/us/calc/index.cfm.
$Price_{2004} = Price_{1985} \times (CPI_{2004}/CPI_{1985})$, where $CPI_{2004} = 188.9$, and $CPI_{1985} = 107.6$
This formula will be used throughout the document.

Initial Option through LARRS	Ruling grade against loads is 0.2%; total rise against loads is 30-ft; length of ruling grade against loads is 15,000 ft; represents best route from engineering perspective, estimated construction cost $129.2 mm* adjusted to 2004 dollars as $226.8 mm.	Further from Tongue River; significant impacts to range research plots on LARRS	Eliminated from further consideration due to significant impacts to LARRS
IntraSearch, East of Miles City	Ruling grade against loads is 0.24%; total rise against loads is 36-ft; length of ruling grade against loads is 14,000 ft; significant engineering and environmental consequences; estimated construction cost $133.7 mm* adjusted to 2004 dollars as $234.7 mm.	Bisects agricultural, commercial and residential properties on east side of Miles City; requires additional crossing of Tongue River and two additional highway crossings; greater socioeconomic, aquatic, and hydrological impacts	Eliminated from further consideration
Option in T4N R47E	Ruling grade against loads is 0.4%; total rise against loads is 32-ft; length of ruling grade against loads is 8,000 ft; minor additional engineering constraints; results in additional adverse grade; possible benefits that might result from the option were not significant enough to warrant further consideration; construction cost estimate $129.7 mm adjusted to 2004 dollars as $227.7 mm.	Requires more cuts and fills than Proposed Action	Eliminated from further consideration
Milwaukee Road Option	Requires rehabilitation of the abandoned Milwaukee Rail Yard Interchange; requires an additional public grade crossing and high fills over BN Tracks, U.S. Highway 10 and I-94.	Requires large cut through Camel's Back; greater impact on Emergency Services in Miles City; impacts fewer acres of LARRS than BN options.	Eliminates from further consideration.
BN Option	Eliminates overpass of BN track and eliminates need to acquire property used by Miles City Livestock Yard, BLM and City of Miles City.	Eliminates one at grade crossing; eliminates need to cut through Camel's Back; reduce air quality and noise impacts to Miles City.	Included as part of Proposed Action.

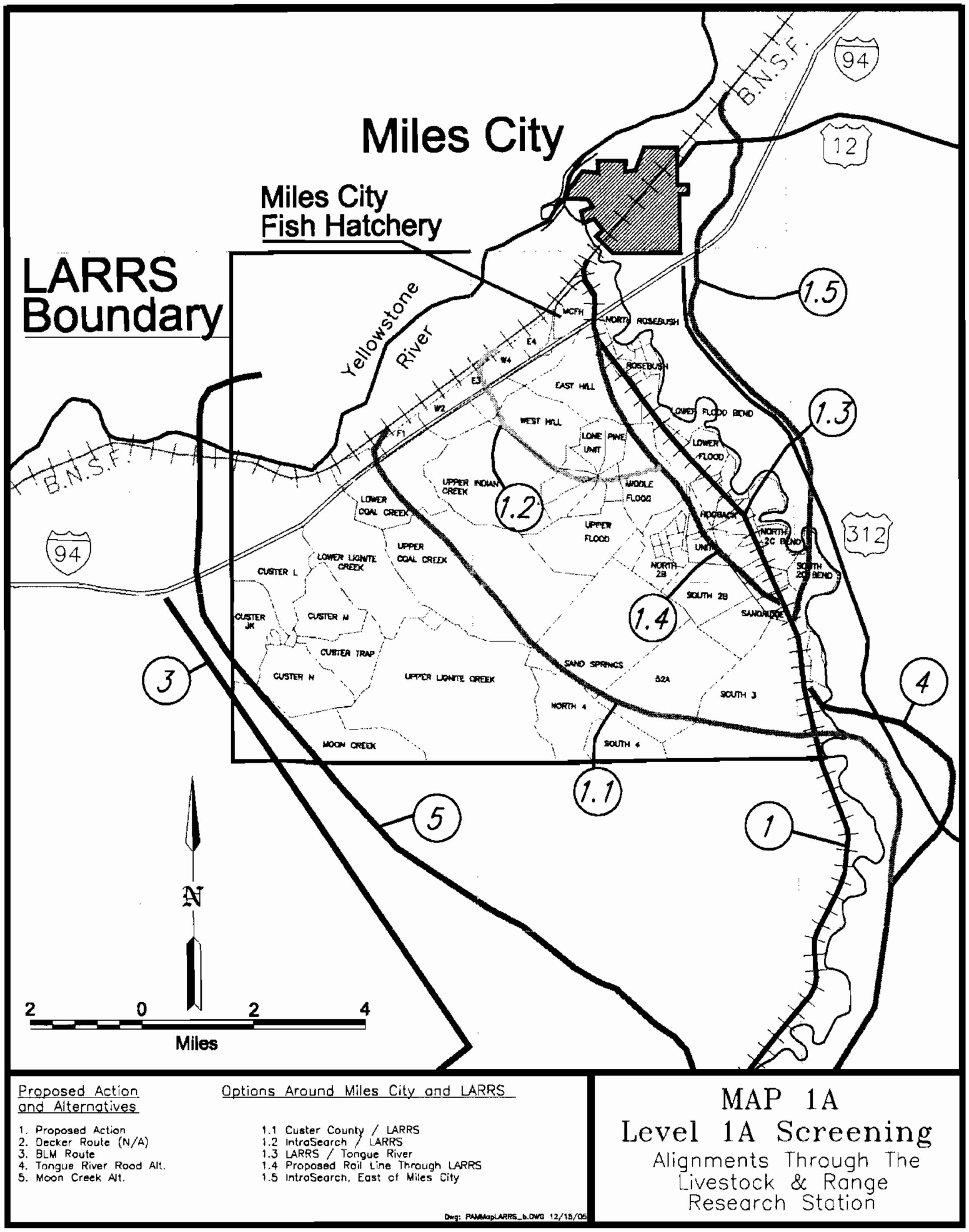
Ashland NW Alignment	Ruling grade against loads is 0.6%; total rise against loads is 36-ft; length of ruling grade against loads is 6,000 ft; best engineering route around Ashland; affects some residential areas and might isolate the community fire station; socioeconomic impacts associated with option are possible constraints to selection; construction cost estimate $128.9 mm* adjusted to 2004 dollars as $226.2 mm.	Proximity to Tongue River	Included in Level 1B Screening and EIS.
Optional Route through Ashland	Ruling grade against loads is 0.5%; total rise against loads is 50-ft; length of ruling grade against loads is 10,000 ft; requires additional earthwork (fill); construction cost estimate $136.5 mm* adjusted to 2004 dollars as $239.6 mm.	Could increase sedimentation and impact water quality and aquatic resources in Otter Creek Drainage	Eliminated from further consideration since it did not appreciably differ from proposed rail line.
Ashland SE Alignment	Ruling grade against loads is 0.2%; total rise against loads is 30-ft; length of ruling grade against loads is 15,000 ft; similar difficulties as Optional Route through Ashland; better direct access to Otter Creek coal reserves; construction cost estimate $131.1 mm* adjusted to 2004 dollars as $230.2 mm.	Potential impact to water quality and aquatic resources	Retained for further evaluation and became part of the Proposed Action.

*1985 dollars.

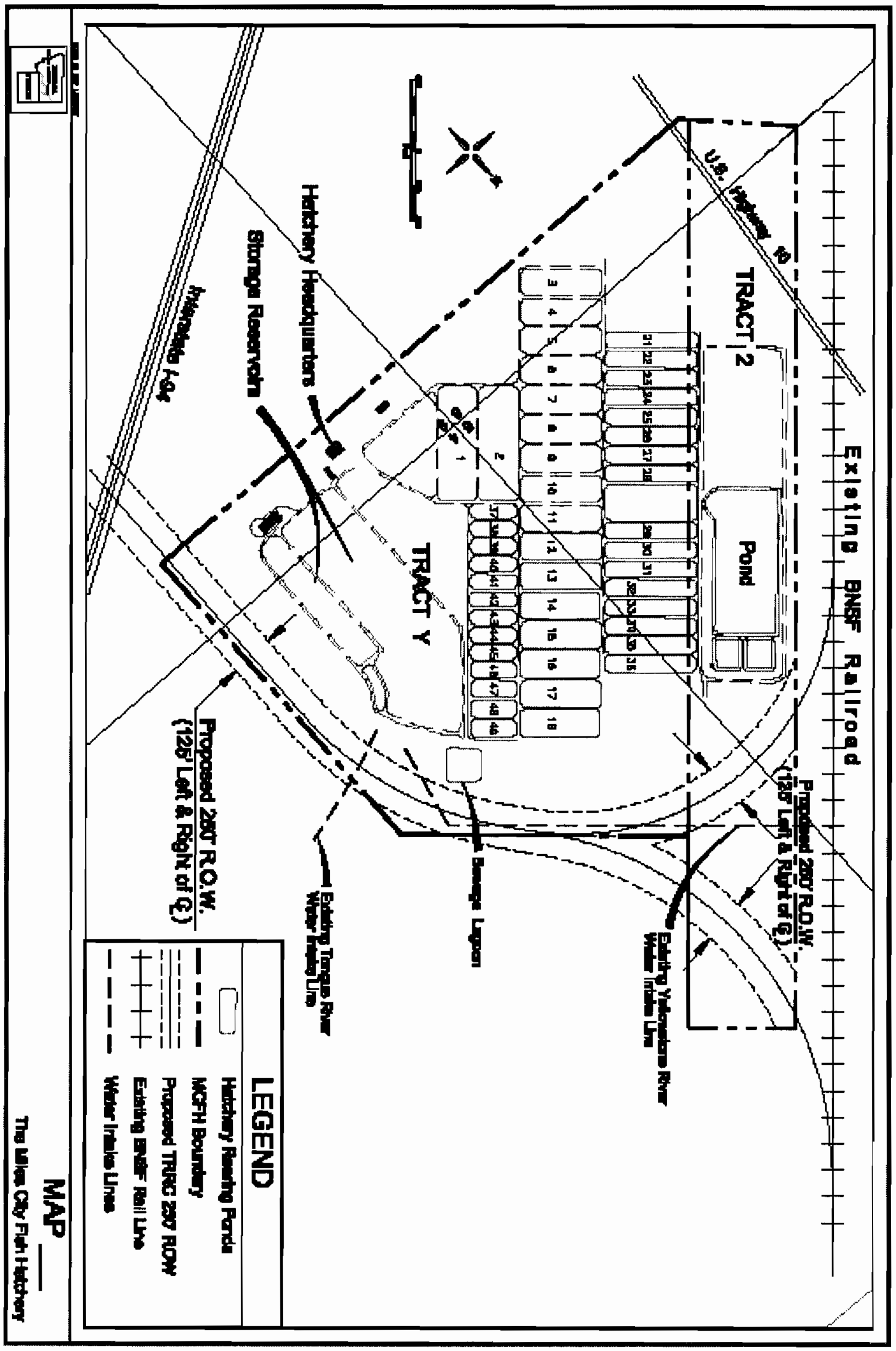
MAP 1 - Level 1A Screening Miles City to Ashland Alternatives



MAP 1A - Level 1A Screening Miles City to Ashland – Alternative Alignments Through LARRS



MAP 1B - The Miles City Fish Hatchery (North End Map)



As a result of the Level 1A screening process four alternatives were identified for further evaluation: (1) the Proposed Action, which included two alternative routes through Ashland -- Options 7 and 9 --discussed above and the BN Option at Miles City; (2) Tongue River Road Alternative; (3) Moon Creek Alternative; and (4) Colstrip Alternative. Each of these four alternatives is discussed in the Level 1B screening process below.

Ashland to Decker Extension

Given the existing end-points, (i.e., the end of the Miles City to Ashland segment on one end and the Spring Creek Mine Spur near Decker on the other end), desired operating characteristics and the topography of the region, there were a limited number of alternatives available for this extension. Criteria similar to those for the Miles City to Ashland line were considered for the Ashland to Decker extension including:

- Impact on agricultural, residential and commercial properties;
- Number of crossings or conflicts with the Tongue River;
- Number of county or state highway crossings;
- Number and length of bridges;
- Total curvature;
- Total cut;
- Total fill;
- Ruling grade;
- Length of ruling grade;
- Total length;
- Total costs;
- Operating and maintenance features and costs.

Initially five alternative routes were studied for the Ashland to Decker Extension, including:

- Four Mile Creek Alternative
- Original Preferred Alignment
- Prairie Dog Creek Alternative
- Canyon Creek Alternative
- Hanging Woman Creek Alternative.

A sixth alternative – the Western Alignment – was developed after the 1996 FEIS for the Ashland to Decker Extension proceeding was completed and is discussed in the 2004 DSEIS.

Three of these alternatives were screened out as not meeting the operational and design criteria outlined above. The three alternatives that were eliminated at this stage were the Prairie Dog Creek Alternative, the Canyon Creek Alternative and the Hanging Woman Creek Alternative. Each is discussed briefly below and in Table 5 on pages 36 and 37 and shown on Map 2 on page 38. The remaining routes are discussed in the Level 1B screening.

The Prairie Dog Creek Alternative is discussed at page 18 of the 1994 SEIS.[20] This alternative would leave the Tongue River Valley at milepost 22 and climb westerly approximately 960 feet in elevation toward the divide with Rosebud Creek. When it reached the divide, it would turn south and tie in with the north end of the Four Mile Creek Alternative. This alternative was rejected as not practicable because grades (ascending and descending) would exceed 2% creating safety concerns, and it would not meet engineering or operational criteria, due to undesirable curvature, length and safe speeds. This alternative also is significantly longer than the Original Preferred Alignment with a total length of 58 miles as opposed to 39.7 for the Original Preferred Alignment.

The Canyon Creek Alternative is discussed at pages 18-19 of the 1994 SDEIS. This alternative would leave the Tongue River Valley at milepost 25.4 and then climb westerly toward the divide with Rosebud Creek. When it reached 900 feet above the Tongue River Valley, it would turn south to tie in with the north end of the Four Mile Creek Alternative. This alternative also was rejected as not practicable because grades (ascending and descending) would exceed 2% and it would not meet design or operational criteria, such as curvature and safe speed. In addition, it would be significantly longer than the Original Preferred Alignment -- 54 miles v. 39.7 miles.

The Hanging Woman Creek Alternative is discussed at page 19 of the 1994 SDEIS. This alternative would separate from the Original Preferred Alignment at milepost 14.8 just north of Birney and proceed south following Hanging Woman Creek until a few miles north of the Montana/Wyoming border. At that point, the alternative would turn west and climb toward the divide between Hanging Woman Creek and the Tongue River. After crossing the divide, the alternative would turn northwest and descend toward the East Decker mine where it would join the East Decker rail spur. This alternative was rejected because it would have excessive grades against loads exceeding 2%, would fail to meet engineering or operational design criteria, such as curvature and safe speed and would be significantly longer than the Original Preferred Alignment -- 56 miles vs. 39.7 miles.

Based upon the rough topography of the area and evaluation of the engineering designs in consultation with engineering and operations experts, SEA concluded that these three alternatives would not be feasible. See 1994 SDEIS at 19-20.

Initially as a result of the Level 1A Screening Process for the Ashland to Decker Extension only two alternatives, the Original Preferred Alignment, as modified, and the Four Mile Creek Alternative were identified for further evaluation. These two alignments plus the No Action Alternative are discussed in the Level 1B screening process below as well as in the 1992 DEIS, 1994 SEIS, 1996 EIS. Subsequently in

[20] A complete copy of the 1994 SEIS will be submitted to the USCOE with the final Showing. Referenced pages from the 1994 SEIS are in Appendix 7.

1998, TRRC proposed an additional alternative for the Ashland to Decker Extension. This alternative routing, known as the Western Alignment, is discussed in the Level 2 Screening and in the 2004 DSEIS.

Table 5
Level 1A Screening
Ashland to Decker Extension

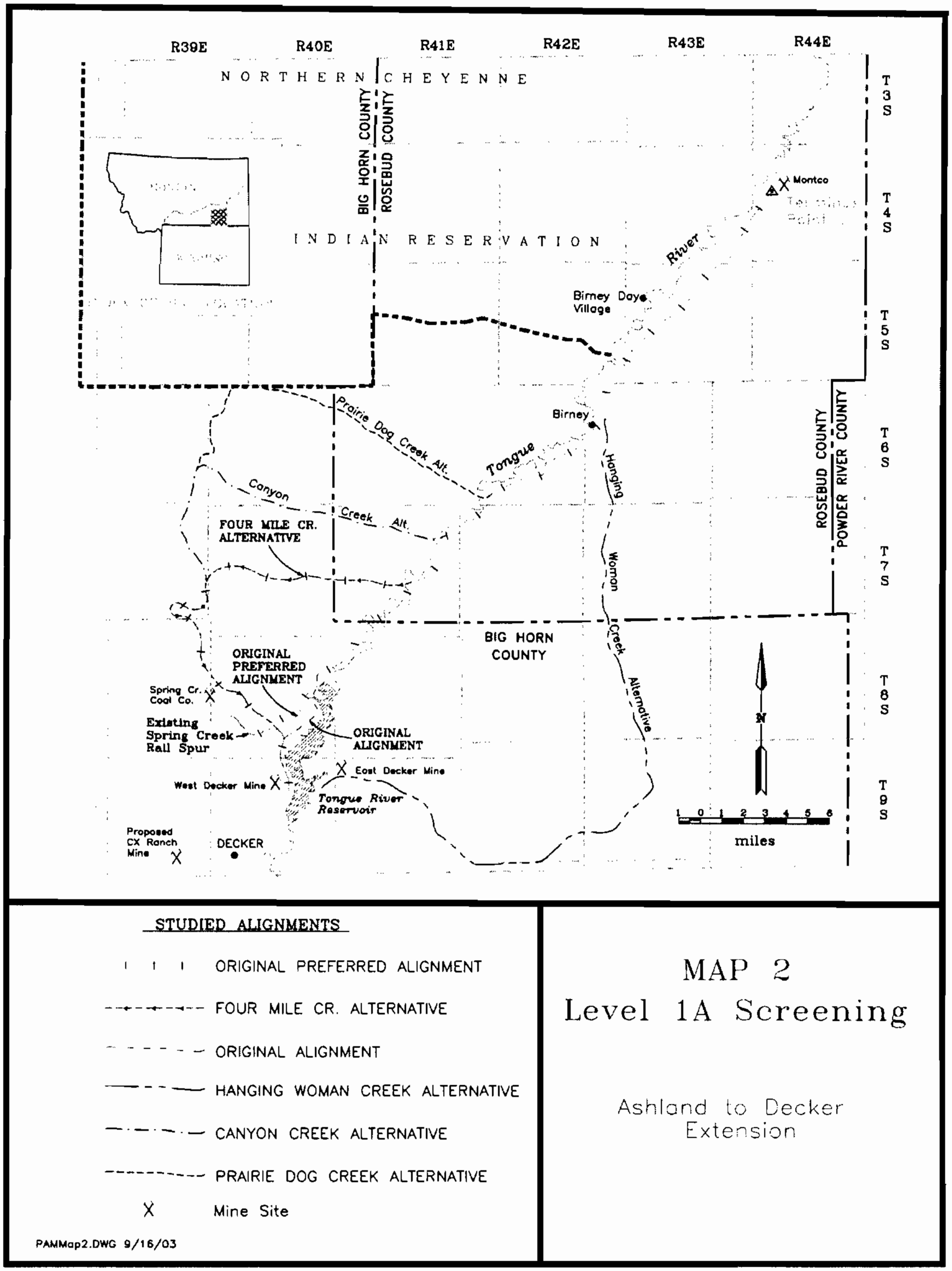
Alternative	Operating Characteristics	Issues	Results
Four Mile Creek	Maximum loaded ascending grade of 1.5% for approximately 13 miles and a maximum descending grade of 2.3%	51 miles in length; route traverses pronghorn habitat and ROW could inhibit pronghorn migration;	Included in Level 1B screening, 1996 EIS and 2004 DSEIS STB approved this alignment in 1996
Original Preferred Alignment[21]	Maximum loaded ascending grade of 0.33 for approximately 2 miles and gradual descending grade to Miles City	41 miles in length. Would require the construction of five bridges and a tunnel in the Tongue River Canyon	Included in Level 1B and 1996 EIS; not included in 2004 DSEIS
Prairie Dog Creek[22]	Ascending and descending grades exceed 2% creating safety concerns	58 miles long (significantly longer than the Original Preferred Alignment); steeper topography requiring greater land disturbance than the Original Preferred or Four Mile Creek Alignments.	Eliminated from further consideration

[21] Approximately 4 miles of this routing was modified as a result of comments from the Montana Department of Natural Resources and Conservation. This modification, which was considered in the 1994 SDEIS, changed the proposed route on the west side of the Tongue River Reservoir. At the northern end of the modification the alignment was moved approximately 300 feet west to avoid fishing access, private cabins and the recreational access road. At the southern end, the alignment was moved ¾ to 1½ miles west to provide a larger buffer between the proposed railroad and the state recreational area.

[22] The number of locomotives was not calculated for the Prairie Dog Creek, Canyon Creek and Hanging Woman Creek options; maximum loaded ascending grade was used to compare operational issues.

Canyon Creek	Ascending and descending grades would exceed 2%; curvature does not meet operational and design criteria	54 miles long (significantly longer then the Original Preferred Alignment); steeper topography requiring greater land disturbance than the Original Preferred or Four Mile Creek Alignments.	Eliminated from further consideration
Hanging Woman Creek	Grades against load would exceed 2%; fails to meet operational criteria for curvature	56 miles long (significantly longer than the Original Preferred Alignment). Steeper topography requiring greater land disturbance than the Original Preferred or Four Mile Creek Alignments.	Eliminated from further consideration

MAP 2 - Level 1A Screening Ashland to Decker Extension



Level 1B Screening

Miles City to Ashland Line

Four alternatives and the No-Action Alternative were discussed in the 1985 EIS for the Miles City to Ashland line. These four alternatives, the TRRC Preferred Alternative (the Proposed Action), the Tongue River Road Alternative, the Moon Creek Alternative and the Colstrip Alternative, are summarized in Table 6 on page 44. Each of these alternatives is discussed below. In addition, Map 3 on page 46 shows the four alternatives.

The No Action Alternative would provide no rail service to the Ashland area, and, thus, foreclose economic transport for the new mine production of low-sulfur coal from the Ashland area. The 1985 EIS concluded that due to "various environmental, economic, engineering and legal considerations" there was no alternative mode of transporting coal from the area. See 1985 EIS at iii.[23] The No Action Alternative would provide no service to the proposed Ashland mines and, therefore, does not meet the stated purpose and need for the Proposed Action and is not a practicable alternative.

The Proposed Action would provide a direct link with the existing BNSF mainline at Miles City. From Miles City the route would bear south along the west side of the Tongue River to a point approximately 10 miles north of Ashland. The route would cross the Tongue River and continue south along the east side of the Tongue River drainage. Near Ashland the route would divide with one branch following approximately eight miles southeast along the Otter Creek drainage to Terminus Point 2 and the main branch would continue along the east side of the valley about nine miles to Terminus Point 1.[24]

From an engineering and operational standpoint, the Proposed Action is the most desirable route. The 0.33-percent ruling grade against loads is less than the ruling grade for any of the other alternatives. The 1985 EIS recognized that this would be the most desirable route from an engineering standpoint and stated that the environmental impacts associated with the Proposed Action would be comparable to those that are anticipated for the Tongue River Road Alternative and the Moon Creek Alternative, but would be

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[23] See Appendix 8.

[24] Two alternative routes around Ashland were considered and both were approved by the ICC. The two routes are the Ashland Northwest Alignment (Option 7) and the Ashland Southeast Alignment (Option 9). The Ashland Northwest Alignment runs through the west side of Ashland, swinging southwest toward the river about a mile north of Ashland and closely following the east side of the Tongue River for about 2 miles. The Ashland Southeast Alignment swings east of Ashland about a mile north of the town, crosses Highway 212 east of town, then swings back to the west about 2 miles south of town. TRRC ultimately selected the Ashland Southeast Alignment as part of the Proposed Action because it had fewer impacts on the Ashland community and the Tongue River.

greater than those for the Colstrip Alternative. Taking into account the engineering and marketing considerations[25] in addition to the environmental impacts, the 1985 EIS concluded at page i that the Proposed Action and the Colstrip Alternative were the only feasible alternatives. However, as discussed in the Level 2 Screening, the Proposed Action has fewer impacts on aquatic resources than the Colstrip Alternative. Further, the 1985 EIS did not consider the environmental impacts associated with rebuilding the Colstrip to Forsyth spur which, as discussed below, would be required to meet current mainline railroad specifications.

In 2005 TRRC asked Robert Leilich, a railroad operations and economics consultant, to review the issues identified in the 1985 FEIS to see if any changes in railroad operations since the original analysis would change the comparisons. As part of that analysis Mr. Leilich conducted a simulation of the trains on the Proposed Action. He found that: "trains in the loaded direction would require three SD-40 type locomotives, take about one hour and twenty minutes and consume about 455 gallons of fuel. In the reverse direction, the empty returning train would take a few minutes less time and consume 492 gallons of fuel. (The loaded trains are running downgrade and the empty trains are running upgrade.)"[26] He concluded that " the superior operating, maintenance and economic advantages of the Proposed Action, which were discussed in the prior environmental documents, remain intact or even enhanced" due to increased fuel costs.

The Tongue River Road Alternative would follow the Proposed Action south from Miles City on the west side of the river for about eight miles and then cross to the east side of the river near the mouth of Pumpkin Creek. It would then parallel the Tongue River Road until it would rejoin the Proposed Action approximately 10 miles north of Ashland.

From an engineering standpoint, the route would not be as desirable as the Proposed Action. The 0.85-percent ruling grade against load would result in higher construction and ultimately higher operational and maintenance costs. Because this alignment attempts to parallel an existing road it has many changes in elevation, which would result in significant earthwork, and, thus, increased construction costs. The 1985 EIS found at page 42 that the Tongue River Road Alternative would require two additional locomotives per train over most of the line. The Tongue River Road Alternative follows the same alignment through the LARRS as the Proposed Action, and would pose the same potential for impact to ongoing research and research plots. While the 1985 FEIS concluded at page i that the environmental impacts of the Tongue River Road Alternative and the Proposed Action were comparable, it also concluded that the Tongue River Road Alternative was not feasible because of marketing and engineering factors.

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[25] The main market for coal transported on the Tongue River Railroad would be the Upper Midwest. Factors such as the length of the line, construction costs and operation and maintenance costs all impact the transportation costs of the coal, and, thus, the competitive marketability of the coal.

[26] 2005 Statement of Robert Leilich at Appendix 9.

In 2005, Mr. Leilich also reviewed the issues identified in the 1985 FEIS to see if any changes in railroad operations could lessen the impacts of the engineering and economic concerns of the Tongue River Road Alternative. Mr. Leilich concluded that even though new locomotives are more powerful today, the length of adverse grade and reduced operating speeds for this alternative would prohibit reliance on momentum for climbing the adverse grades and therefore TRRC would still have to either add more power to trains for the entire trip or station a fleet of helper locomotives and crews to handle loaded trains over ruling grade portions of the run. Mr. Leilich stated that "[t]he higher construction capital costs, higher operating and maintenance costs, closer proximity to population, and several additional road crossings represent a significant economic liability for the TRRC to bear." Leilich Statement, Appendix 9.

The Moon Creek Alternative would cross the Yellowstone River near Miles City and head west along an abandoned railroad right of way for approximately eight miles, then cross the Yellowstone River again and head southeast up the Moon Creek drainage, cross a ridge dividing the Yellowstone and Tongue Rivers and descend to join the Proposed Action approximately 14 miles south of Miles City.

This alternative was examined primarily as a means of limiting the potential impacts to the LARRS. It traverses only 2.5 miles of the southwest corner of that facility and would not be likely to significantly affect ongoing research activities. The 1985 EIS concluded at page xiii that a 1% ruling grade against load renders this route less favorable in terms of engineering constraints, energy efficiency and ultimate consumer costs. The 1985 EIS noted at page 43 that the Moon Creek Alternative would require three additional locomotives per train because of the rough topography encountered on this alignment. While the 1985 EIS concluded at page i that the environmental impacts of the Moon Creek Alternative and the Proposed Action were comparable, it also concluded that the Moon Creek alternative was not feasible because of marketing, engineering, and operational factors.

Mr. Leilich also looked at any changes in railroad operations that would impact the factors identified in 1985 regarding the feasibility of this alternative. Mr. Leilich found that this alternative would add significant time and mileage to the route. He concluded:

> This alignment requires lifting loaded 17,000 ton coal trains 285 feet over a distance of 5.87 miles. Climbing this grade, alone, takes two additional SD-40 locomotive unit and 330 gallons in additional fuel. If 30 million tons of coal are handled per year, this translates to about 742,000 additional gallons of fuel. At $2.40 per gallon, extra fuel costs for this grade translates to about $1.8 million per year and this does not count additional locomotive capital and maintenance costs, additional labor costs, or additional fuel, labor, and locomotive costs associated with the longer route. This, along with significantly higher construction, maintenance and operating costs eliminates this route as a viable alternative.

> Thus, the conclusion reached about the infeasibility of this route in the environmental documents prepared in the 1980's still stands. [27]

Leilich Statement, Appendix 9.

The Colstrip Alternative would begin west of the town of Forsyth on the BNSF rail line at a point about 50 miles west of Miles City. It would use the existing Colstrip Spur running about 30 miles south to the town of Colstrip. However, much of this spur would have to be rebuilt to handle the tonnage projected for the Tongue River Railroad. From Colstrip the route would cross Cow and Rosebud Creeks, then head southeast up the Greenleaf Creek drainage. It would cross the divide between the Rosebud Creek and Tongue River drainages, then parallel Roe and Cooper Creeks as it descends into the Tongue River Valley, where it would join the TRRC Preferred Alignment north of Ashland.

The Colstrip Alternative has higher operation and maintenance costs than the Proposed Action. The 1985 EIS at page 44 found that the Colstrip Alternative would require two additional locomotives per train because topography for this alignment would be rougher than that for the Proposed Action. The 1985 EIS concluded that Colstrip and the Proposed Action were feasible alternatives. However, it also concluded that the Colstrip Alternative would have fewer environmental impacts than the Proposed Action. In reaching this conclusion, the 1985 FEIS did not consider the impacts of rebuilding the Colstrip to Forsyth spur, which would significantly increase the cost of the Colstrip Alternative.

Mr. Leilich also reviewed the operational and financial impacts of the Colstrip Alternative under 2005 operating conditions. He found that over half of the line would have to be re-laid with heavier rail to allow for the safe operation at the projects loads and speed for the TRRC. The part of the line without new and various improvements to the ties and subgrade will be needed. In addition, a signal system, grade crossing improvements and a new rail siding would be required at an estimated cost of 24.3 million.

Mr. Leilich also ran simulations comparing the Colstrip Alternative and the Proposed Alternative. He found that the Colstrip Alternative would require five or six locomotives as opposed to three locomotives for the Proposed Alternatives due to the adverse grades on the Colstrip Alternative. He quantified the impact of the longer route and adverse grade as follows.

> For each round trip operated, the time penalty associated with the Colstrip Alternative would be roughly 2.5 hours for train labor and equipment (not counting the two or three extra locomotive units required). Locomotive capital and maintenance costs would be 65 – 100 percent higher.

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[27] Leilich Statement, Appendix 9.

The fuel consumption penalty per round trip between the two points studied would be about 1,653 gallons. Translated to the movement of 30 million tons of coal per year, the fuel penalty alone translates to about 3.6 million gallons per year between the two study points and does not count additional fuel that might be used by the extra locomotives outside of these limits. At $2.40 per gallon, this adds over $8.6 million in additional operating expense – just for fuel – each and every year. Labor and additional locomotive requirements would add additional millions of dollars. [28]

[28] Leilich Statement, Appendix 9.

Table 6
Level 1B Screening
Rail Alternatives Miles City to Ashland

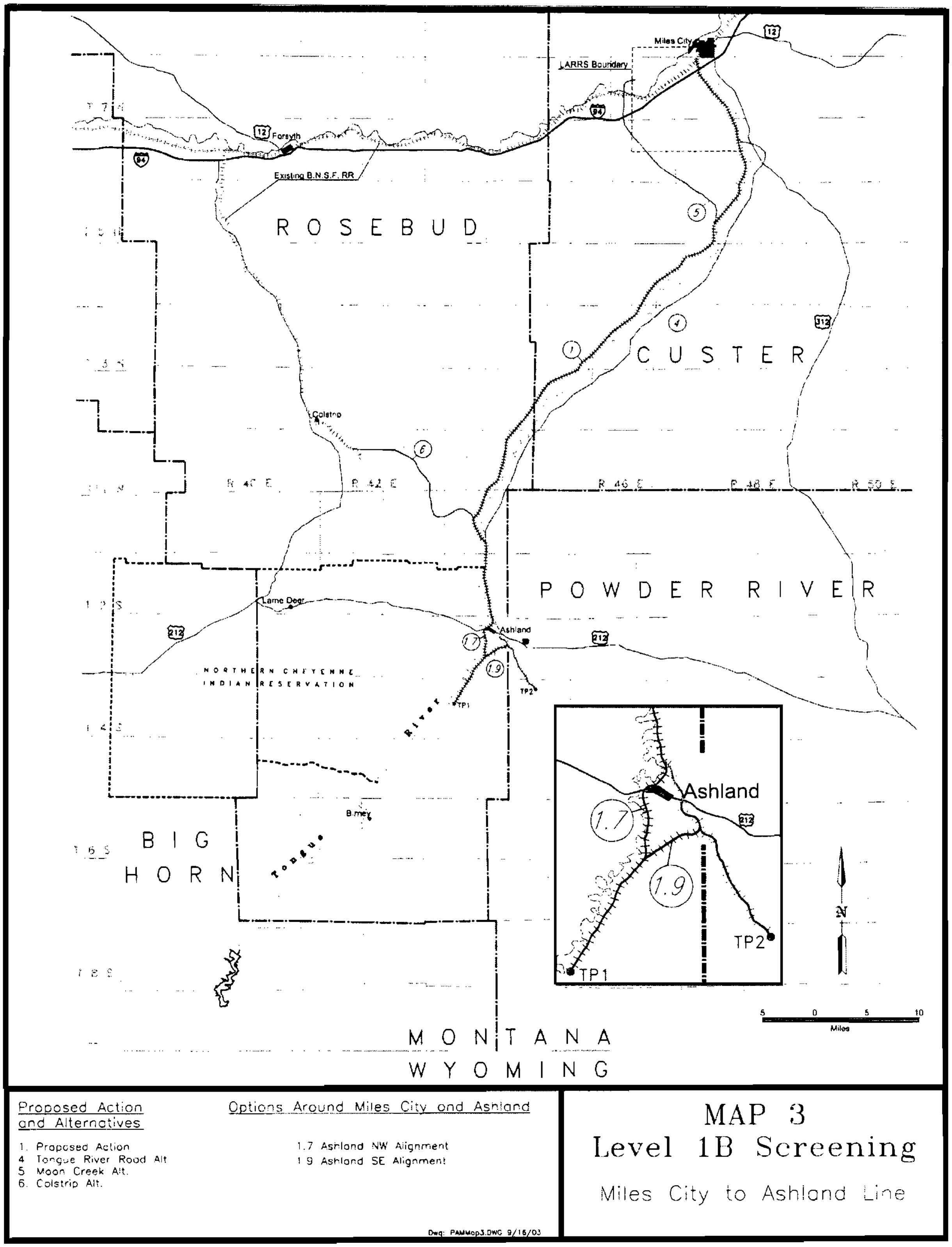
Alternatives	**Marketing, Operational and Engineering Costs**
No Action Alternative	Does not meet project objectives
Proposed Action	89 miles of new rail line. Requires 3 locomotives for operations. Vegetation and wildlife habitat lost due to ROW 1,278 acres. **Construction cost estimate $137.3 mm* adjusted to 2004 dollars as $241.0 mm.**[29] Estimated 430 to 690 million tons of coal hauled from project area during analysis period. Round trip running time 2 hours 30 minutes; Fuel consumption to haul 30 million tons annually to Miles City is: 30 mmt @ 15,000 tons/train = 2,000 trains/year; **Round-trip fuel use 947 gallons/rd. trip x 2,000 trains = 1.894 mm gallons/yr**
Tongue River Road Alternative	88 miles of new rail line. Requires 4 locomotives for operations due to adverse grades. Greater grade and curvature specifications requires additional maintenance. Vegetation and wildlife habitat lost due to ROW, 1,413 acres. **Construction cost estimate $146.5 mm* adjusted to 2004 dollars as $257.2 mm.** Estimated 430 to 690 million tons of coal hauled from project area during analysis period. Fuel consumption to haul 30 million tons annually to Miles City :30 mmt @ 15,000 tons/train = 2,000 trains/year; **Round-trip fuel use 1,845 gallons/rd trip x 2,000 trains = 3.69 mm gallons/yr** .
Moon Creek Alternative	89 miles of new rail from TP#1 & #2 to BNSF, 7 miles on BNSF to Miles City for a total miles 96. Requires 5 locomotives for operations due to adverse grades. Greater grade and curvature specifications necessitate more frequent maintenance. Vegetation and wildlife habitat lost due to ROW, 1,323 acres. **Construction cost estimate $140.8 mm* adjusted to 2004 dollars as $247.2 mm**. Estimated 430 to 690 million tons of coal hauled from project area during analysis period. Fuel consumption to haul 30 million tons annually to Miles City: 30 mmt @ 15,000 tons/train = 2,000 trains/year; **Round-trip fuel use 1,337 gallons/rd. trip x 2,000 trains = 2.674 mm gallons/yr**

[29] See footnote 18 on page 27 for adjustment calculations.

Colstrip Alternative	47 miles of new rail to Colstrip, 85 miles on BNSF (from Colstrip to Miles City), for a total of 132 miles; increased total hauling distance to Miles City and markets in the upper midwest. Requires 5 or 6 locomotives for operations, as per Statement of Robert Leilich set forth at Appendix 9. Greater grade and curvature specifications necessitate more frequent maintenance. Vegetation and wildlife habitat lost due to ROW, 838 acres, not including acres necessary to upgrade rail alignment north from Colstrip to the BNSF mainline. Construction cost estimate $74.5 mm* adjusted to 2004 dollars as $130.8mm, not including costs to upgrade rail spur from Colstrip north to the connection with the BN mainline. The estimate cost to re-lay heavier rail and make other improvements to make the line a Class III rail are estimated at 24 million, **making the estimated construction costs in 2004 dollars as 154.8 million.** Estimated 430 to 690 million tons of coal hauled from project area during analysis period. Fuel consumption to haul 30 million tons annually to Miles City: 30 mmt @ 15,000 tons/train = 2,000 trains/year; **Round-trip fuel use 2,600 gallons/rd. trip x 2,000 trains/yr. = 5.2 mm gallons/year**

*1985 dollars.

MAP 3 - Level 1B Screening Alternatives Miles City to Ashland Line.



Ashland to Decker Extension

Two alternative routings for the Ashland to Decker extension and the No Action Alternative were considered in the 1996 EIS. The two alternatives are: the Original Preferred Alignment and the Four Mile Creek Alternative. Subsequently, the Western Alignment was developed in 1998 and is considered below and in the 2004 DSEIS. Each of these alternatives are discussed below and summarized in Table 7 on page 50.

The No Action Alternative would not offer the same transportation distance advantages to the Decker area mines. These mines would continue to use the existing BNSF route through Sheridan, Wyoming. This circuitous route is significantly longer than the Proposed Action. The Proposed Action would save approximately 320 to 350 miles on each round trip. The No Action Alternative provides no transportation savings to the Decker mines, and, therefore, does not meet the purpose and need for the Proposed Action and is not a practicable alternative.

Original Preferred Alignment. From Terminus Point 1 on the Miles City to Ashland segment, this alternative would follow the east side of the Tongue River Valley to the mouth of the Four Mile Creek drainage. The alignment then would cross the river five times and pass to the west of the Tongue River Reservoir before it joins the existing Spring Creek mine spur. The alternative was TRRC's preferred route in the Ashland to Decker extension proceeding. The Original Preferred Alignment and the environmental impacts associated with it are discussed in detail in the 1992 DEIS, 1994 SEIS and 1996 EIS. This alternative is shown on Map 4 on page 51. The 1996 EIS concluded at page iv that the Four Mile Creek Alternative would be environmentally preferable to this alternative because the Four Mile Creek Alternative would avoid the environmentally sensitive Tongue River Canyon.[30]

The Original Preferred Alignment has certain engineering advantages over the Western Alignment (TRRC's current preferred route and part of the Proposed Action) and the Four Mile Creek Alternative. The Original Preferred Alignment would require fewer cuts and fills and would disturb less acreage overall than the Western Alignment or the Four Mile Creek Alternative. The Original Preferred Alignment has a maximum ascending grade for loaded trains of 0.5% for approximately 2 miles and then a gradual descending grade to Miles City. This is almost identical to the Western Alignment and is preferable to the more severe grades of the Four Mile Creek Alternative. Loaded trains on the Original Preferred Alignment would not require helper locomotives as would be required for the Four Mile Creek Alternative. However, the Original Preferred Alignment would cross the Tongue River five times as compared to only once for the other two alternatives. It is also 1.4 miles longer than the Western Alignment. The Original Preferred Alignment could result in greater impacts to the Tongue River due to the river crossings and would be closer to a bald eagle nest site than the other two

[30] A copy of the 1996 FEIS will be submitted to the USCOE with the final copy of the Showing document. Referenced pages are in Appendix 10.

alternatives. The STB decided not to approve the alignment. This alternative is not considered in the 2004 DSEIS.

Four Mile Creek Alternative. The Four Mile Creek Alternative would be identical to the Original Preferred Alignment from Terminus Point 1 on the Miles City to Ashland segment paralleling the east side of the Valley until the confluence of the Tongue River and Four Mile Creek. This alternative would then diverge from the Original Preferred Alignment and extend westerly along Four Mile Creek, climbing steeply away from the Tongue River. It would then turn southwestward approximately three miles from the divergence point and continue southwesterly. It would then turn south and east until it connects with the Spring Creek rail spur. This alternative is shown on Map45 on page 51. While recognizing that there are potentially significant environmental impacts associated with this alternative, the 1996 FEIS concluded at page iv that the Four Mile Creek Alternative would be environmentally preferable to the Original Preferred Alignment.

The Four Mile Creek Alternative poses significant operational problems due to the adverse grades and curves on the alignment. The Four Mile Creek Alternative has a maximum ascending grade for loaded trains of 1.5% for a distance of approximately 13 miles and a maximum descending grade of approximately 2.3% extending for 3.18 miles. In comparison, the Original Preferred Alignment and the Western Alignment both have a maximum ascending grade for loaded trains of 0.5% over 2.1 miles and then a gradual descending grade to Miles City. There would be significantly higher operating and maintenance costs associated with the Four Mile Creek Alternative that would impact the viability of the railroad. In addition, this alternative would require the use of three helper locomotives for over 16 miles, while the Western Alignment would require a helper locomotive only for that portion of the Spring Creek mine spur that would connect to the Tongue River Railroad from the West Decker mine. The extra locomotives required for the Four Mile Creek Alternative would result in increased fuel consumption and air emissions. The alignment is longer than the Western Alignment and is closer to residences. The Four Mile Creek Alternative would require more disturbance of earthwork than the Original Preferred Alignment, but less than the Western Alignment.

Western Alignment (Proposed Action). The Western Alignment is part of the Proposed Action. The Western Alignment separates from the Four Mile Creek Alternative and the Original Preferred Alignment approximately nine miles north of the mouth of the Four Mile Creek. At that point, the Western Alignment crosses to the west side of the Tongue River Valley approximately 3,000 feet downstream from the existing county road bridge over the Tongue River. The alignment then generally parallels the existing Tongue River county road for four miles, at which point it separates from the county road and continues to climb away from the Tongue River Valley. After approximately two miles, the Western Alignment crosses the Four Mile Creek drainage continuing south and away from the Tongue River Valley. After approximately six miles, the Western Alignment passes about one mile west of the Tongue River Dam and proceeds directly southwest to tie with the Spring Creek mine spur. The Western

Alignment and the environmental impacts associated with it are discussed in detail in the 2004 DSEIS. This alternative is shown on Map 4A on page 52.

The Western Alignment has significant engineering and operational advantages over the Four Mile Creek Alternative. The grades and curves are much less severe than the Four Mile Creek Alternative and are comparable to those in the Original Preferred Alignment. The Western Alignment has a maximum ascending grade for a loaded train of 0.5% for approximately 2 miles and then a gradual descending grade to Miles City. The maximum descending grade for loaded trains is 0.93%. Unlike the Four Mile Creek Alternative, helper locomotives would not be required for the Western Alignment. While the volume of earthwork for the Western Alignment is greater than for the Four Mile Creek Alternative or the Original Preferred Alignment, the total number of disturbed acres is less than for the Four Mile Creek Alternative.

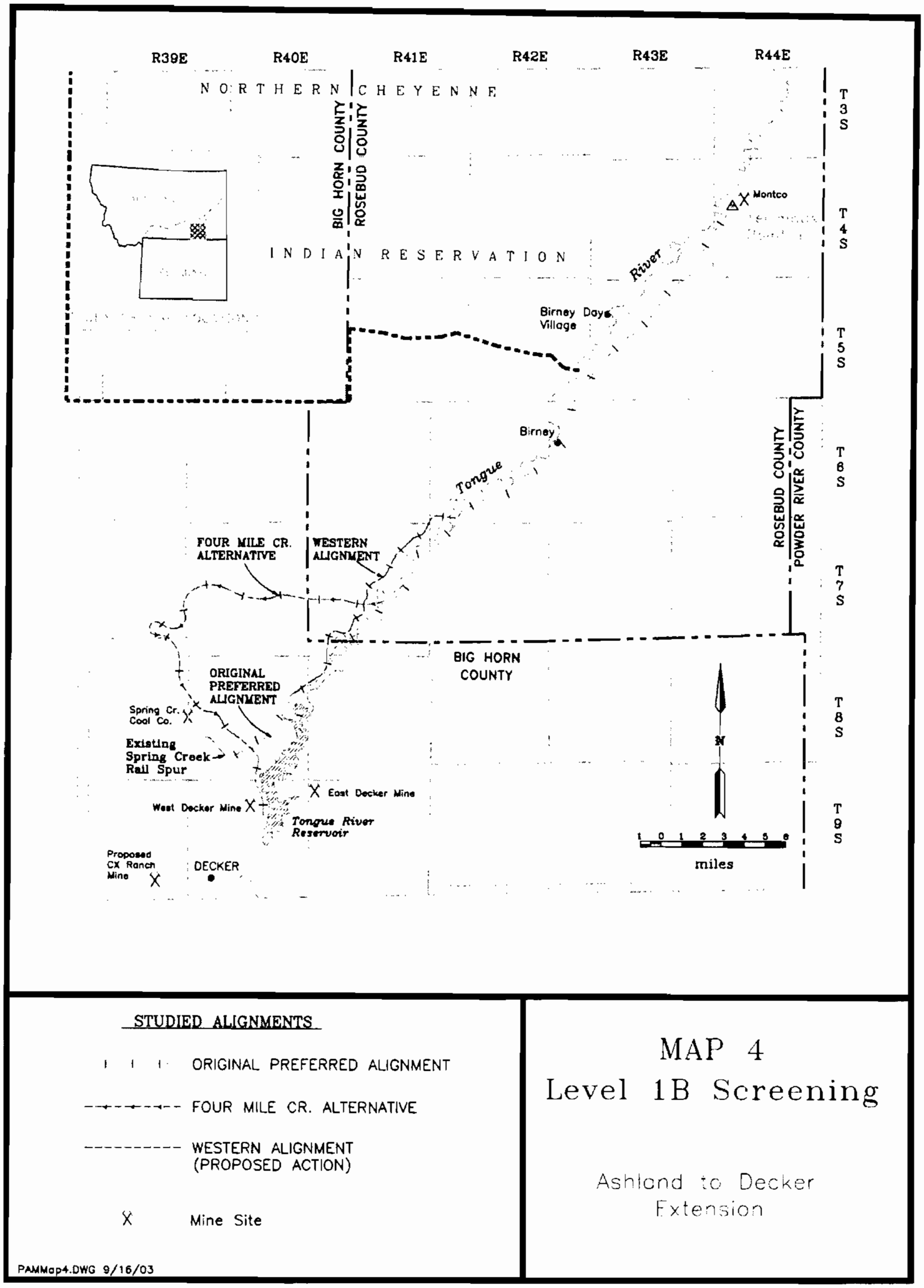
Table 7
Level 1B Screening Analysis
Ashland to Decker Extension

Alternative	Marketing, Operational and Engineering Costs
No Action Alternative	Does not meet project purpose and needs
Original Preferred Alignment	Approximately 41 mile rail line extension. Requires 3 locomotives for operations; maximum loaded ascending grade of 0.33 % and gradual descending grade for loaded coal trains. Vegetation and wildlife habitat lost to due to ROW 637 acres; would require the construction of five bridges and a tunnel in the Tongue River Canyon. Estimated construction costs $76.8 mm.* adjusted to 2004 dollars as $89.0 mm.[31]
Four Mile Creek Alternative	Approximately 50 mile rail line extension. Requires 5 locomotives; maximum ascending grade of 1.5% and maximum descending grade of 2.3% for loaded coal trains raises safety, engineering and operational concerns; Vegetation and wildlife habitat lost to due to ROW 781 acres; Estimated construction costs $84.3mm.* adjusted to 2004 dollars as $97.7mm.
Western Alignment (Proposed Action)	An alternative alignment for the southernmost 17 miles of an approximately 40 mile extension of the rail line was proposed in 1998. Requires 3 locomotives; maximum ascending grade of 0.46% and maximum descending grade of 0.93% for loaded coal trains. Vegetation and wildlife habitat lost due to ROW 672 acres. Estimated construction costs $92.6mm.* adjusted to 2004 dollars as $107.3mm.

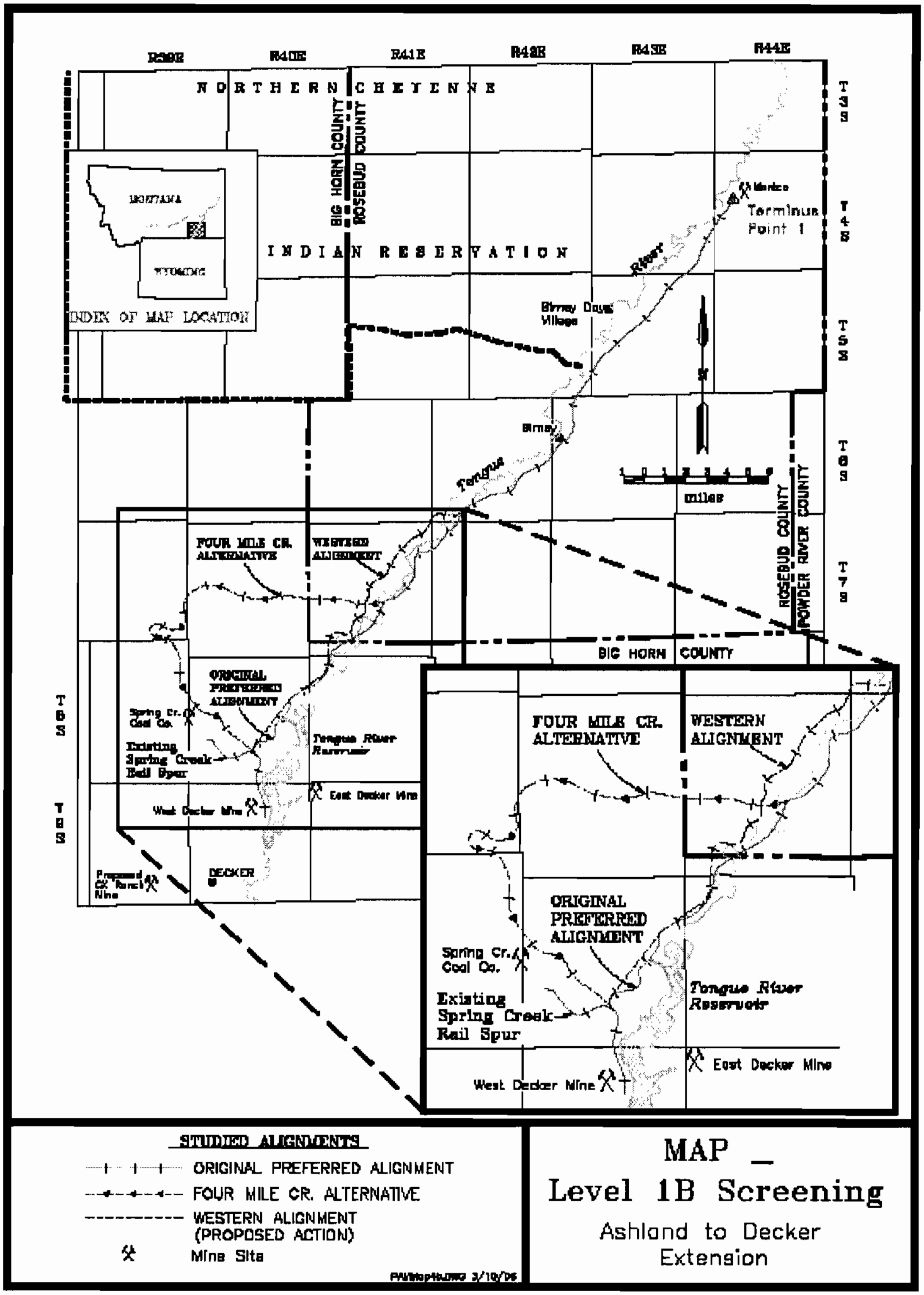
*1998 Escalated dollars.

[31] This figure has been adjusted to account for inflation using the Consumer Price Index published by the Department of Labor, Bureau of Labor Statistics. The calculation is as follows and is available at http://minneapolisfed.org/Research/data/us/calc/index.cfm. $Price_{2004} = Price_{1985} \times (CPI_{2004}/CPI_{1998})$, where $CPI_{2004} = 188.9$, and $CPI_{1998} = 163.0$ This formula will be used throughout this chart.

MAP 4 - Level 1B Screening Ashland to Decker Extension



MAP 4A – Level 1B Screening Ashland to Decker Extension



STEP 4 LEVEL 2 SCREENING.

In the Level 2 Screening Process the practicable alternatives as identified from the Level 1A and Level 1B screenings are considered in three parts coinciding with the information considered in TRR I, TRR II, and TRR III.

Miles City to Ashland (TRRI)

The four alternatives considered from Miles City to Ashland in TRRI are:

- Proposed Action
- Tongue River Road Alternative
- Moon Creek Alternative
- Colstrip Alternative

These alignments are shown on Map 3 on page 46. Table 8 on page 56 provides a comparison of the alternative alignments evaluated by TRRC and ICC for the portion of the rail line between Miles City and Ashland. The ICC studied these alternatives in TRRI and approved the Proposed Action in 1986. Table 8 compares the length, total number and total acreage of Waters of the U.S. impacted, cultural resources potentially impacted, air emissions, public grade crossings, fuel consumption, required locomotives, number of potential accidents, potential number of threatened and endangered species, and aquatic impacts for each of these four alternatives.

In addition to the information in the 1985 EIS or 1996 EIS, information on the impact of each of these alternatives on the Waters of the U.S. was reviewed in 2003 and has been incorporated in the "Initial Analysis of Waters of the U.S., Tongue River Railroad Alternatives" ("Initial Analysis Report"), which is attached as Appendix D to the 2004 DSEIS. Each of these alternatives is discussed below. Two of these alternatives, Tongue River Road and Moon Creek, only questionably pass the Level 1B screening for practical alternatives due to engineering and operational concerns. Nevertheless, these two alternatives are included in the Level 2 screening as each was discussed in detail in the 1985 EIS.

The Proposed Action is the proposed Tongue River Railroad route approved by the STB and its predecessor, the ICC, in prior proceedings. The Proposed Action impacts less total acreage of Waters of the U.S. than any of the other alternatives. See Initial Analysis Report at Table 1. The Proposed Action impacts 33.54 total acres of Waters of the U.S. as compared to 49.42 acres for the Colstrip Alternative. Moreover, it is aligned away from the river to the extent practicable. In addition, because it would use the least number of locomotives, it would result in lower fuel consumption and air emissions than the other alternatives. Its impact on cultural resources is similar to those of the other alternatives. The proposed action would have the same impact on threatened and endangered terrestrial species as the other alternatives. It would have fewer impacts on aquatic resource due to the fewer stream crossing and according to the EIS in TRRI it is the only alternative that does not impact areas with significant aquatic habitat values and significant aquatic species values. It would have some impacts on the Miles City Fish Hatchery, but these impacts could be addressed through mitigation, which the Applicant has proposed and the STB and its predecessor, the ICC, have required. The Proposed Action avoids dissection of major research plots at LARRS.

Tongue River Road Alternative would utilize portions of an existing transportation corridor, thereby limiting, to some extent, the necessity to sever agricultural parcels and disturb irrigation systems. The alignment would potentially disrupt access to residences and agricultural fields along the Tongue River Road. The 1985 EIS at page xiii found that the potential for grade-crossing accidents along the Tongue River Road Alternative would be higher than for any of the other alternatives. The Tongue River Road Alternative also impacts the largest acreage of Waters of the U.S. Moreover, the acres especially affected are classed as river with wetland fringe and abandoned meanders. See Initial Analysis Report at Table 1. The large acreage in these two categories is due to the fact that the centerline for this alternative passes within 200 feet of the Tongue River or its abandoned meanders at several locations. Upon final design the number of the sites might be reduced, but this alternative would still have a more significant adverse impact on Waters of the US than the Proposed Action. This alternative would have the same potential impacts on the Hatchery as the Proposed Action and would also impact Pumpkin Creek, which carriers a high aquatic species habitat value. The alignment would have a similar impact to LARRS as the Proposed Action.

Moon Creek Alternative would require the construction of a railroad bridge across the Yellowstone River and the rehabilitation of an existing bridge across the Yellowstone River. The bridge construction is on an area of the Yellowstone River that the DEIS has categorized as a "high priority fishery resource." None of the other routes under consideration include a Yellowstone River crossing. The Initial Analysis Report found that this alternative would impact 42.40 acres of Waters of the U.S. This alternative has the highest number of potential cultural resources within the right of way. It would take some research land from LARRS, but it would be less than the Proposed Action or the Tongue River Road Alternative.

Colstrip Alternative would be comprised of about 30 miles of reconstructed route from the BNSF line approximately 6 miles west of Forsyth to Colstrip and about 22 miles of new route from Colstrip southeast to the Tongue River Valley where it would connect with the Proposed Action. The greater length of this alternative would result in longer haul distances, higher rail rates, greater fuel consumption and higher air emissions than the Proposed Action. This alternative would avoid impacts to the LARRS entirely. However, the 1985 EIS concluded at page xiii that increased rail traffic in the Colstrip and Forsyth areas would result in more vehicular delays. In addition, the adverse grades associated with this alternative would require two additional helper locomotives resulting in higher fuel consumption and air emissions than for the Proposed Action. The 1985 EIS concluded at page xiii that by virtue of the considerably shorter distance involved, Colstrip would result in proportionally fewer environmental impacts than the Proposed

Action. However, the 1985 EIS did not consider the environmental impacts of rebuilding the existing spur north of Colstrip. The spur would have to be rebuilt to meet the specifications for the projected tonnage for the Tongue River Railroad. The Initial Analysis Report showed that the Colstrip Alternative, although representing the shortest newly constructed route, impacts more acreage of Waters of the US than the Proposed Action because it follows the existing railroad from Forsyth to Colstrip along or in the floodplain of Armells Creek, a perennial stream. It also would require the crossing of Rosebud Creek, which the DEIS found is a significant aquatic species habitat. It would avoid impacts to the Hatchery. In addition, the 2005 train performance model runs show that the Colstrip Alternative will require approximately double the number of locomotives and will have longer running time. This results in significantly increased fuel consumption, and, thus, related emissions It also results in substantial cost increases for fuel and equipment as well as increased labor costs as the longer running times impact crew service times. The Colstrip Alternative is not feasible from an engineering and operational standpoint due to the increased operational costs.

Table 8
Level 2 Screening
Miles City to Ashland (Alternatives Considered in TRRI)

Alternative	Approx. Length (Miles)	Total Number Waters of the US	Total Acreage WUS	Cultural Resources Impacted Within the ROW	Potential Cultural Resource Sites within 1,500 Feet of the Centerline	Air Emissions Operation	Number of Public At Grade Crossings*	Fuel Consumption per round trip Miles City to Ashland	Required Locomotives	Number of Potential Accidents	Number of T&E Species Potentially Impacted Terrestrial	Aquatic Impacts
TRRC Proposed Action (approved 1986)	89	195	33.54	4	34	TSP 2.4 ug/m^3 SO_2 0.002 ppm NO_2 0.016 ppm CO 0.08 ppm HC 0.024 ppm	2	989 gals.	3	7.6	1 (Bald Eagle)	Potential impacts to Hatchery required additional study; subsequent study showed vibration and coal dust impacts not likely; other impacts addressed in mitigation; two bridge crossings of Tongue River could have short-term impacts but are not in high sport fishery value areas
Tongue River Road Alternative	88	207	89.84	4	48	TSP 3.3 ug/m^3 SO_2 0.003 ppm NO_2 0.023 ppm CO 0.112 ppm HC 0.034 ppm	4	1456 gals.	4	8.2	1 (Bald Eagle)	Same potential impacts to Hatchery as Proposed Action; plus requires a bridge across Pumpkin Creek, which carries a high species/habitat value
Moon Creek Alternative BN to Miles City	89 +7 96	192	42.40	7	32	TSP 3.6 ug/m^3 SO_2 0.003 ppm NO_2 0.025 ppm CO 0.124 ppm HC 0.037 ppm	3 +0 3	1573 gals +90 gals 1663 gals	5	7.9	1 (Bald Eagle)	Similar to proposed action in impacts to the Tongue River plus requires bridge crossing of the Yellowstone River in section of the river which is "high priority fishery resource."
Colstrip Alternative Colstrip to Miles City	46 +80 126	206	49.42	2	20	TSP 5.4 ug/m^3 SO_2 0.005 ppm[c] NO_2 0.038 ppm CO 0.18 ppm[d] HC 0.055 ppm	2 +6 8	1118 gals +1385 gals 2503 gals	4	5.7	1 (Bald Eagle)	Requires crossing of Rosebud Creek, which holds a significant species/habitat area

*Using the Ashland SE Alignment

Ashland to Decker (TRRII)

The alternatives considered in the extension from Ashland to Decker in the 1996 FEIS include the route originally proposed by the TRRC and the Four Mile Creek alternative. Table 9 on page 58 provides a comparison of the alternate alignments studied by TRRC and STB in TRRII. The alignments are shown on Maps 4 and 4A on pages 51 and 52. The STB approved the Four Mile Creek alternative in 1996.

Original Preferred Alignment. This alternative would follow the east side of the Tongue River Valley from the terminus point of the Miles City to Ashland segment to the mouth of the Four Mile Creek drainage where it would then cross the Tongue River five times and pass to the west of the Tongue River Reservoir before joining the existing Spring Creek Mine Spur. The Original Preferred alignment would require fewer cuts and fills and disturb less acreage overall than the Four Mile Creek Alternative. It has a maximum ascending grade for loaded trains of 0.33%. However the alignment would cross the Tongue River five times and could result in greater impacts to the Tongue River Canyon. In 1996 the STB's Section of Environmental Analysis determined that the environmental impacts of this alternative were greater than those of the Four Mile Creek Alternative and the STB decided not to approve this alignment. This alignment is discussed in detail in the 1996 EIS. It is not included in the 2004 DSEIS.

Four Mile Creek Alternative. This alternative would follow the east side of the Tongue River Valley from the terminus of the Miles City to Ashland segment until the confluence of the Tongue River and Four Mile Creek, extending westerly along Four Mile Creek and climbing steeply away from the Tongue River. It would then turn southwesterly approximately three miles from the divergence point and continue southwesterly until turning south and east to connect with the Spring Creek rail spur. The Four Mile Creek Alternative and the environmental impacts associated with it are discussed in detail in the 1996 EIS and the 2004 DSEIS.

The 1996 EIS noted at pages 4 to 6 that while the Four Mile Creek Alternative segment would avoid ranching and farming operations and impacts to nesting and wintering bald eagles and wintering waterfowl immediately below the Tongue River Dam, it would cross more residential access roads, and would be as close as 100 feet to two residences. In addition, it would require more locomotives during operations, resulting in more fuel consumption and air emissions. It also would require reconstruction of a portion of State Highway 312. The Four Mile Creek would impact more acres of Waters of the U.S. than the other alternatives. In addition, the Initial Analysis Report found that this alternative encounters the greatest number of potential Waters of the U.S. as it follows the drainage of Four Mile Creek.

Table 9
Level 2 Screening
Ashland to Decker Extension (Alternatives Considered in TRRII)

Alternative	Approx. Length (Miles)	Total Numbers Waters of the US	Total Acreage Waters of the US	Cultural Resources Impacted Within the ROW	Potential Cultural Resource Sites within 1,500 Feet of the Centerline	Air Emissions Operation	Number of Public At Grade Crossings	Fuel Consumption per round trip Decker to Ashland	Required Locomotives	Number of Potential Accidents	Number of T&E Species Potentially Impacted Terrestrial	Aquatic Impacts
Original Preferred Alignment (TRRC's Preferred Alignment in 1996)	40.3	102	4.51	8	44	PM-10 0.58 SO_2 - 0.61 NO_2 7.09 CO - 2.96 HC 0.65	5	890 gals.	3	<1	1 (Bald Eagle)	Bridge construction results in temporary impact to invertebrates in fishery zone V; construction impacts to bass and pike spawning area near Hanging Woman Creek
Four Mile Creek (Approved 1996)	50.3	130	31.97	6	40	PM-10 0.69 SO_2 0.61 NO_2 8.44 CO 3.52 HC 0.77	5	1951 gals.	5	<1	1 (Bald Eagle)	Primary impacts are at stream crossings and reduced number of crossings resulted in reduced impacts

Ashland to Decker Alternate Route (TRR III including the Western Alignment)

In 1998 TRRC sought STB approval of an alternate route for the southernmost 17 miles of the Ashland to Decker Extension to address many of the concerns with the Four Mile Creek Alternative. This alternative, known as the Western Alignment, was reviewed in the 2004 DSEIS and is included in the Proposed Action summarized on Table 10 on page 60.

The Western Alignment separates from the Four Mile Creek alignment approximately nine miles north of the mouth of Four Mile Creek and crosses to the west side of the Tongue River Valley where is parallels the existing Tongue River County Road for four miles before climbing away from the valley. This alignment would avoid the environmentally sensitive Tongue River Canyon. The grades and curves are significantly less severe than the Four Mile Creek Alternative with a maximum ascending grade of 0.5% per day. Moreover the Western Alignment impacts a lower number of disturbed acres and potential Waters of the US than the Four Mile Creek Alternative. The Alignment is discussed in greater detail in the 2004 DSEIS.

TRRC also proposed minor modifications to the alignment between Miles City and Ashland to improve operations and reduce construction costs. These alignment modifications were studied by the STB and are discussed in detail in the 2004 DSEIS. Table 10 on page 60 provides a comparison of the Miles City to Decker alternatives considered in TRRIII.

The alternatives compared in Table 10 on page 60 include the following: the Approved Route without modifications (via the Four Mile Creek alternative); the Approved Route without modifications via the Western Alignment; the Modified Route via the Four Mile Creek alternative; and, the Modified Route via the Western Alignment (Proposed Action).

In addition to the mitigation measure specific to the Hatchery, there are numerous other mitigation measures identified in the Draft Supplemental EIS such as re-vegetation requirements, culvert design and bridge construction that will further reduce the impacts of the Proposed Action. In total, there are 89 mitigation measures which are outlined on pages 7-10 to 7-24 of the draft EIS. A complete listing of the proposed mitigation measures from the draft Supplemental EIS is set forth in Appendix 11.

Table 10
Level 2 Screening
Miles City to Decker (Alternatives Considered in TRRIII)

Alternative	Approx. Length (Miles)	Total Number Waters of the US[32]	Total Acreage WUS	Cultural Resources Impacted Within the ROW	Potential Cultural Resource Sites within 1,500 Feet of the Centerline	Air Emissions	Number of Public At Grade Crossings *	Fuel Consumption per round trip Miles City to Decker	Required Locomotives	Number of Potential Accidents	Number of T&E Species Potentially Impacted	Aquatic Impacts
Approved Route w/out modification (via Four Mile Creek)	131.4	338	67.16	20	105	**	7	3354 gals.	5	8.17	1 (Bald Eagle)	Potential impacts to Hatchery required additional study; which showed vibration and coal dust impacts not likely; other impacts addressed in mitigation; bridge crossings of Tongue River may have short-term impacts but are not in high sport fishery value area; potential impact due to construction sediments, but could be mitigated; may be restricted access to fishing near the bridge at Four Mile Creek
Approved Route w/out modification via Western Alignment	119.4	310	39.70	18	69	**	5	1707 gals.	3	7.94	1 (Bald Eagle)	Same as above except that Western Alignment would not impede access to fishing.
Modified Route via Four Mile Creek	127.6	325	65.51	16	98	**	7	2877 gals.	5	8.17	1 (Bald Eagle	Potential impacts to Hatchery required additional study, which showed vibration and coal dust impacts not likely; other impacts addressed in mitigation; bridge crossings of Tongue River may have short-term impacts but are not in high sport fishery value area; potential impact due to construction sediments, but could be mitigated; may be restricted access to fishing near the bridge at Four Mile Creek

[32] A breakdown on Water of the US and a draft mitigation plan is found in Appendix 12. The mitigation plan will be revised to include more specific information once the final alignment is selected and TRRC gains access to the entire right of way. This more detailed plan will be submitted to the USCOE.

Modified Route via Western Alignment (Proposed Action)	115.6	297	38.05	16	62	**	5	1546 gals.	3	7.94	1 (Bald Eagle	Same as above except that Western Alignment would not impede access to fishing.

*Using the Ashland SE Alignment
** To be completed when the information from the 2006 SEIS is available for review.

Least Environmentally Damaging Practicable Alternative

Based on a side-by-side comparison, the Proposed Action is the only practicable alternative in terms of costs, existing technology and logistics as shown on Table 11. Although the Proposed Action does not have the lowest construction costs, it has the most efficient operating costs.

Table 11 Practicability Matrix

Miles City to Ashland

Category	Modified Route (Proposed Action)	Approved Route w/out modification	Tongue River Road Alternative to Miles City	Moon Creek Alternative BN to Miles City	Colstrip Alternative Colstrip to Miles City
Costs					
Minimize construction costs	NO $241.0m	NO $241.0	NO $257.2m	NO $247.2m	YES $154.8m
Minimize operating costs	YES makes use of momentum grade[33] to reduce operating costs	YES makes use of momentum grade to reduce operating costs	NO length of adverse grade and reduced speed would require more power or use of helper locomotives and crews	NO Adds significant miles and time to each train; requires additional labor costs	NO longer running times; higher locomotive maintenance costs; more labor costs
Existing Technology (Engineering)					
Avoid adverse ruling grades	YES 0.2%	YES 0.2%	NO 0.85%	NO 1.0%	NO 0.85%
Maximize the Operating Characteristics	YES momentum grades as opposed to adverse ruling grades means more efficient operations	YES momentum grades as opposed to adverse ruling grades means more efficient operations	NO Adverse grades require more crews	NO Severe ruling grade impacts operations	NO Longer route with adverse grades means longer running times and costs

[33] Momentum grade exists where the speed and/or inertia of the train provides much of the energy needed to lift the train over the hill.

Minimize Number of Locomotives and Fuel Consumption	YES 3 locom. 937 gal. roundtrip	YES 3 locom. 938 gal. roundtrip	NO 4 locom. 1456 gal roundtrip	NO 5 locom. 1663 gal. roundtrip	NO 5-6 locom. 2600 gal. roundtrip
Logistics					
Minimize Distance of Coal Haul	YES 89 miles	YES 89 miles	YES 88 miles	NO 96 miles	NO 126 miles
Minimize crossings of transportation features	YES 2 public road crossings	YES 2 public road crossings	NO 4 public road crossings; potential for grade crossing accidents	NO 3 public road crossings; requires new bridge and rehabilitation of an old bridge	NO 8 public road crossings; Reconstructed BNSF line

Table 11A Practicability Matrix

Ashland to Decker

Category	Via Western Alignment	Via Four Mile Creek
Costs		
Minimize construction costs	NO $108.9 m	YES $97.7m
Minimize operating costs	YES Shorter distance and ability to take advantage of momentum grades	NO Steep grades require high operating and maintenance costs and more complicated operations to comply with safety requirements
Existing Technology (Engineering)		
Avoid loaded ruling grades	YES 0.4%	NO 1.5%
Maximize the Operating Characteristics	Flatter grade reduces the power needed and enhances safety	Ascending loaded train grades nearly four times as steep as Western Alignment requires more complicated operation to comply with safety requirements.
Minimize Number of Locomotives and Fuel Consumption	3 locoms. no helper locomos needed 1,826 gal. roundtrip	5 locoms. (including helpers for 16 miles) 2,798 gal. roundtrip
Logistics		
Minimize Distance of Coal Haul	Yes 17.3 miles	No 29.4 miles
Minimize crossings of transportation features	Yes 4 public road crossings	No 7 public road crossings

The Proposed Action also is the least environmentally damaging alternative as shown in Table 12.

Table 12 Resource Matrix

Miles City to Ashland

Category	Modified Route (Proposed Action)	Approved Route w/out modification	Tongue River Road Alternative	Moon Creek Alternative BN to Miles City	Colstrip Alternative Colstrip to Miles City
Minimizes Impacts to Waters of US	YES 33.54 acres	YES 33.54 acres	NO 89.84 acres	NO 42.40 acres	NO 49.42 acres
Avoids Impacts to Areas with Significant Aquatic Habitat Values	YES one bridge crossings of Tongue River could have short-term impacts but are not in areas of high sport fishery value areas	YES one bridge crossings of Tongue River could have short-term impacts but are not in areas of high sport fishery value areas	NO requires bridge across Pumpkin Creek which requires carries a high species/ habitat value	NO requires bridge crossing of Yellowstone River in section which is high priority fishery resource	NO Requires crossing of Rosebud Creek which holds a significant specifies/ habitat area
Minimizes land needed for ROW	YES 1,278 acres	YES 1,278 acres	NO 1,413 acres	NO 1,323 acres	YES 838 acres
Minimizes impacts to terrestrial wildlife	YES 1-Bald Eagle	YES 1-Bald Eagle	YES 1-Bald Eagle	YES 1-Bald Eagle	YES 1-Bald Eagle

Table 12A Resource Matrix

Ashland to Decker

Category	Western Alignment (Proposed Action)	Four Mile Creek
Minimizes Impacts to Waters of US	Yes 4.51 acres	No 31.97 acres
Avoids Impacts to Areas with Significant Aquatic Habitat Values	Disturbs approximately 1.69 acres of wetlands; 42 non-perennial stream crossings; 1 bridge crossing over Tongue River, which could have short term impacts to the invertebrates in the fishery zone	Disturbs approximately 6.09 acres of wetlands; 40 non-perennial stream crossings; 1 bridge crossing over Tongue River, which could have short term impacts to the invertebrates in the fishery zone
Minimizes land needed for ROW	Yes 672 acres	No 765 acres
Minimizes impacts to terrestrial wildlife	Yes Less pronghorn antelope habitat potentially impacted (approx. 76 acres); would not result in significant isolation of pronghorn habitat area; overall less terrestrial habitat lost	No Approx. 358 acres of pronghorn antelope habitat potentially impacted; more terrestrial habit lost overall

COMPLIANCE STATEMENT

As shown on Tables 8 through 12, the Proposed Action (which includes the Western Alignment) complies with the requirements in Section 230.12 of the Guidelines as it is the least environmentally damaging practicable alternative. None of the other practicable alternatives would have less adverse environmental effects and others would have more. For example, the Tongue River Road, Moon Creek and Colstrip Alternatives would have substantially greater environmental impacts, including greater impacts to Waters of the U.S.

The Proposed Action would impact 33.54 acres of waters of the US. By comparison the Moon Creek Alternative and the Colstrip Alternative would impact 42.40 and 49.42 acres respectively and the Tongue River Road Alternative would impact 89.84 acres. The Tongue River Road Alternative would have the same impacts to the Hatchery as the Proposed Alternative and would also require a bridge crossing of a creek designated as high species/high habitat value. The Colstrip Alternative would require crossing of a creek in a significant species/habitat area. The Moon Creek Alternative would require a crossing of the Yellowstone River in a section of the river which is a high priority fishery resource.

Moreover, because of adverse grades, the Colstrip Alternative would have substantially higher long-term operational and maintenance costs, and result in greater fuel consumption and increased air emissions as compared to the Proposed Action. The Proposed Action would consume approximately 1.9 million gallons of fuel per year to haul 30 million tons of coal annually to Miles City. By comparison the Colstrip Alternative would consume approximately 5.2 million gallons of fuel per year to haul the same tonnage of coal. The Tongue River Road and Moon Creek Alternatives would consume approximately 3.7 and 2.6 million gallons respectively to haul the same tonnage of coal.

While the Proposed Action would impact the Miles City Fish Hatchery the TRRC has agreed to various mitigation measures such as protection of the Hatchery water supply lines, reduced train speeds and mechanical weed control that will mitigate these impacts. The mitigation measures will become part of the STB's order, and, thus will be required. The Proposed Action also follows the fencelines at the LARRS research station, thus avoiding impacts to historical research plots. Changes to the configuration of historical research plots would make it difficult, if not impossible, to meaningfully relate past and future study results. The long-term consistency in the research plots is important to the overall research and cannot be mitigated except by avoidance of the plots.

The Four Mile Creek Alternative has significant adverse grades resulting in operational and safety concerns that would severely impact the viability of the railroad. In addition, it would impact more acres of Waters of the US (67.16) than the Proposed Action (38.05). Moreover, the proposed Four Mile Creek Alternative is 15.8 miles longer than the Proposed Action, has additional road crossings, requires reconstruction of

State Highway 312 and is closer to more residences than the Proposed Action. The No Action Alternative using the existing BNSF lines provides no service to the proposed Ashland and Otter Creek area mines and no improvement in service to the Decker area mines. It also is important to note that 89 mitigation measures ranging from culvert design to re-vegetation has been identified by the SEA that would further mitigate the impact of the Proposed Action. Sufficient information exists in the 1984 SDEIS, the 1986 FEIS, the 1994 SDEIS, the 1996 FEIS and the 2004 DSEIS and has been relied upon in this Showing Document to determine compliance with the requirements of Section 230.12.

Given all of the above factors, TRRC believes that the least environmentally damaging and best practicable alternative is the Proposed Action. The Proposed Action meets the design and the operational criteria for the railroad, provides for the economic transport of coal for the Ashland/Otter Creek area mines and reduces the transportation distance for the Decker mines, and some Wyoming area mines. The Proposed Action thus meets the purpose and need of the project. The Proposed Action also impacts the fewest acres of Waters of the US and encounters the lowest acreage of probable wetlands. The Proposed Action also has the least impact on aquatic resources. While there are some impacts to the Fish Hatchery, these can be mitigated.

TRRC strongly requests that the USCOE consider all of the above in evaluating the issuance of the 404 Permit for the Tongue River Railroad. TRRC believes that the Proposed Action will bring needed economic and efficient rail transportation to the Ashland/Otter Creek area with the least damaging environmental impacts.

APPENDIX 1

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(b)(1) SHOWING

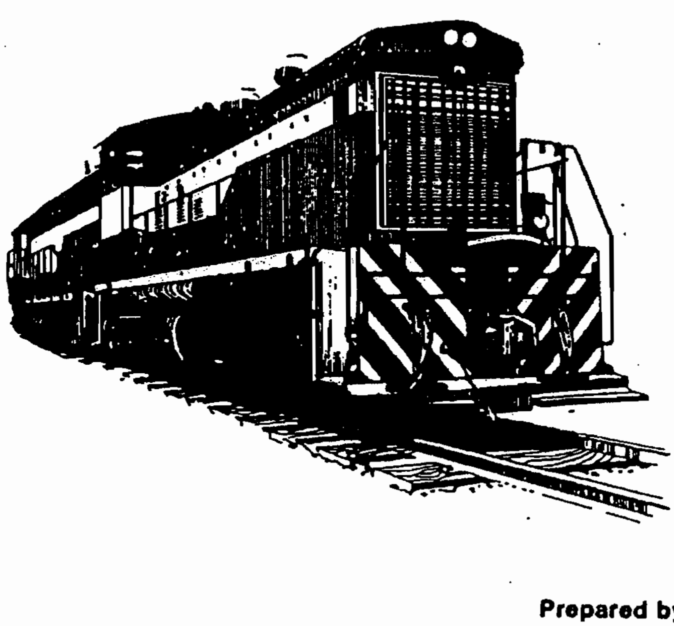
Service Date: July 15, 1983

Comment Due Date: October 21, 1983

Draft
Environmental Impact Statement

Finance Docket No. 30186

Tongue River Railroad Company
—Construction and Operation—
of a line of railroad in Custer,
Rosebud, and Powder River Counties, Montana



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APPENDIX B

SCREENING OF ALTERNATIVE ROUTES

B3.0 IDENTIFICATION AND DESCRIPTION OF ALTERNATIVES

A number of possible alternatives to the proposed TRRC railroad were identified as a result of public and cooperating agency input during the early stages of the EIS preparation process. Additional alternatives were developed by the TRRC as a result of engineering, environmental and social concerns regarding the proposed railroad. In accordance with NEPA, alternative modes of coal transportation and the possibility of a "No Action Alternative" also were examined. Alternatives examined can be divided into four categories:

(1) The "No Action Alternative"
(2) Alternative modes of transportation
(3) Alternative rail alignments outside the proposed rail line
(4) Alternatives (options) within the proposed rail line

B3.1 THE "NO ACTION ALTERNATIVE"

The "No Action Alternative" suggests the possibility that the TRRC project may not merit a "Certificate of Public Convenience and Necessity" from the ICC. This alternative is based upon the assumption that either: (1) there is not or will not be a need to transport coal from the Montco Mine or other potential mines in the area; or (2) another mode of transportation is preferable to the proposed railroad. The "No Action Alternative" would constitute the ICC's denial of a Certificate of Public Convenience and Necessity for the proposed railroad.

The "No Action Alternative" further assumes that alternative modes and alternative railroad routes are likewise unjustifiable in terms of the nation's energy demands balanced against the potential environmental, social, and economic impacts that would accrue to the affected area.

B3.2 ALTERNATIVE MODES OF TRANSPORTATION

B3.2.1 Coal Slurry Pipeline

Coal movement by a slurry pipeline system is a possible alternative to the proposed railroad. Such a system could transport coal from the Ashland/Birney/Otter Creek area to Miles City or to another railhead serving the Midwest markets. A slurry system would require several components, including: (1) a coal slurry preparation facility; (2) a water supply system; (3) a 24-inch pipeline (buried or elevated; (4) pump stations as necessary over the length of the route; (5) a dewatering plant and loading facility. Such a system would require at least a 30-foot right-of-way and could consume an estimated 7,200 acre-feet of water per year.

B3.2.2 Conveyor Belt System

A conveyor belt system could be constructed as an alternative to the proposed railroad. A conveyor system could transport coal over the 89.2-mile route from the Ashland/Birney/Otter Creek area to Miles City, where it would be transferred to unit trains for transport to the Midwest markets.

A conveyor system would require several components, including: (1) storage and loading facilities; (2) a series of sections of conveyor belt in 89, 1-mile straight lengths; (3) unloading, storage, and loading facilities at the railhead. The conveyor system would be covered and would contain a belt, 48 inches wide, on which the coal would be transported. The system could rest at ground level or could be elevated. A minimum 30-foot-wide right-of-way would be required, and, based upon a projected coal production of 12 million tons a year, the cost of such a conveyor would be roughly $162 million.

B3.2.3 Hauling by Truck

The use of trucks to haul coal from the Ashland/Birney/Otter Creek area to railroad loading facilities at or near Miles City could be an alternative to the proposed railroad. The transportation corridor followed by the existing Tongue River Road likely could be adapted for this purpose.

Such a means of transporting coal would require the construction of a separate, hard surface roadway. Approximately 300, 50-ton trucks would be necessary to transport the expected annual production of coal to the railhead. Facilities requirements for such a transportation system would include road and vehicle maintenance shops to provide continual maintenance of the road and to keep the trucks in constant operation. Storage and loading facilities also would be required at the railhead.

B3.2.4 Mine-mouth Generation

Transportation of coal over long distances could be avoided completely if electrical-generating facilities were located at the sites of the coal mines to be serviced by the TRRC railroad. A number of such power plants have been suggested for southeastern Montana but, other than the existing Colstrip facilities, none, to date, has gone beyond the conceptual stage.

Such a generating plant would necessitate the construction of high voltage power lines to a destination where they could join existing power grids serving the same customers as would coal transported by the railroad. A large volume of water would be required for the operation of such a plant, since a typical power plant requires 7 to 8 tons of water per ton of coal burned. For the Montco Mine, at a projected 12 million tons annually, water requirements would reach more than 61,000 acre-feet.

B4.0 EVALUATION OF POSSIBLE ALTERNATIVES TO THE PROPOSED ACTION

B4.1 THE "NO ACTION ALTERNATIVE"

A favorable evaluation of the "No Action Alternative" would indicate that either an alternative mode of transportation is preferable to a railroad or that there does not exist, and will not exist in the foreseeable future, a need for transporting coal from the Ashland/Birney/Otter Creek area. The alternative modes of transportation identified in section B3.0 were evaluated for their feasibility. They were found to be unfeasible alternatives to a railroad. The following sections summarize the results of the evaluation.

B4.1.1 Coal Slurry Pipeline

Constructing a coal slurry pipeline from the Ashland/Birney/Otter Creek area would present no inordinate engineering problems.[3] However, recent studies have shown that transporting coal by slurry over a relatively short distance is less economical than shipment over a greater distance.[4] A coal slurry pipeline is not economically competitive with a unit train when used for transporting small volumes of coal over a relatively short distance. Unit train rates and coal slurry compare more favorable only when the length of haul approaches 1,000 miles (0.7 cents per ton-mile to 1.1 cents per ton-mile).[5]

There are numerous legal and environmental constraints to the construction of slurry pipelines in the state of Montana. They include the beneficial use of water, water rights, changing the use of a prior appropriated water right, and the Yellowstone River Compact. Under 85-2-104(2) of the Montana Code Annotated, "Use of water for the slurry transport of coal is not a beneficial use of water."[6] In addition, under Montana's system of prior appropriation of water rights, it would be difficult, if not impossible, to obtain water rights to construct a slurry line. The priority uses of water in the Tongue River Valley are for domestic and municipal use and for agriculture. Another legal constraint applies to change of purpose of use: "An appropriator of more than 15 cubic feet of water per second may not change the purpose of use of an appropriation right from an agricultural use to an industrial use" [85-2-402(3) MCA 1979]. It also should be stated that the Yellowstone River Compact (85-20-101 et. seq. MCA) under Article V limits the amount of water to be removed from the Tongue River to 60 percent of its flow to the State of Montana.

Promoters of coal slurry pipelines also suffer from a lack of the power of eminent domain.[7] The ramifications of this issue have been particularly evident when slurry pipeline investors have attempted to cross railroad rights-of-way. In order to discourage competition in the movement of coal, a number of railroad companies have been notably reticent to grant a right-of-way to a coal slurry operator. Without the power of eminent domain, and given the current opposition of rail carriers to slurry pipelines, it would be very difficult for a coal slurry line to be built from Ashland to markets in the Midwest.

The most significant issue from an environmental perspective on coal slurry pipelines is the availability of water.[8] A reliable source of both surface and ground water would be necessary to support a slurry line of the size required to serve the Ashland/Birney/Otter Creek area. Given the relative aridity of southeastern Montana, it could be questioned whether sufficient water is available in the Tongue River Valley. Consequently, public policy in Montana discourages the construction of coal slurry pipelines, and the SEE eliminated it from further consideration as a reasonable alternative to the proposed rail line.

B4.1.2 Conveyor System

Conveyor belts are most economical when used to transport coal over relatively short distances. They are employed principally in moving coal from a strip mine to a mine mouth electrical-generating plant or to a railhead. Given the 89-mile distance to Miles City, a conveyor system would not be as economical as a railroad. The additional cost would have a negative impact on the marketability of the coal.

Construction of a conveyor belt system along the Tongue River would not offer any more substantive legal problems than would a railroad. From an environmental perspective, construction of a conveyor belt would pose similar problems as would the building of a railroad. However, a conveyor belt could have a greater impact on air quality than would the railroad. Control of fugitive dust, not only during construction but over the long term, would be difficult. Noise might also be a significant impact of such a system.

Additional environmental consequences of utilizing the conveyor belt mode of coal transport would be the difficulty in maintenance of the system. The security of the system over 89 miles would be a persistent problem. Furthermore, a conveyor system presents a significant physical barrier to wildlife migration. For these reasons, the conveyor alternative was eliminated by the SEE from further consideration as a reasonable alternative to the proposed rail line.

B4.1.3 Hauling by Truck

It is possible for trucks to use a slightly more adverse grade than locomotives. Thus, a new haul road may require fewer cuts and fills than would a railroad. However, without a substantial reduction in grade, fuel costs would outweigh any advantages. It would require more than 300, 50-ton trucks to haul the expected annual tonnage from Ashland to Miles City.

Trucks are most economical when used to haul coal over relatively short distances--less than 50 miles.[9] In the West, they are used primarily to transport coal from a strip mine to a railhead or to a mine mouth generating plant. Hauling coal by truck for the 89 miles to Miles City would not be as cost or energy efficient as transporting the product by unit train. While construction of a new coal-hauling road may require fewer cuts and fills than a new railroad line, there would be a definite increase in energy consumption with the steeper grades. Use of trucks would add roughly 12 cents per ton-mile to the cost of coal and would affect the marketability of the product.

The legal ramifications of utilizing trucks to haul coal are difficult to assess. Assuming that the existing Tongue River Road would be used by these vehicles, the road would have to be upgraded and a new right-of-way would have to be negotiated by the Rosebud and Custer County Commissioners. Potential problems in securing an adequate right-of-way would be similar to those encountered for a railroad. In addition, a significant number of disturbed acres would be added, due to larger right-of-way requirements.

The use of trucks to haul coal from the Ashland/Birney/Otter Creek area to Miles City could have significant environmental impacts. Truck haulage of coal would impact air quality. Fugitive dust from the road would be serious and could be mitigated only by continuous watering or paving. By employing either method, it is likely that the dust problems still would be greater by using trucks than by using a railroad. There also would be a significant impact from diesel exhaust from the trucks. Moreover, there would be environmental impacts associated with coal handling facilities, located near Miles City, that would be necessary for transferring coal from trucks to unit trains.

As mentioned earlier, the existing road along the east side of the Tongue River would have to be rebuilt. In order to mitigate the deleterious impacts from fugitive dust, this road would likely require some form of hard surface. Given the number of trucks that would be required to haul 12 million tons of coal from the Ashland area, continual maintenance of the road would be essential. Nonetheless, it is likely that damage to the road would occur and might result in accidents. The consequences of vehicle accidents could be fatalities to humans and livestock. Accidents would be more likely if passenger vehicles were to share the road with coal-hauling trucks.

A large number of trucks traveling over the Tongue River Road also would increase noise levels in the valley. This impact may be most significant immediately southeast of Miles City, where the county road enters town. Increased truck traffic through Miles City would certainly raise noise and vibration levels in that community and should be considered a significant environmental consequence of employing the truck mode of transportation.

In addition to dust, noise, and vibration, truck haulage of coal will require a larger work force than other modes of transportation. Consequently, the socioeconomic problems related with industrial development in southeast Montana may be greater by carrying coal by trucks than by another means.

Considering all these factors, the SEE eliminated this alternative from further consideration as a reasonable alternative to the proposed rail line.

B4.1.4 Mine-mouth Generation

The location of a mine-mouth electrical-generating plant in the Ashland/Birney/Otter Creek area may be cost competitive with rail transportation. Recent studies are contradictory on this point. A U.S. Bureau of Mines study in 1975 concludes that unit train transport of coal would be "30 percent less costly and 21 percent more efficient" than electrical transmission.[10] The National Power Grid Study, conducted by the Department of Energy during that same year, reports that mine-mouth generation of electricity would be 15 percent more efficient than rail transport of coal to local generating plants.[11]

Notwithstanding the disparity of opinion regarding the economic benefits of mine-mouth electrical generation, few researchers dispute the environmental difficulties associated with establishing a mine-mouth power plant. One of the more important environmental constraints to siting a new generating plant in the West is the need for a large volume of water. A typical power plant requires 7 to 8 tons of water for each ton of coal that is burned.[12] The availability of sufficient water for power plants in the arid southeast Montana region is questionable. If that water were available, the environmental consequences of utilizing that much water can only be imagined.

An equally important environmental impact from mine-mouth generating plants is the possible deterioration of air quality in the Tongue River Valley. A mine-mouth generating plant located near Ashland clearly would impact the Northern Cheyenne Indian Reservation's Class I air designation.

Other significant environmental constraints that are associated with a mine-mouth electrical plant involve the siting and the construction of high voltage transmission lines. Each new plant would require electrical linkage to the place of use. As has become apparent in Montana in recent years, right-of-way acquisition for transmission lines is a serious legal and jurisdictional problem. Moreover, all of the environmental consequences that result from development of any kind would be attendant to the construction of a transmission line. When added to the apparent environmental factors presented by a power plant siting, these consequences could be cumulatively more important than the transportation of coal from the southeast Montana region. Therefore, this alternative was eliminated from further consideration by the SEE.

Another significant environmental objection to the Decker route is its possible traverse of a known antelope wintering ground. In addition, the route would parallel the western boundary of the Northern Cheyenne Indian Reservation for a greater distance than would any other alternative alignment. Effects on the reservation's Class I air quality designation might be more substantial than would occur on another route.

Finally, the direction of coal transport through the Sheridan, Wyoming, area might create a severe "bottleneck" at that point. This concentration of coal shipment would not only affect the movement of coal and other commodities, but might have significant socioeconomic impacts on northern Wyoming communities. For these reasons, the SEE eliminated the Decker route from further consideration as a reasonable alternative to the proposed rail line.

B4.2.2 Bureau of Land Management Route (Map Designation 3)

The principal engineering obstacle to constructing a rail line along the BLM-suggested alignment is the necessity to leave the Tongue River Valley. The suggested railroad route would have to climb approximately 400 feet from the valley before eventually dropping into the Moon Creek drainage. Extra locomotives would be required to pull a unit train up this grade, thereby adding to operating costs. Furthermore, this alignment would necessitate substantial amounts of cut and fill in order to cross the rougher terrain. In addition, significant cost would be incurred if the railroad connected with the Milwaukee Road, which would require construction of a bridge across the Yellowstone River. All of these factors explain the higher cost of this alignment when compared to the other alternative routes.

The same right-of-way problems that are associated with crossing federal lands on the Decker route would apply to the BLM route. Acceptance of this route would necessitate securing a second permit from the U.S. Army Corps of Engineers, should the Yellowstone River have to be crossed.

Environmentally, the BLM route presents a number of problems. The amount of cut and fill that would be necessary to cope with the rough terrain would impact more acreage during the construction phase. In addition, this route may dissect three antelope wintering ranges and one turkey range. The U.S. Fish and Wildlife Service has expressed concern over the possible effects of this alignment to wildlife populations in the area.

For these reasons, the BLM route was eliminated by the SEE from further consideration as a reasonable alternative to the proposed rail line.

alignment would require large amounts of cuts and fills. The total rise against load of 600 feet represents a significant engineering obstacle. The longer haul for coal on the Colstrip route also would have some affect on the coal's marketability in the Midwest.

Brief previews of the environmental impacts from construction and operation of a rail line to Colstrip suggest that the route might be more acceptable than other alignments. However, the route's proximity to the Northern Cheyenne Indian Reservation and its Class I air designation could be a potential constraint to the project.

Possible benefits of this route, particularly the shorter distance and smaller associated disturbance, in conjunction with the large volume of data available, were decisive factors in retaining this route for further evaluation.

B4.3 EVALUATION OF ALTERNATIVES (OPTIONS) WITHIN THE PROPOSED RAIL LINE

B4.3.1 Custer County/LARRS Option (Map Designation 1.1)

The Custer County option differs from the other alignments in that it has a 400-foot rise. Its location through the LARRS offers no qualitative advantage over other options. The route would require more cuts and fills than other options and probably would create more environmental impacts to the research facility. In addition, the Custer County route as suggested bisects the LARRS and would likely have more impact on the facility than would a route nearer the station's extremities. For these reasons, the SEE eliminated this option from further consideration.

B4.3.2 IntraSearch/LARRS Option (Map Designation 1.2)

This option would have a more adverse grade than other routes through the LARRS. As with the other alignments through the range station, it could affect activities at the facility. However, this option could have a more serious impact to the station than other alignments in that it might cross several irrigated fields north of Interstate Highway 94. Therefore, the SEE eliminated it from further consideration.

B4.3.3 LARRS/Tongue River Option (Map Designation 1.3)

Selection of this option would dictate raising the grade above the Tongue River flood plain. Proximity of the river also might necessitate placement of rip-rap. Selection of this option might avoid possible impacts to range experiments at the LARRS. However, the route's proximity to the river may present aquatic and hydrological problems. Should rip-rap in the banks of the Tongue River become necessary, additional Section 404 permits would be required from the Corps of Engineers. This option was retained for further study as part of the Proposed Action because of the minimal impacts it would have on the LARRS.

B4.3.4 Proposed Rail Line through LARRS (Map Designation 1.4)

This option represents the best route from an engineering perspective. It is further from the Tongue River than the LARRS/Tongue River option, yet it has the same engineering characteristics (0.2 ruling grade against load). The main constraint to selection of this option would be its significant impact to range research plots at the LARRS. Due to this consideration, this option was eliminated from further consideration by the SEE.

B4.3.5 IntraSearch, East of Miles City (Map Designation 1.5)

This option has significant engineering and environmental consequences associated with it. This route would bisect agricultural, commercial, and residential properties on the east side of Miles City. The city's future residential expansion to the east would directly conflict with the railroad. In addition, selection of this option would necessitate a second crossing of the Tongue River. Two additional highway crossings also would be needed. Greater socioeconomic, aquatic, and hydrological impacts are associated with this option than with other options or alternatives. This option was not retained by the SEE for further study because of the concerns cited here.

B4.3.6 Option in Township 4 North/Range 47 East (Map Designation 1.6)

This option presents some minor additional engineering constraints when compared to the proposed rail line. It would require more cuts and fills and would result in additional adverse grade. The possible benefits that might result from this option were not significant enough to warrant its retention for further consideration by the SEE.

B4.3.7 Ashland NW Alignment (Map Designation 1.7)

The Ashland Northwest (NW) Alignment presents the best engineering route around Ashland. However, it might affect some residential areas of Ashland and might isolate the community fire station. Socioeconomic impacts associated with this option are the possible constraints to its selection, but it was retained as an option and will be considered in the DEIS.

B4.3.8 Optional Route Through Ashland (Map Designation 1.8)

The principal difficulty in constructing a rail line along this optional route is the amount of earthwork that would be required. Conceivably, a substantial amount of fill would be needed through the Otter Creek drainage. This work might increase sedimentation to the creek and impact water quality and aquatic resources. The SEE eliminated this option since it did not appreciably differ from the proposed rail line.

APPENDIX 2

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

Miles City State Fish Hatchery Investigation To Assess Potential Effects of the Construction and Operation of the Tongue River Railroad

Prepared for:

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are often used to control weeds along railroad rights-of-way. Radian's report states that herbicide transport from the TRR right-of-way to the ponds is dependent on wind speed, wind direction and other atmospheric conditions during the days that herbicides are applied. The wind rose for Miles City shows that the prevailing winds are from the northwest and southeast. Durig less than 20% of the year, the winds are from directions that could cause concern. Radian's report indicates that the chance of herbicide transport to the fish hatchery ponds is unlikely based on the wind data collected and the limited number of herbicide applications planned. However, according to Radian, the possibility of herbicide reaching the ponds is sufficient to warrant a recommendation for the use of mechanical weed control in the vicinity of fish hatchery. If mechanical means are not adequate to control the spread of some weed species of concern, a combination of mechanical and herbicide spray may be necessary. Radian recommends using the least toxic form of herbicide in the vicinity of the fish hatchery ponds and preparing a specific weed control implementation plan. Radian's report is in Appendix 7. Diuron, Tordon, and 2,4-D are common chemicals used for weed control. Information on the toxicity of these chemicals was obtained and summarized by Dr. Anderson. Exposure to significant concentrations of these common chemicals does not cause mortality, and long-term chronic exposure produces a variety of effects in mammals, birds and fishes. Used as directed these chemicals do not have measurable impacts on animals. For ground applications, the EPA recommendations require spraying to occur more than 20 yards from sensitive habitats. TRR is many times this distance from the hatchery. Anderson discusses this issue in detail in Appendix 6b.

8.0 FINDINGS AND CONCLUSIONS

8.1 Vibration Effects

The measurements and calculations performed by SK Geotechnical (Appendix 4) and Cooksley Geophysics (Appendix 5) lead to the conclusion that the TRR will have no effect on structures. Maximum vibration levels expressed as particle velocity in inches per second (ips) are predicted to be in the range 0.02 to 0.04 ips, which is much lower than the threshold value of vibration to damage structures of more than 1 ips.

Anderson's analysis (Appendix 6a1 and 6a2) concludes that sound produced by vibration will be heard by the fish, but will be below levels known to cause physiological damage to fish, eggs, or zooplankton. The sound levels will also be below levels used to effect or influence fish, and the fish are likely to be habituated to the sounds in their environment.

8.2 Coal Dust Emissions

Radian (Appendix 7) concludes that, because train speeds will be about 20 mph in the vicinity of the MCFH, well below the threshold velocity of 47 mph required to mobilize coal dust, coal dust emissions will not occur. Furthermore, since the TRR is downwind from the site, it is likely to represent an improvement over the existing conditions, where coal traffic on the BNSF is predominantly upwind of the site. Anderson (Appendix 6b) found no evidence that coal dust is detrimental to fish.

8.3 Herbicides

Radian International concluded that, although unlikely, the possibility of herbicide reaching the ponds warrants using mechanical weed control methods near the fish hatchery. If, however, mechanical means are not adequate to control the spread of some species, a combination of mechanical and herbicide spray may be necessary. A specific weed control plan addressing herbicide drift near the fish hatchery should be prepared that is consistent with the existing mitigation plans for weed control along the TRR, in particular near watercourses.

Anderson's review (Appendix 6b) concludes that the herbicides used by BNSF, and planned for use by TRRC, are not expected to be harmful to the hatchery.

8.4 Soil Chemistry

The data collected for this study are consistent with previous studies that the soil is corrosive in areas and likely to have a deleterious effect on iron valves and concrete structures when the soil is saturated. The recommendations provided in the original report to Interstate Engineering (1998, Appendix 8) by Northland Corrosion Services, Ltd. should be followed.

9.0 LIMITATIONS

This report has been prepared based on the field data collected for this study and information contained in the references cited below and is intended for single use. Actual site conditions may vary, although soil types encountered in the boreholes were consistent across the site. This report has been prepared in a manner consistent with the level of care and skill ordinarily exercised by members of the profession currently practicing in this area under similar conditions. No other warranty is made or implied.

10.0 REFERENCES

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APPENDIX 6

James Anderson

6A1: Potential Effects of Train Sounds

6A2: Further Information on Effects of Sound on Fish

6B: Potential Effects of Coal Dust and Herbicides

APPENDIX 6

James Anderson

6A1: Potential Effects of Train Sounds

Potential Effects of Train Sounds on the Mile City Fish Hatchery

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University of Washington
Seattle, WA 1998
March, 1999

Summary

This report evaluates the possible effects of railroad sounds from the proposed Tongue River Railroad Alignment on fish at the Fish Hatchery in Miles City, Montana. Expected levels of sound produced by trains were estimated and compared with levels fish experience in other environments. The probable effects of the sound on the behavioral and physiology of the hatchery fish are discussed.

Using seismographic measurements taken at the hatchery, fish raceway sound levels from the proposed alignment of the Tongue River Railroad are expected to be about 5 db (rel 1 Pa) at a distance of 1000 ft. and 18 db at 100 ft. distance from the tracks with a train moving between 20 and 30 miles per hour. Sound from trucks will be below the levels generated from trains. A review of the literature indicates that while fish will hear this level of sound, it is below the levels used to divert fish from power plant intakes and the level shown to cause physiological damage to fish. Furthermore, studies on habituation of fish to sound and other stimulus suggest that Miles City hatchery fish are likely to become habituated to the sounds of trains.

Estimating Sound Pressure Levels

General approach

Studies on the effects of sound on fish are expressed in terms of sound pressure levels (SPL) measured in decibels relative to a reference pressure. In the study by SK Geotechnical (Rice 1999) sound was expressed in terms of peak velocity of the vibration measured by a seismograph. The relationship between peak velocity measured with an instrument, V_i, and SPL involves the density of the media, ρ, the propagation speed of sound through the medium, *c*, the distance between the source and the measuring instrument, *r*, and a calibration factor, k, that characterizes the instrument. A general relationship can be expressed as

$$SPL = 20 \log_{10} P / P_{ref} = 20 \log_{10} (\rho\, c\, 2^{-1/2} k V_i / r) / P_{ref}$$

where $\log_{10}$ is log to the base 10. This relationship requires knowing or estimating the above factors once the distance and the instrument peak vibration are known. In particular, critical unknowns are the calibration factor and the pathway of the sound wave to the instrument, which affects the velocity of the sound wave *c* and the effective density of the medium. To obtain an approximate calibration of the instrument a mass of known weight was dropped to generate a reproducible sound source and the resulting instrument vibration was measured at various distances. This calibration, described below in detail, was designed to convert instrument-measured vibration levels into SPL.

Vibration and Frequency levels of sound

To evaluate the sound levels, vibration monitoring data were collected at the Miles City Fish hatchery by SK Geotechnical (Rice 1999). The data were reported as peak velocities in inches per minute (ips) from various sources measured at various distances. The sound frequency of the freight trains and trucks were low, ranging from a low of 11 Hz to a high of 168 Hz. The mean frequencies, 14 Hz for trains and 58 Hz for trucks, were taken from the longitudinal components of the particle vibration measurements.

Calibration

The calibration of the seismograph, relating vibrational intensities to measured particle velocities, used a sound source generated by a falling weight onto a steel plate. A good approximation of the waves generated by the transient force is given by the equation

$$D_r = \mathrm{G} \cos \phi \; g(t - r/c) / [4 \pi \rho c^2 r]$$

where D_r is the displacement along the radial coordinate of the spherical coordinate system, G is the magnitude of the force, g(t) is its time dependence, ϕ is the angle between the measurement and the positive X-axis of the coordinate system, *r* is radial distance from the source, ρ is the density of the medium, and *c* is wave propagation velocity (White 1983). The energy from the source can reach the geophone from both air and ground pathways and for this analysis we assume all the energy is transmitted through the ground.

The force generated from the falling calibration weight can be expressed as

$$\mathrm{G} = \mathrm{M}\ \mathrm{V}_0 / \Delta \mathrm{t} = \mathrm{M}\ (2 \mathrm{g}_0 \mathrm{x})^{0.5} / \Delta t \qquad (1)$$

where V_0 is the velocity, M is the mass of the object in kg, x is the distance the weight is dropped in meters, g_0 is the gravitational acceleration constant, and Δt is duration of the force in s. We characterize the wave form generated by the impact as

$$g(\mathrm{t}) = (1 - \cos (2 \pi \omega t)) \qquad (2)$$

where $2\pi\omega$ is the measured frequency in cycles per second or Hz. The particle velocity $V(t)$ is defined as the derivative of displacement, so

$$V(t) = dD_r/dt = G \sin\phi \, g'(t - r/c) / [4 \pi \rho c^3 r]$$

where differentiation of eq(2) gives

$$g'(t) = 2\pi \omega \sin(2\pi \omega t).$$

The peak velocity occurs when $\sin(2\pi \omega t) = 1$, and so the relationship of a wave propagating perpendicular to the direction of movement of the calibration weight (when $\sin(\phi) = \sin(\pi/2) = 1$) is

$$V_{peak} = \omega G/[2 \rho c^2 r]$$

To estimate the peak velocities generated by the weight dropping on the plate the following values are used in eq(1). The calibration weight of 4.53 kg was dropped a distance of 0.61 m, and assuming the force was dissipated over a few milliseconds, $\Delta t = 0.002$ s the resulting force using eq(3) is G = 7833 newtons. Note, this is likely to be a maximum estimate of the force since the rate of dissipation is expected to be a few (> 2) milliseconds (White 1989). To estimate the density of the medium note the SK Geotechnical report measured sound vibration in alluvial deposits, hard bedrock, and mud but did not find significant differences in vibration levels between them. Using published studies (Cordier 1985) we assume a wave propagation velocity in the soft alluvium soils of $c = 1000$ m s^{-1} with a soil density of $\rho = 2000$ kg m^{-3}. In this calibration procedure the soil density drops out of the equation so the exact density is not important although the wave velocity is important. The frequency of the wave form generated by the falling calibration weight was between 41 and 83 Hz. A representative angular frequency is then $\omega = 10$. The peak velocity generated from the calibration weight expressed in m s^{-1} is then

$$V_{peak} = 10*7833/(2000*1000^2) / r = 0.000039/r$$

where V_{peak} is in m/s and r, the distance to the source, is in m.

The peak sound pressure (P_{peak}) is directly proportional to the particle velocity in an advancing wavefront. Also noting that the effective, or root mean square, pressure is related to the peak pressure by $P = 2^{-1/2} P_{peak}$, then the effective sound pressure is related to the peak velocity by

$$P = \rho\, c\, 2^{-1/2} V_{peak}$$

where V_{peak} is the peak particle velocity (m s^{-1}), ρ is the density of the medium (kg m^{-3}) and c is the wave propagation velocity (m s^{-1}). The product of (ρ c) is the acoustic impedance and is a measure of the acoustic properties of the medium.

The instumment measured peak velocities V_i are expected to be proportional to the actual peak velocities through the calibration coefficient so we can write

$$V_{peak} = k\, V_i$$

where the calibration coefficient is determined by the ratio of the observed and the calibrated peak velocities at specified distances r is

$$k = V_{peak}(r) / V_i(r)$$

where both velocities are expressed in m s^{-1} the mean value of the coefficient using the calibration data is $k = 0.009$.

The sound pressure inferred from the instrument velocity measurements is then

$$P = \rho\, c\, 2^{-1/2} k\, V_i$$

Sound pressure level

The standard measure of sound for fish behavior studies is the sound pressure level SPL. This is expressed in a logarithmic measure - the decibel - relative to a reference quantity (Kinsler and Frey 1962) Thus:

$$\mathrm{SPL} = 20 \log_{10} \mathrm{P} / \mathrm{P}_{ref}$$

In this report all sound pressure levels (P_{ref}) are referenced to a pressure of 1 Pascal (Pa). The sound pressure measures are related as follows: 1 Pa = 1 N m^{-2} = 10 μ bars = 10 dyn cm^{-2}. The resulting sound pressure and SPL , as a function of distance from freight trains and trucks, is given in Table 1.

Table 1. Vibration data and sound pressure data from the Miles City fish hatchery study.

	distance (ft.)	peak particle velocity V_i (ips)	sound pressure (Pa)	SPL (db ref 1 Pa)
Freight Trains	25	0.11	35.6	31.0
	50	0.07	22.6	27.1
85, 118 and 120 units	100	0.06	19.3	25.7
	200	0.01	3.2	10.2
traveling between 21 and 30 m.p.h.	200	0.02	6.5	16.2
	200	0.03	9.7	19.7
	200	0.03	9.7	19.7
	225	0.02	6.5	16.2
	225	0.03	9.7	19.7
	1200	0.01	3.2	10.2
trucks on interstate	33	0.04	12.9	22.2
	100	0.01	3.2	10.2
	33	0.04	12.9	22.2
	100	0.01	3.2	10.2

Sound attenuation

Sound pressure levels attenuate with distance from the source. The decrease may be expressed with the log to the base 10 of distance in a linear manner and the regression is highly significant (r-squared = 0.77; $p = 0.009$) with 13 measurements given in Table 1. The equation for sound pressure levels generated from a freight train is

$$\text{train} \quad SPL(x) = 49 - 5.8 \log_{10} x$$

where x is distance in feet and SPL is the sound pressure level in decibels referenced to 1 Pa. From this we can approximate the SPL from a freight train at the tracks is about 49 db and it decreases away from the source. The equation for the SPL attenuation generated from a truck on the interstate can be fit to the same equation. The result is

$$\text{truck} \quad SPL(x) = 60 - 10.8 \log_{10} x$$

From this we can approximate the SPL from a truck is 60 db. There are limited measurements for the sound generated from trucks so the above equation coefficients are highly uncertain but we may conclude that at a distance the sound level from trucks is considerably less than the level from trains.

For comparison to the studies at the fish hatchery, a regression of the sound dissipation in front of a McNary Dam on the Columbia River (Anderson et al 1989) gives the regression

$$SPL(x) = 34.2 - 13.0 \log_{10} x$$

(r-squared =f 0.96; p-value = 0.0005) and x is distance in feet. Finally assuming the SPL attenuation measured at McNary dam applied to the attenuation measured at a pile driving operation in Everett Harbor Washington (Feist 1991), then from a point measurement the source level for the pile driving environment is 52 db.

Sound transmission

Finally because the sound pressure experienced by fish must pass through the water earth interface, a portion of the energy is lost because of refraction. This can be accounted for by the ***sound power transmission coefficient***, which depends on the densities of the two media and the wave propagation velocity in each and is defined (Kinsler and Frey, 1962)

$$\alpha = 4 \rho_1 c_1 \rho_2 c_2 / (\rho_1 c_1 + \rho_2 c_2)^2$$

The transmission loss from the pressure wave in crossing from a solid to a water boundary is

$$P_{water} = P_{solid} * \alpha^{0.5}$$

Using the densities of 2000 and 1000 kg m^{-3} for the solid and water, respectively, and wave velocities of 1000 and 1500 m s^{-1}, the power transmission coefficient is $\alpha^{0.5} = 0.64$.

Projected Hatchery Sound Pressure Levels

The sound pressure levels at different locations in the hatchery complex from the track alignment were estimated using the attenuation equations for trucks and freight trains. Sound reference points for the trains are the Northeast and South West corners of the pond near the proposed track and the raceway nearest the track. The reference point for the truck estimate is the hatchery raceway nearest the highway. The equation relating the sound pressure levels experienced by fish from sound generated by freight trains and trucks can be expressed by combining the equation for the transmission loss with the equations defining the attenuation of sound through the ground to give

$$\text{train } SPL(x) = 45.5 - 5.89 \log_{10} x$$

$$\text{truck } SPL(x) = 56.3 - 10.86 \log_{10} x$$

where x is distance in feet and SPL is the sound pressure level in decibels referenced to 1 Pa.

LITERATURE ON FISH AND SOUND

Comparison of sounds fish encounter

Fish encounter a number of natural and artificial sounds in their environment. High level sound have been used to divert fish from the entrances of power plant intakes. Moderately high levels of sound are generated by ships, dams and pile driving at their sources. Levels generated by freight trains at the three distances from locations in the Miles City Hatchery are lower than fish experience from other mechanical sources. The level from trucks are also lower (Table 2).

Table 2. Estimated sound levels produced by various sources.

Sound Source	Distance (ft.)	Frequency (Hz)	SPL (rel 1 Pa)	Comment	Reference
Pneumatic gun	source	50	146	Matousek et al 1988	Matousek et al 1988
Fish diversion hammer	3	38	74	Patrick et al 1988	Patrick et al 1988
Aircraft carrier	source	100	55		Kinsler and Frey 1962
Dams	5	~ 25	18 to 38	in dam forebay	Anderson et al 1989
Pile Driving	10	200	39	near pile driving rig	Feist 1991
Submarine	source	100	30	medium speed	Kinsler and Frey 1962
Freight train	10	14	32	N.E pond corner	this study
Freight train	100	14	18	S.W. pond corner	this study
Freight train	1000	14	5	Hatchery raceway	this study
Truck	1500	58	2.7	Hatchery raceway	this study
water falls	1	200	-28		Konagaya 1980
Sea state	0	100	-35 to -60		Kinsler and Frey 1962

Hearing thresholds

The hearing threshold of fish is below the levels expected to be generated by trains and trucks. Salmon hearing threshold at the frequencies identified is about -10 db relative to 1 Pa. (Hawkins and Johnstone 1978) goldfish are more sensitive and have hearing thresholds at 25 Hz of about -20 db (Hawkings 1981), and catfish have a threshold of about -40 db (Poggendorf 1952). For comparison the human threshold at 30 Hz is -35 db.

Damage from sound

It is well known that intense sounds can damage the sensor hair cells in the ears of birds and mammals leading to permanent loss of hearing, but the effects of intense sound on aquatic organisms have received little study (Reviewed in Popper and Carlson 1998). Intense sound can cause several-hour-long loss of hearing sensitivity in goldfish but intense sounds are not known to damage in developing eggs. Sound pressure levels of 84 db caused sensory damage in goldfish after 2 hr exposure but no damage was observed with a 60 db level and frequencies of 60 to 300

Hz. In contrast a 60 db sound disturbed the ciliary bundles on the sensory cells of the saccule in Atlantic cod. Bennett et al. (1994) evaluated the effects of 100, 800 and 6500 Hz at sound pressure levels of -15 to 47 db in Lake Pend Oreille, Idaho. They found no effect on the development of fish eggs and little or no effect on zooplankton and fishes, with the exception that a 800-Hz signal appeared to cause a significant decrease in predation on cutthroat trout by northern squawfish.

Behavioral responses.

Fish respond to sound in a variety of ways. A fright response to sound is common amongst many species. Communication by means of sound appears to be widespread in fish, low frequency calls being produced in social contexts including competitive and aggressive behavior and courtship. Fish use sound to distinguish conspecifics from other species and to seek out both prey and predators (Pritcher 1996). The response of fish to sound depends on their motivational state, and they may only respond during certain times of the year or stages of their life cycle (Anderson 1988).

Table 3. Behavioral and physiological responses of fish exposed to sound levels.

Sound Source	SPL (rel 1 Pa)	Reference	Behavioral responses
Pneumatic gun	146	Matousek et al 1988	diverts blueback herring and alewife from power plant cooling intake. No mortality noted
pure tone 250 Hz	77	Popper and Carlson 1998	sensory damage in goldfish after 2 hr exposure.
pure tone 60- 300 Hz	60	Popper and Carlson 1998	no sensory damage in goldfish after 2 hr exposure but sensory damage in Atlantic cod
Fish diversion hammer	56 to 74	Patrick et al 1988	alewife avoidance within 30 ft. of hammer. Ineffective at repelling coho. No mortality in rainbow trout, tomcod and emerald shiners
Dams	18 to 38	Anderson et al 1989	no evidence that dam sounds cause mortality or behavioral response in salmon
Pile Driving	39 to 16	Feist 1991	Percent of fish in pile driving area drops 50% during days of driving but no significant direct response to sounds
pure tones 100 800 5600 Hz	-15 to 47	Bennett 1980	no physiological effects on fish eggs, plankton decreased predation of northern squawfish on cutthroat trout with 800 Hz tone
70 to 200 Hz	6 to 25	Blaxter and Hoss 1981	elicits startle response in herring
100 Hz 100 Hz 100 Hz 100 Hz 100 Hz	-50 -40 -20 5 20	Popper and Carlson 1998	threshold goldfish, Carassius auratus threshold Atlantic cod, Gladus morhua threshold Atlantic salmon, Salmo Salar threshold beaugregory, Pomacentrus leucostictus threshold kawakawa, Euthynnus affinis
water fall	-48	Konagaya 1980	minimum level required to induce juvenile ayu to exhibit jumping response for upstream migration

Habituation to stimuli

Habituation to novel stimuli is an adaptive mechanism in organisms. Such responses are observed in fish species. The habituation of freight and arousal responses of goldfish (*Carassius auratus*) and roach (*Rutilis ritulis*) to repeated operations of a plunger in water were studied by Laming and Ennis (1982). Both species habituated to the stimulus. A similar patterns of habituation was observe in the cyprinid *Halichoeres bivittatus* (Laming and Ebbesson 1984). Hatchery fish in particular can habituate to stimuli in their environment. Evidence by Knudsen et al (1992) showed that wild and hatchery-raised salmonids respond differently to sound with the hatchery fish less responsive. Fish raised in hatcheries might become acclimated to continuous or intermittent loud sounds.

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APPENDIX 6

James Anderson

6A2: Further Information on Effects of Sound on Fish

Further information on effects of sound on fish

Reported by James J. Anderson
University of Washington
March 22 1999

This brief literature survey expands the information on the behavioral responses to stress of fish species that are raised in the Miles City hatchery. The species include walleye, smallmouth and largemouth bass, channel catfish, sauger, Northern pike, rainbow trout and chinook salmon. The literature survey used a number of sources including a collected Biography (Anderson and Feist, 1990) containing 151 articles published between 1952 and 1988. In addition a library search of articles published between 1989 and 1999 was conducted. Journals included: the Transactions of the American Fisheries Society, the North American Journal of fisheries Management, the Journal of Fish Biology, the Journal of Ecological Applications, the Journal of Comparative Physiology, and the Progressive Fish Culturest.

In general there were few relevant articles on the impacts of sound on these species. The main findings follow:

Squawfish (*Ptychocheilus oregonensis*) were monitored by radio telemetry below Columbia River hydroelectric plants. Squawfish moved close to dams, which are areas of high sound levels, when the juvenile salmon were passing the dam (Faler, Miller, Welke 1988). The species is commonly observed in the forebays of dams and there is no indication that sounds at the dam affect squawfish behavior.

A number of warmwater fish species including gizzard shad, white crappie and channel catfish readily pass through turbines at inland warmwater hydroelectric facilities. These species occasionally exhibited enhanced likelihood of passage compared to what would be expected based on their abundance in the lake. The authors speculated that the fish were attracted to the cover afforded by the intake structure of the dams and by this proximity were more likely to be entrained in turbines (Sorenson, Fisher, and Zale, 1998). As with squawfish, the proximity of the fish to the dams is indirect evidence that the fish were not significantly affected by the sound.

A study by Whittier and Hughes (1998) evaluated fish species tolerance to environmental stressors in lakes in the North Eastern United States. Although this study did not include sound it does provide a relative scaling of the sensitivity of the species to stress. Species of interest to the Miles City fish hatchery included Northern pike smallmouth bass, and largemouth bass. The authors ranked 42 fish species according to their tolerance to stress. Five levels of tolerance were identified (intolerant, moderately intolerant, moderate, moderately tolerant, and tolerant) to four stressors (phosphorus, turbidity, watershed disturbances, and human activity along the shoreline). Stressors were ranked in four categories from highly disturbed to undisturbed conditions. The pattern of fish ranking was similar for each stressor and provided a measure of the fishes' ability to deal with classes of stressors. Of the species reported, none of the Miles City species were in the intolerant category. Smallmouth bass and Northern pike were classified as moderate and Largemouth bass as a tolerant species.

Further evidence that sound is not expected to be a problem comes from studies to attract or repel fish with low frequency sound. Low frequency sound (270 Hz) has been used unsuccessfully to guide rainbow trout (Van Derwalker 1967). The number of fish entering a channel seemed to increase when sound was on but there was no statistical analysis. Burner and Moore (1962) also obtained no response from rainbow trout to low frequency sounds.

The most up to date report on the impacts of sound on fish was by Popper and Carlson (1998). They reported few fish groups have been systematically tested for avoidance of low-frequency sounds Walleye are not in the species reported.

In summary, from the information available there is no indication that the fish raised at Mile City hatchery are highly sensitive to sound or other stressors.

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APPENDIX 6

James Anderson

6B: Potential Effects of Coal Dust and Herbicides

The Miles City Hatchery: Information on the effects of herbicides and coal dust associated with railroad operations

prepared by
James J. Anderson
University of Washington
March 1999

With the alignment of the Tongue River Railroad close to the Miles City Hatchery there is an increased risk of exposure of hatchery fish to chemicals associated with operation of the railroad. This report summarizes the potential hazards of the chemicals used for weed control along the railroad tracks. Also reviewed briefly is the nature of coal dust and ash fly from coal burning and potential effects of these materials on fish.

Two forms of weed control are used by the BNSF railroad by BNSF, and planned for use by TRRC:

1. The herbicide Diuron, sold as Karmex is mixed with Oust. (These are tank mixed)

Application rates: Karmex - 8 lbs/Acre and Oust 3 oz/Acre

Both application rates are below label recommendations

2. For Noxious weeds Tordon mixed with 2-4-D (Applied post-emergent below label recommendations)

Information on these toxicity of these chemicals was obtained from a literature survey.

DIURON

Chemical name:

3-(3,4-dichlorophenyl)-1,1-dimethylurea.

Use:

Diuron is used for weed control and as a soil sterilant. Requests to use Diuron as a controller of algae in catfish ponds in Mississippi and Arkansas were made in 1998. Permits were withdrawn in two cases, and scientific review is pending in a third (source EPA office of pesticides program web site http://www.epa.gov/opprd001/section18/page_d.htm)

Allowable Levels:

The USSR has set the maximum allowable concentration (MAC) in water bodies used for domestic purposes of 1 mg/l and MAC in water bodies used for fishery purposes of 1.5 • g/l. A long-term health advisory of 0.875 mg/l and a lifetime health advisory of 0.014 mg/ l is set in the US.

Toxicity:

Studies on the survival and growth of Pacific tree frog, bullfrog, red-legged frog, and African clawed frog embryos and tadpoles indicated the 14-day LC50 for tadpoles was 22.2 mg/l.

In ground applications of dimethylurea near the habitat of Alabama cavefish, EPA regulations required no application of Diurnon within 20 yards from the edge of all caverns, sinkholes, and surface waters within the shaded area. For aerial applications the minimum distance was 100 yards of these sites.

A 2-year dog feeding study in 2 male and 3 female dogs was done at levels of 0, 25, 125, 250, and 1250 ppm (0, 0.625, 3.125, 6.25, and 31.25 mg/kg/day) diuron in the diet. The 1250 ppm (31.25 mg/kg/day) dose caused weight loss, depressed red cell counts, erythrogenic activity in bone marrow, elevated liver weight, and increased pigment deposition in liver cells. Also, abnormal pigments were found in the blood of males at levels higher than 25 ppm (0.625 mg/kg/day) and females above 125 ppm (3.125 mg/kg/day).

Critical Effect:

Abnormal pigments in blood   No Effects Level (NOEL): 25 ppm

2-Year Dog Feeding   Lowest Effect Level (LEL): 125 ppm

OUST

No information was found on Oust

TORDON

Chemical Name:

Picloram, a chlorinated pyridine herbicide.

Use:

Picloram and its salts are systemic herbicides produced by chlorination of 2-methlpyridine followed by hydrolysis and reaction with ammonia. Picloram is effective in controlling annual weeds and is used in combination with 2,4-D against deep-rooted perennials on non-cropland.

Allowable Levels:

Permissible concentration in drinking water: 0.175 to 0.3 mg/l in USA 10 mg/ l in USSR.

EPA regulations state no application of this pesticide in the habitat of snail darter. In addition, for ground applications the minimum distance is within 20 yard of the habitat, nor within 100 yards for aerial (crop duster) applications.

Toxicity:

A multi-generation study with rats exposed to levels as high as 3000 ppm diet produced no evidence of effects on fertility, gestation, viability of pups, lactation or skeletal development. Picloram was not mutagenic in gene mutation assays in bacteria and yeasts. Picloram is slightly toxic to warm water fish (catfish, blue gill) and moderately toxic to cold water fish (trout). However, chronic studies on lake trout suggest that low concentrations of picloram will adversely affect the rate of yolk sac absorption and growth of fry.

EPA status:

Many forms of Picloram have been cancelled. The exception is specific types of Tordon.

Critical Effect:

Increased liver weight	NOEL: 7 mg/kg/day	
6-Month Dog Feeding study	(males only)	LEL: 35 mg/kg/day

2-4-D

Chemical name:

2,4-Dichlorophyenoxyacetic acid.

Use:

A selective herbicide which kills broad-leaved plants.

Allowable Levels:

At recommended application rates, the concentrations of 2,4-D in water has been estimated to be a maximum of 50 mg/l. Most applications would lead to water concentrations of lower than this (between 0.1 and 1.0 mg/l).

Toxicity:

In general 2,4-D is relatively non-toxic to water and soil microorganisms at recommended field application rates.

2,4-D does not persist in soil because of its rapid degradation. Its bioavailability to, and uptake by, aquatic and terrestrial organisms is strongly influenced by the organic matter content of soils and microbiological activity. In aerobic soils, with high organic matter content at high pH and temperatures, toxicity is limited because of rapid degradation.

Although the free acid is the physiologically toxic entity, the ester formulations represent a major hazard to fish when used directly as aquatic herbicides. The no-observed-effect-level (NOEL) varies with species and the formulation: less than 1 mg/l for coho salmon to 50 mg/l for rainbow trout. Fish larvae are the most sensitive life stage. The concentrations that produce mortality in 50% of the population in a specified amount of time (typically 2 to 4 days) range between 165 mg/l for large mouth bass embryos to 4 mg/l for rainbow trout embryos. These levels are unlikely to be reached under normal recommended usage of the herbicide.

Chronic toxicity and reproduction studies of 2,4-D indicated no adverse effects at dietary levels up to 500 ppm in dogs (approximately 14.5 mg/kg bw/day), up to 1250 ppm in rats (approximately 62.5 mg/kg bw/day) (Hansen et al., 1971), or at levels of 1000 ppm in drinking water (50-100 mg/kg bw/day) in pregnant rats (exposed through gestation and for 10 months following parturition) or their offspring exposed for up to 2 years after weaning) (Bjorklund and Erne, 1966).

Critical Effect:

Hematologic, hepatic and renal toxicity	NOEL: 1.0 mg/kg/day
90-Day Rat Oral Bioassay and 1-Year	LEL: 5.0 mg/kg/day

COAL DUST

To assess the potential effect of coal dust on fish a comparison of the elemental composition of coal to soil is useful.

Table 1: Concentration of Trace Elements (• g/g)

Element	Coal	Soil
As	15	6
B	50	10
Be	2	6
Cd	1.3	0.06
Cr	15	100
Cu	19	20
Hg	0.18	0.03
Mn	100	850
Mo	3	2
Ni	15	40
Pb	16	10
Sb	1.1	6
Se	4.1	0.2
Ti	800	5000
V	20	100
Zn	39	50

Analysis by the U.S. Geological Survey indicated coal averages 10% moisture, 11% ash, 2% sulfur. The coal to be transported on the TRR railcars has approximately 0.5% sulfur and 20% moisture. Silica is the most abundant element in coal ash followed by aluminum and iron. Boron, chlorine selenium, arsenic, cadmium, mercury and molybdenum are enriched in coal relative to soil. Estimated enrichment of trace elements onto soil adjacent to a coal-fired power plant was negligible for all except Selenium (10% enrichment) over a 35-yr. exposure period.

Coal combustion products in contact with water produce solutions which are generally alkaline although a few ashes primarily derived from the eastern and southeastern U.S. coals may generate acidic solutions.

A potential pathway for the concentration of trace elements in fishes is through a bioaccumulation mechanism. Plants grown on soils treated with fly ash from various sources have been found to accumulate a number of trace elements, including As, B, Mo, Se, Zn, Cu, Fe, Hg, I, Ni, and Sb. In most cases the amount of accumulation is proportional to the amount of fly ash added to the soil. Bioaccumulations of trace elements in aquatic organisms grown in drainage basins of settling ash ponds were also found to concentrate large numbers of trace elements. A potential hazard could exist for higher organisms feeding on these plants. Under natural conditions the bioaccumulation of trace elements was not found in a case study (Anderson and Smith 1977). Sampling the soil, lake sediments, fish, macrophytes and ducks around a 1200 Mw coal-fired power plant in operation for 6 years indicated between 26 to 70% of the Hg emitted was incorporate into the soil within a 19.3 km radius of the plant. Lake sediments accounted for only 1% of the Hg emitted and fishes contained unusually low concentrations of Hg. Anderson and smith (1977) concluded that their findings failed to implicate mercury as a serious pollutant in the lake and surrounding agricultural land.

Summary

Diuron, Tordon and 2,4-D are common chemicals used for weed control. Exposure to significant concentrations does not cause mortality, and long term chronic exposure produces a variety of effects in mammals, birds and fishes. Used as directed these chemicals do not have measurable impacts on animals. For ground applications EPA recommendations state spraying should be greater than 20 yards from critical habitats, 100 yards for aerial (crop dusting) application. Coal dust has elevated levels of trace elements compared to typical soil. A study of the effects of these trace elements released in coal burning indicate they had negligible impacts on fish in a power plant cooling pond.

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May 7, 2004

Doug Day
Tongue River Railroad Company
P.O. Box 1181
Billings, MT 59103-1181

RE: MILES CITY FISH HATCHERY SUPPLEMENTAL GEOTECHNICAL AND VIBRATION ANALYSIS

Dear Doug:

The attached report presents results of supplemental geotechnical and vibration analyses associated with the Miles City Fish Hatchery (MCFH). These analyses are a follow up to our report dated March 15, 1999, and include two elements: review of vibration recordings at MCFH in 1998 in light of vibration recordings associated with trains at other sites reported in 1999 and 2000; and supplemental slope stability analyses.

Womack & Associates, Inc.

MONTANA
WESLEY R. WOMACK
8312PE
LICENSED
PROFESSIONAL ENGINEER
5-7-04

Ray Womack, P.E.
Enc: Letter report, Figures 1 and 2, Stability analyses

Introduction

In 1999, Womack & Associates conducted studies and prepared a report for the TRRC, i.e., "Miles City Fish Hatchery Investigation to Assess Potential Effects of the Tongue River Railroad". The scope of the 1999 study included: 1) a geotechnical analysis of the rock and soil types within and adjacent to the fish hatchery; 2) measurement and analysis of vibration from existing unit train and interstate traffic adjacent to the fish hatchery; 3) evaluation of potential effects on the hatchery and fish reproduction from the construction and operation of the TRR; and, 4) soil chemistry analysis to evaluate corrosive effects on buried fish hatchery piping. Another concern addressed in the 1999 report is the effect of coal dust and herbicides on the fish hatchery.

The purpose of this supplemental report is to respond to comments made by the Montana DNRC to the 1999 report related to vibration analysis, geotechnical investigations, and slope stability. In addition, the findings of vibration analyses conducted for the proposed DM&E rail line in Minnesota, South Dakota, and Wyoming which substantiate the findings in Womack & Associates 1999 report are incorporated herein.

Vibration Investigation

The purpose of the vibration study performed in 1998 as part of the Miles City Fish Hatchery Investigation (Womack & Associates, 1999) was to measure train vibration levels from the existing BNSF rail line and to evaluate potential future vibration levels from the proposed rail line. Soil attenuation characteristics were used in conjunction with measured peak particle velocities from existing unit train traffic to model expected peak particle velocities from construction and operation of the TRR at critical sites around the fish hatchery. The peak particle velocities predicted from the proposed TRR alignment are equal to or less than those currently experienced at the hatchery from the existing unit train traffic along the BNSF line. Therefore, it is reasonable to assume that since the fish hatchery produces fish under existing conditions (i.e., very low levels of vibration from the existing rail line), operation of a new rail line constructed at an equal or greater distance away from the hatchery than the existing rail line will have no detrimental effects on the fish hatchery.

The vibration monitoring conducted at the MCFH in 1998 used two instruments; an SSU 3000 L/C Seismograph and an SSU 2000 D Seismograph with detection limits of 0.01 and 0.02 inches per second (peak particle velocity), respectively. These instruments were deemed adequate to measure the vibration levels from the existing BNSF rail line and to develop attenuation relationships that are sufficient to evaluate vibration levels within the fish hatchery and predict future vibration levels from operation of the TRR.

In addition to the data obtained from the Miles City Fish Hatchery Investigation (Womack & Associates, Inc., 1999), the EIS document prepared by the Surface Transportation Board for the DM&E proposed railroad extension provides additional information and data. In

October 1999, David Braslau Associates, Inc., with assistance from ESI Engineering, Inc. and Schoell & Madson, Inc., prepared a report for the City of Mankato that evaluated the potential noise and vibration impacts that could result from the DM&E's expanded rail activity through the City of Mankato. The City of Mankato submitted the Braslau report to the Surface Transportation Board and requested that the DM&E Draft EIS consider potential noise and vibration assessment issues raised in the Braslau report. Subsequently, the DM&E Draft EIS included a ground vibration assessment, i.e., Ground Vibration Impacts Associated with Unit Coal Trains on the DM&E Railroad (Wilson, Ihrig & Associates, Inc., 2000). Comparison of the vibration data collected for the MCFH study with data from other investigations validates the use of the SSU 2000/3000 Seismographs to measure ground vibration levels.

The attached Figure 1 summarizes vibration levels caused by trains measured at several locations around the country, including the MCFH. Vibration levels on Figure 1 are expressed as peak particle velocity, illustrating the attenuation relationship between ground vibration and distance from the source. As indicated on the graph, the vibration data from the MCFH study are consistent with data reported from other studies measuring train vibration and generally follow the FTA Baseline Attenuation Curve for trains traveling at 50 miles per hour. Note that few of the studies reported vibration levels with peak particle velocities below 0.01 inches per second.

Slope Stability and Geotechnical Investigation

The following discussion addresses comments provided by the State of Montana regarding geotechnical investigations and analyses performed in 1999 to evaluate the potential for slope instability of the Camelsback resulting from construction and operation of the Tongue River Railroad (TRR). The specific concerns raised by the State of Montana about the slope stability evaluation are summarized below:

- Location and depth of fill from construction of an I-94 rail line overpass and potential impact to pore pressures and water table fluctuations.
- Bedding plane orientations within the Camelsback.
- Lower soil strength parameters for weathered material on the flanks of the Camelsback.
- Basis for the assumed coal strength parameters used in the stability analyses.
- Justification for groundwater elevations used in the slope stability models.

Current plans for the TRR alignment and grade indicate that the rail line will pass under Interstate 94 on the east side of the Camelsback. There will be no railroad overpass and no fill placement along the east side of the Camelsback. The current rail alignment passes approximately 200 feet east of the east flank of the Camelsback, about 500 feet east of the ponds on the east edge of the fish hatchery. Railroad grades along this portion of the alignment will require about 5 to 10 feet of cut into the existing ground surface. No potential increases in pore water pressure or groundwater levels are anticipated from construction and operation of the TRR east of the Camelsback.

In October 1998, drill hole VC0-1 was cored into the Camelsback. Interbedded claystone, siltstone, sandstone, and thin coal beds were recovered in the core samples. Horizontal bedding plane orientations were observed and recorded in the cores. Some secondary cross-bedding was noted in the sandstone that appeared to be inclined at about 20 degrees. Cross-beds are not continuous or critically weak and were not used in the models. A regional bedrock geology map compiled by Stagle and others (1983) shows structural contours (elevations) for the top of the Bearpaw Shale in the Tongue River Drainage basin. The structural contours indicate the top of Bearpaw Shale is essentially flat-lying in the vicinity of Miles City. The Bearpaw shale is a Cretaceous aged formation that underlies the Tertiary aged Fort Union formation (Tullock shale).

It is reasonable to assume that if the bedding orientation of the underlying Bearpaw Shale is near horizontal, then the bedding orientation of the overlying Fort Union formation is essentially horizontal.

In response to comments from the State of Montana, the slope stability analyses were revisited. In our opinion, the original analyses represent a reasonable and conservative approach based on observation, testing and literature review. However, supplemental analyses were prepared using the following highly conservative assumptions:

- Dipping bedding planes
- Thick weathered zone
- Much lower coal strength
- Higher piezometric surface

Although published geologic maps and observations of core samples indicate that bedding plane orientations are horizontal in the Camelsback, the slope stability models presented below assume a conservative 5-degree westward tilt to the beds (i.e., inclined toward the fish hatchery). Figure 2 represents the stability cross-section with a 5-degree dip imposed.

The core samples from drill hole VCO-1 in the central-portion of the Camelsback indicate that the bedrock is relatively fresh and unweathered. The slope stability analyses presented below conservatively assume that a 15-foot thick zone of lower strength weathered material occurs on the Camelsback. Soil strength parameters, rather than bedrock strengths, are assigned to the potential weathered zone. For stability modeling, we have assumed that the claystone bedrock has weathered to medium stiff, high plastic clay, a CH soil in the Unified Soil Classification System. Soil strength parameters for the undrained and drained conditions were estimated from published values and are referenced below.

Coal strength values used in the original slope stability analyses performed in 1999 were derived from the unconfined compressive strength and shear strength tests performed on core samples recovered from drill hole VCO-1. Although individual coal seams were too thin to test, weak high-plastic claystone intervals adjacent to the coal seams were tested for unconfined compressive strength. The assumed coal strength values used in the 1999 analyses are lower than the lowest claystone strengths. Published values for coal strength were reviewed to verify that the strength values used in the original analyses are consistent with measured coal strength parameters.

The stability results tabulated below use the original value of 3,330 psf for the undrained coal strength and the low range of published values for cohesion and internal friction angle for the drained coal strength.

Groundwater was not encountered in drill hole VCO-1 drilled to a depth of 59 feet, or an elevation of about 2,375 feet. Groundwater was encountered in three auger holes drilled in the alluvium on the east, west, and north sides of the Camelsback. Groundwater levels measured at the time of drilling varied from about 10 to 15 feet below the existing ground surface, corresponding to groundwater elevations of about 2,370 to 2,375 feet. The original slope stability analyses performed in 1999 used a phreatic surface in the alluvium and bedrock at an elevation of 2,375 feet. The revisited slope stability models presented below are modeled with a phreatic surface at an elevation of 2,380 feet.

In response to the comments submitted by the State of Montana in May 1999, the slope stability models for the Camelsback were re-run using the conservative assumptions noted above. Figure 2 represents geologic cross section used as the basis for the conservative slope stability models. The line of section is approximately 600 feet long and runs roughly in an east-west direction across the Camelsback. The cross section was developed using a 2-foot contour interval Digital Terrain Model (DTM) base map provided by Tongue River Railroad. The Camelsback is approximately 120 feet high with side slopes that vary from 3:1 to 1:1. Additional descriptions of the field investigation, site conditions, laboratory testing, and geotechnical engineering analyses are provided in the Miles City State Fish Hatchery Investigation to Assess Potential Effects of the Construction and Operation of the Tongue River Railroad (Womack & Associates, Inc, 1999).

Stability of the Camelsback was evaluated for varied slope conditions, assuming potential slope failures on the west side of Camelsback; i.e., toward the fish hatchery. Analyses were performed using two sets of soil and bedrock strength parameters under both static and pseudo-static (induced ground acceleration) forces and using circular and block failure modes. Short-term (Su) or End-of-Construction cases were evaluated using undrained shear strength values obtained from Unconfined Compression Tests. This is a conservative approach that assumes construction might create a short-term load, and that the soil pore pressures may increase if the soils cannot drain quickly enough to maintain equilibrium, possibly leading to development of undrained loading conditions. This type of analysis is very conservative because no construction (cut or fill) is planned on or near the flanks of the Camelsback, so loading and soil pore pressures are highly unlikely to change. The second case evaluated was a Long-Term or Consolidated-Drained case using drained shear strength values from the Direct Shear Tests. Stability of the existing slope conditions is evaluated in this case assuming no change in soil surcharge and that pore pressures will maintain equilibrium. Soil and bedrock strength parameters used in the analyses are summarized on Figure 2 and in the following tables:

Table 1 – Soil Parameter Summary

Short Term Conditions (Su)

SS Model Soil Number	Soil Type	Moist Weight (pcf)	Saturated Weight (pcf)	Cohesion Intercept (psf)	Friction Angle (degrees)
S1	Alluvium*	110	115	300	0
S2	Claystone	83.7	109.6	3900	0
S3	Sandstone	103.9	117.7	3300	0
S4	Coal*	80	90	3300	0
S5	Shale	114.8	132.3	9000	0
S6	Weathered Zone*	110	115	2000	0

Long Term Conditions (CD)

SS Model Soil Number	Soil Type	Moist Weight (pcf)	Saturated Weight (pcf)	Cohesion Intercept (psf)	Friction Angle (degrees)
S1	Alluvium*	110	115	100	30
S2	Clay/Siltstone	83.7	109.6	1924	35
S3	Sandstone	103.9	117.7	1000	35
S4	Coal*	80	90	500	15
S5	Shale	114.8	132.3	600	38
S6	Weathered Zone*	110	115	280	15

*Strength parameters estimated from laboratory data and published values.

Static and pseudo-static analyses were performed using the above soil strength parameters. Vibration monitoring conducted during the 1998 field investigation measured peak particle velocities as well as peak ground accelerations from the existing BNSF rail line. A maximum horizontal ground acceleration of 0.02g measured at a distance of 25 feet from the trains was applied to the slope to simulate forces that may potentially affect the Camelsback. This assumption is extremely conservative because the proposed tracks will be at least 400 feet from the west side (fish hatchery side) of the Camelsback and vibrations from the rail line will be insignificant. In fact, the effects of such vibrations are so small that it is not standard practice in the geotechnical engineering profession to consider vibrations generated by rail and highway traffic in slope stability assessments of this type.

Results from a slope stability analysis are expressed as a factor of safety (FOS) against slope failure. The FOS is a ratio of the forces resisting slope movement divided by the forces driving slope failure. When the resisting forces are larger than the driving forces the ratio is greater than 1 and indicates slope stability. When the driving forces are larger than the resisting forces the ratio is less than 1 and indicates potential slope instability. The higher the ratio, the more stable the slope.

The calculated factors of safety against a slope failure indicate that the Camelsback is stable under existing (static) conditions and assuming vibration accelerations in the slope (pseudo-static) far in excess of those expected to result from coal-train operations. The FOS are summarized in the table below. Individual slope stability models/cross sections and data files are attached. Under short-term (undrained) static conditions the calculated FOS are 1.70 and 1.77 for circular and block failures, respectively. The FOS are reduced to 1.64 and

1.71 with an applied horizontal acceleration of 0.02g. Under existing or long-term (drained) conditions the FOS are 1.39 and 1.81 for circular and block failures, respectively. With a horizontal acceleration of 0.02g applied the FOS decrease to 1.34 and 1.73. These factors of safety values indicate stable slope conditions. As shown in Table 2, the reduction in the factor of safety attributable to an acceleration of 0.02g is on the order of 3 to 4 percent. Actual reduction in factor of safety due to railroad operations is insignificant.

Table 2 – Calculated Factors of Safety

Case Evaluated	Failure Type	Static FOS	Pseudo-Static FOS
Short-Term (Su)	Circular (Bishop)	1.70	1.64
	Block (Rankine)	1.77	1.71
Long-Term (CD)	Circular (Bishop)	1.39	1.34
	Block (Rankine)	1.81	1.73

Over a prolonged period of time the slopes will likely continue to weather, and through natural slope processes, it is possible that localized shallow slumps, erosion, or raveling of weathered material may occur. However, given that it is unlikely that soil loading will change or that pore water pressures will increase within the Camelsback, the probability is extremely small that deep-seated rotational or translational slope failures will occur. In addition, the measured ground accelerations from passing trains are extremely small (0.01 to 0.02g, at or near minimum detection levels) within 25 feet of the rail line, and the proposed rail line will be about 400 feet or more from the west side of the Camelsback. Any ground acceleration produced by the trains will attenuate over this distance resulting in no significant influence on slope stability.

The stability of the embankments around fish hatchery ponds was not evaluated for this investigation because construction of the TRR will not alter the configuration of the embankments, increase the pore-water pressures, nor influence the groundwater levels. Branum Lake was constructed approximately 300 feet from the pre-existing BNSF rail line and the raceways along the north side of the fish hatchery were constructed within about 700 to 800 feet of the pre-existing rail line. Based on the attenuation curve presented in Figure 1, peak particle velocity vibration levels experienced at Branum Lake and the north edge of the raceways is on the order of about 0.01 and 0.002 inches per second, respectively. This is considerably lower than the published vibration thresholds for damage to buildings of about 0.5 to 2.0 inches per second (ESI Engineering, Inc., 1999). The proposed TRR alignment is about 400 to 500 feet east of the ponds on the east side of the hatchery and about 1,000 feet or more away from the eastern most raceways, corresponding to attenuated peak particle velocity vibration levels of less than 0.01 inches per second. Therefore, the predicted ground vibration levels at the Miles City Fish Hatchery from construction and operation of the TRR are extremely low and potential damage to the ponds and raceway from train vibration is not indicated by the models conducted for the TRR and analysis conducted for other rail projects, including the DM&E.

APPENDIX 3

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

Proposed mitigation measures to ensure the protection and long-term viability of the water supply pipelines serving the Miles City Warm Water Fish Hatchery from the Yellowstone River and the Tongue River.

- Currently there are two water supply pipelines serving the Miles City Fish Hatchery, one a 24" diameter line from the Yellowstone River and the second a 14" diameter line from the Tongue River.
- It is critical that the integrity of these water supply pipelines be maintained during the construction and operation of the Tongue River Railroad.
- The following measures are to be undertaken in order to protect and ensure the integrity of the water supply pipelines during construction and operation of the Tongue River Railroad. The Tongue River Railroad will be responsible for all costs associated with implementing these measures:
    - Relocate, as necessary, portions of the Yellowstone River and Tongue River water supply pipelines so that each pipeline crosses the rail right-of-way at a right angle or perpendicular to the rail alignment.
    - To ensure the structural integrity of the water supply pipelines, that portion of each pipeline lying perpendicular beneath the rail alignment will be encased in a reinforced concrete pipe ("RCP"). The RCP will be of sufficient size to allow for inspection and maintenance of the water supply pipelines.
    - Access to the pipelines beneath the rail alignment will be provided by installation of reinforced concrete manholes, located on each side of the rail alignment. The RCP and

manholes will meet or exceed the American Railway Engineering Association's ("AREA") Standard Specifications for installation of utilities underneath railway embankments.

- In those locations where the supply lines will be relocated to cross the rail alignment perpendicularly, new pipe and connectors will be installed that meet or exceed the diameter and pressure requirements of the existing water supply pipeline.
- The final design plans for the relocation of sections of the water supply pipelines and the installation of the concrete pipe and manhole components will be prepared by the Tongue River Railroad during final engineering and design and submitted to the Montana Fish, Wildlife & Parks for approval prior to the start of construction. All features associated with the water supply pipeline relocation/reconstruction, RCP casing, and manholes will be designed to meet or exceed "AREA" and/or "Montana Public Works Standard Specifications."

APPENDIX 4

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

Tongue River Railroad Company - Weed Control Management

General Weed Control Management

Prior to the construction of the Tongue River Railroad project, a weed control plan ("plan") will be developed in conjunction with appropriate state and local agencies responsible for weed control in Custer, Powder River, Rosebud and Big Horn counties. The plan will be designed and implemented for the full length of the rail alignment from Miles City to the southernmost terminus point with the primary objective being to control the establishment and spread of noxious weeds along the rail alignment.

The TRR weed control plan will incorporate both mechanical control methods and herbicide application. If mechanical means are not adequate to control the spread of some species of concern, a combination of mechanical and herbicide application may be necessary. Only those chemicals approved and licensed by the State of Montana will be used to control trackside weeds. The chance of herbicide transport to properties adjacent to the rail right of way is dependent on wind direction, wind speed, and other atmospheric conditions.

TRR Weed Control In Proximity to Miles City Warm Water Fish Hatchery

Radian International on behalf of TRR performed an air quality evaluation to assess the potential effect of TRR operations on the Miles City Fish Hatchery. The evaluation assessed the following: effect of coal dust emissions from open railroad cars during transportation; and, the use of herbicides along the rail right of way. The results of Radian's evaluation are presented in Appendix 7 to the "Miles City State Fish Hatchery

Investigation to Assess Potential Effects of the Construction and Operation of the Tongue River Railroad", Womack & Associates, Inc., March 1999).

Pursuant to Radian's recommendation, TRR intends to use only mechanical means of weed control in its right of way adjacent to the Miles City Warm Water Fish Hatchery between the point the rail alignment crosses Interstate 94 north to the connection with the Burlington Northern Santa Fe Railway mainline.

Generally, the prevailing winds in the vicinity of the Miles City Warm Water Fish Hatchery are from the northwest and southeast. The winds in the area are from directions that would carry from the rail alignment towards the hatchery facility less than 20 percent of the year.

If it becomes necessary to utilize herbicide application to control noxious weed infestation along the TRR right of way between Interstate 94 north to the BNSF Railway's mainline, TRR agrees that any herbicide application will be subject to prior approval from the Montana Fish, Wildlife & Parks and the use of herbicide would be used only under controlled means of application such as by hand sprayer.

Montana Fish, Wildlife & Parks prior approval will be required as to the type of herbicide to be applied, application rate, means of application and will take into consideration wind speed and wind direction at the time herbicide application is proposed.

APPENDIX 5

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

Train Speed, Coal Dust Movement

Train Speed

The Miles City Warm Water Fish Hatchery is located adjacent to the northern terminus point of the Tongue River Railroad with the Burlington Northern Santa Fe Railway main line. At the northern terminus, the TRR connects with the BNSF in a "Y" configuration, allowing rail traffic to flow either to the west or to the east. The western "Y" is on a 3°56'16" degree curve and the eastern "Y" is on a 2°59'59" degree curve. Empty coal trains traveling on the BNSF from either the west or the east and connecting with the TRR and loaded coal trains traveling north on the TRR and connecting with the BNSF will be required to gradually reduce speed in order to safely navigate these curve and switches.

Train performance modeling completed by Corporate Strategies, Inc. ("CSI") on behalf of TRR indicates that train operations will be limited to a maximum speed of approximately 20 mph in order for unit coal trains, either empty or loaded, to safely navigate the degree of curvature and run onto or leave the BNSF mainline at the northern terminus. In order to reach safe operating speeds at the terminus, trains will have to begin reducing speed approximately 0.5 to 1.0 mile prior to reaching the terminus point. Train operating speeds on the BNSF main line, in the vicinity of the TRR terminus, are limited to 30 mph.

Train engineers are licensed by the Federal Railroad Administration ("FRA") pursuant to requirements specified in 49 CFR 240. Locomotives are manned by two crewmen, a conductor with the responsibility for train movement and an engineer with the authority to control train operations. Both are responsible for safe operation in accordance with BNSF operating rules and dispatcher or signal movement authority. Devices (event recorders) are installed on most modern train locomotives to monitor operation of the unit, including train speed. Train crews exceeding train operational limits are subject to discipline by the rail operator (with oversight by the FRA).

In addition to FRA regulations, the fact that trains entering or leaving the TRR alignment will be either exiting or entering BNSF mainline traffic requires low operating speeds to allow for safe traffic convergence. It is estimated by CSI that actual train operating speeds at the northern terminus will not exceed 20 mph.

Coal Dust Movement

Radian International on behalf of TRR performed an air quality evaluation to assess the potential effect of TRR operations on the Miles City Fish Hatchery. The evaluation assessed the following: coal dust emissions from open railroad cars during transportation; and, the use of herbicides along the rail right of way. The results of Radian's evaluation are presented in Appendix 7 to the "Miles City State Fish Hatchery Investigation to Assess Potential Effects of the Construction and Operation of the Tongue River Railroad", Womack & Associates, Inc., March 1999). The methodology and results of Radian's evaluation relative to coal dust movement are contained in the report referenced above and summarized below.

Coal dust emissions from coal handling are typically associated with loading and unloading activities at the mine site or destination point. The erosion potential for transported coal is greatest at the mine site and decreases thereafter due to coal dust settling and compacting to the bottom of the rail car during transport. A 1984 article regarding coal dust fugitive emissions stated, "Coal fines tend to accumulate in the bottom of the rail car from vibrations in transit." (Stein, Crow, 1984) Also, the Montana Department of Environmental Quality, Air Quality Bureau has stated that coal dust should settle to the bottom of rail cars within the first few miles of the mine site (Radian International, 1999).

Radian findings show that, if a train is traveling at speeds of 47 mph or less, there will be no emission of coal dust from the rail cars as they pass the hatchery facility. The Miles City Fish Hatchery is located adjacent to the area where the TRR connects with the BNSF main line and train speeds are limited to 20 mph. The coal in the rail cars will have been subject to a minimum of 80 miles of transport and to greater train speeds prior to reaching the terminus at Miles City and will have had sufficient time to settle in the rail cars. As a result of train operations in the vicinity of the Miles City Fish Hatchery, the emission of coal dust near the facility will not occur.

APPENDIX 6

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

APPENDIX 6

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

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May 26, 2006

VIA HAND DELIVERY

Ms. Victoria Rutson
Chief
Section of Environmental Analysis
Surface Transportation Board
1925 K Street, N.W.
Washington, D.C. 20423

Re: **Tongue River Railroad Company, Inc. - Finance Docket 31086 (Sub-No. 3) - Construction and Operation of the Western Alignment**

Dear Ms. Rutson:

Further to my recent letter forwarding the Revised Draft Section 404(b)(1) Showing of the Tongue River Railroad Company, it has come to my attention that one of the Appendices did not contain all of the materials that should have been included. Specifically, two Appendices to the April 13, 2006 "Revised Work Plan for High Resolution Vibration Monitoring, Evaluation of Potential Effects of Tongue River Railroad Construction and Operation, and Potential Mitigation at Miles City Fish Hatchery", set forth in Appendix 6 of the Showing Document, inadvertently were not attached to the Showing. Accordingly, a new Appendix 6 containing the missing materials is attached which should replace the current Appendix 6 to the Showing document.

I apologize for any inconvenience.

Sincerely,

David H. Coburn
Sara Beth Watson
Attorneys for Tongue River Railroad Company, Inc.

cc: Mr. Ken Blodgett
Mr. Scott Steinwert
Ms. Mary Bean
Mr. Douglas Day
Mr. Rodney Schwartz
Ms. Karen L. Lawrence

Montana Fish, Wildlife & Parks

P. O. Box 200701
Helena, MT 59620-0701
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FAX:406-444-4952
Ref:DO214-06
April 28, 2006

Mr. Patrick P. Davison
Tongue River Railroad Company
P.O. Box 80902
Billings, MT 59108-0902

RE: Miles City Fish Hatchery – TRRC proposed easement
Monitoring Program and FWP Commission discussion

Dear Mr. Davison:

This letter is written as a follow up to recent discussions regarding the proposed vibration monitoring program at the Miles City Fish Hatchery (MCFH) operated by the Montana Department of Fish, Wildlife & Parks (FWP). The letter also summarizes discussion by the FWP Commission on April 20, 2006 regarding processing the easement request from Tongue River Railroad Company (TRRC) to cross the MCFH property.

FWP is pleased with the efforts to establish the monitoring program as discussed at the April 6 meeting in Bozeman and in the revised work plan dated April 13, 2006. FWP believes this proposed monitoring program and the follow up study by Dr. Molly Webb should address the vibration and noise concerns at the MCFH. The results of the monitoring program and the follow up study shall be utilized to determine what, and to what extent, mitigation measures need to be incorporated into the actual easement document. FWP would like to emphasize that even though the primary emphasis is on impacts to pallid sturgeon, the results will be important to all fish production and activities at the hatchery, including personnel living and working at the hatchery.

This letter serves as official authorization for TRRC and its contactors to enter grounds at the MCFH in order to perform the monitoring and related activities contemplated by the agreed to monitoring agreement. FWP requests that you notify MCFH personnel before initially entering the grounds, establish a schedule and keep the hatchery apprised of your activities at the hatchery.

The FWP Commission felt the discussion before the Commission on April 20 was of value and thanks TRRC for its participation in the meeting. The Commission concurred with the Department that an Environmental Assessment (EA) on the possible impacts to the MCFH property by the railroad easement is necessary for compliance with the Montana Environmental Policy Act. The Commission stated that the costs of conducting an EA and costs of a property appraisal should be borne by the applicant. FWP has had preliminary discussions with an environmental consulting firm about conducting the EA. Once the EA process begins, FWP (through the contractor) will be seeking input from TRRC in the development of alternatives. FWP anticipates that the vibration monitoring program and follow up study will be incorporated into and be a significant part of FWP's EA and subsequent easement.

The Commission emphasized that the monetary investment and production at the hatchery must be protected when considering the TRRC easement. Therefore, it will be important to develop appropriate easement language to assure this investment and production is maintained. FWP believes that the cooperative discussions that have led to this monitoring plan should be continued through the easement development and submittal to the Commission for final consideration.

Thank you for your cooperation in the review and processing of the proposed easement across the MCFH. FWP will be looking forward to updates on the progress of the vibration monitoring program.

Sincerely,
/s/
M. Jeff Hagener
Director

Mark Wilson, USFWS
Vicki Rutson, SEA
Kenneth Blodgett, SEA
Debbie Dils
Bob Snyder
Bob Lane

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May 24, 2006

VIA HAND DELIVERY

Ms. Victoria Rutson
Chief
Section of Environmental Analysis
Surface Transportation Board
1925 K Street, N.W.
Washington, D.C. 20423

Re: **Tongue River Railroad Company, Inc. - Finance Docket 31086 (Sub-No. 3) - Construction and Operation of the Western Alignment**

Dear Ms. Rutson:

As you know, Tongue River Railroad Company, Inc. ("TRRC") and the Montana Department of Fish, Wildlife & Parks ("Department") have reached agreement on an April 13, 2006 "Revised Work Plan for High Resolution Vibration Monitoring, Evaluation of Potential Effects of Tongue River Railroad Construction and Operation, and Potential Mitigation at Miles City Fish Hatchery" ("Fish Hatchery Monitoring Program"). A copy of that Monitoring Program is attached. The Department has advised TRRC that it concurs with the Monitoring Program and has authorized TRRC to enter Miles City Fish Hatchery ("Hatchery") property to perform baseline monitoring contemplated by the Monitoring Program. That monitoring has in fact already begun. The Monitoring Plan also contemplates further studies if it is concluded on the basis of initial monitoring that construction and operation of the TRRC line will result in higher vibration and noise levels than currently exist at critical facilities at the Hatchery.

TRRC hereby requests that the attached Monitoring Plan be incorporated into the Final Supplemental EIS as a voluntary mitigation measure. Further, TRRC is not aware of any issues raised by the Department in this proceeding relating to the Department's concerns about the impact of the TRRC line on the Hatchery that have not now been fully resolved and, where appropriate, addressed in mitigation measures incorporated in the Draft SEIS. TRRC notes, however, that the Department has advised TRRC that it prefers that draft Mitigation Measure No. 86 (MCFH Continuing Consultation), concerning time frames and a process for addressing any issues of concern to the Department, be retained in the Final SEIS. TRRC does not object to the retention of that mitigation measure in the Final SEIS.

Please let me know if you have any questions.

Sincerely,

David H. Coburn
Attorney for Tongue River Railroad Company, Inc.

cc: Mr. Ken Blodgett
Mr. Scott Steinwert
Ms. Mary Bean
Mr. Douglas Day
Mr. Jeff Hagener
Mr. Rodney Schwartz

Womack & Associates, Inc.
Geology and Geotechnical Engineering

April 13, 2006

Doug Day
Tongue River Railroad Company
P.O. Box 1181
Billings, MT 59103-1181

RE: REVISED WORK PLAN FOR HIGH RESOLUTION VIBRATION MONITORING, EVALUATION OF POTENTIAL EFFECTS OF TONGUE RIVER RAILROAD CONSTRUCTION AND OPERATION, AND POTENTIAL MITIGATION AT MILES CITY FISH HATCHERY

Dear Doug:

I have attached a revised work plan for evaluation of potential effects of vibrations and noise from TRR construction and operation at the Miles City Fish Hatchery (MCFH). Existing very low level vibrations will be measured at the hatchery by Wilson Ihrig Associates (WI) using high resolution equipment. Propagation of vibrations from TRR will be predicted by WI from in situ acoustic data. The vibration data will be evaluated by WI and Shannon & Wilson, Inc. (SW), to determine whether there may be potential effects to hatchery operation. If the hatchery is likely to be affected, acceptability criteria will be determined in cooperation with research personnel from the US Fish and Wildlife Service.

Respectfully submitted,

Womack & Associates, Inc.,

Ray Womack, P.E., P.G.

 5602 Hesper Road, Billings Montana 59106 (406) 656-5398

MILES CITY FISH HATCHERY ACOUSTICAL STUDY

The potential impacts of the Tongue River Railroad (TRR) on the Miles City Fish Hatchery (MCFH) have been studied extensively. Vibration levels have been measured along the existing BNSF rail and at the hatchery. Potential effects on fish of vibrations, windblown coal dust, and weed control have been assessed by experts. Geological conditions have been thoroughly researched and slope stability concerns have been addressed. However, in response to an issue raised by the Montana Department of Fish, Wildlife, and Parks, the work plan described herein has been developed. The work plan represents a refinement of the previous work specifically targeting very low level acoustics and vibration.

The noise and vibration program will include measurements and analysis to:

- Measure baseline conditions at the MCFH
- Predict and assess future sound pressure levels from construction and operation of the TRR near the MCFH and compare to baseline conditions.
- Measure actual noise and vibration during the construction and operation of the TRR to compare actual levels to predicted levels.
- If the predicted or measured levels of noise and vibration show an increase over baseline conditions, then determine acceptability criteria for increased noise and vibration associated with the TRR line in association with the US Fish and Wildlife Service (USFWS) and the Montana Fish, Wildlife & Parks (MTFWP).
- If necessary, recommend mitigation measures to be incorporated into the engineering design phase of TRR rail construction.

This study will focus primarily on the MCFH Headquarters building, although potential effects to other structures in which fish are located will be considered. Access to the hatchery facility will be coordinated with MTFWP. Womack & Associates (WA) will coordinate the work, provide geological and geotechnical consulting, and report to Tongue River Railroad Company (TRR). WA has teamed with Wilson Ihrig and Shannon & Wilson on the design of the monitoring study. Wilson Ihrig (WI) will conduct the noise and vibration work, Shannon & Wilson (SW) will assess effects to fish and appropriate action levels, and the team will evaluate mitigation measures. The work will be performed in cooperation with the US Fish and Wildlife Service (USFWS).

This team brings extraordinary qualifications and experience to the project. Detailed qualifications and resumes are appended and are summarized below.

Wilson, Ihrig & Associates, Inc. is a world renowned consulting firm that provides a complete range of professional services associated with acoustics and the assessment and control of noise and vibration. WI specializes in transit system and railroad noise and vibration control and draws from 40 years of experience with modern rail systems. WI projects include the DM&E Powder River Basin expansion, Bay Area Rapid Transit (BART), the Puget Sound Light Rail system, the Superconducting Supercollider, and research on construction vibration for the US Department of Transportation. WI wrote the Handbook of Urban Rail Noise and Vibration Control under contract to US DOT. Dr. James Nelson and Dr. George Wilson, who will provide senior review, each are graduates of the University of California at Berkeley, and have more than 30 years experience. Derek Watry, WI's lead consultant for the project, has a M.S. from UC Berkeley and 13 years experience with WI.

Shannon & Wilson has provided engineering and environmental consulting on more than 20,000 projects worldwide in the past 50 years. SW's natural resources services include regulatory compliance, wetlands, plant and animal surveys, fisheries, habitat remediation, water quality, biological assessments, and evaluation of impacts to threatened and endangered species. Murray Meierhoff, principal in SW's St. Louis office, has a M.A in Aquatic Biology from the University of Missouri and 20 years experience in aquatic biology, ecology, and limnology. He has worked extensively with the warm water fisheries of Illinois, Missouri, Pennsylvania, Kansas, and Mississippi.

Womack & Associates has provided geotechnical and geological consulting services in Montana since 1978. Ray Womack, P.E., P.G., has a M.S. in Earth Resources from Colorado State University and more than 30 years experience in the western US, as well as sub-Saharan Africa, Asia, and Central America. Mr. Womack assembled and led the geotechnical team for the TRR project beginning in 1997 and has been responsible for assessment of site conditions and vibration monitoring at the Miles City Hatchery since 1998.

SCOPE OF WORK

1.0 MEASURE BASELINE LEVELS

The existing ambient noise and vibration levels at the MCFH in Miles City, Montana, will be measured. Sources of existing noise and vibration at Miles City include pumps and other mechanical equipment in the Hatchery Headquarters, existing rail operations on the BNSF line (which are expected to be reduced once the TRR line becomes operational), and highway traffic on Interstate-94. Using these measurements, the environmental conditions which are currently prevalent at the hatchery will be established. USFWS and MTFWP will be consulted regarding the design of the study.

High-sensitivity, low noise floor transducers, low noise floor amplifiers, and digital-audio signal recorders will be used to quantify both noise and/or vibration over a frequency range of 1 Hz to 10,000 Hz. The transducers will include a hydrophone (for underwater measurements), seismic accelerometers, and precision microphones. All signal data will be recorded for later laboratory data analysis. Special, large diameter wind screens will be used to reduce wind-generated noise interference for outdoor noise measurements, if necessary.

It is anticipated that the data will be resolved into standardized 1/3-octave band levels. If issues arise regarding specific frequencies, additional data analyses could include narrowband resolution of the data.

2.0 PREDICT FUTURE NOISE AND VIBRATION LEVELS

2.1 Construction Operations

Construction activities are likely to include, but not necessarily be limited to, excavation, compaction, and bulldozing. Of these, compaction typically generates the most vibration and noise. Transfer functions between the construction site and sensitive facilities at the MCFH will be predicted from results of in situ testing, probably using a heavy vibrating roller as the energy source. Continuous vibration monitoring will be performed during critical construction periods.

2.2 Rail Operations

To predict future vibration and underwater sound pressure levels from rail operations, the methodology first developed by the staff of WI in the 1970s, now adopted as the industry standard, will be employed. Briefly, the methodology breaks train vibration into two pieces: the dynamic forces inherently generated by the train at the wheel/rail interface and the transmission of those dynamic forces as ground vibration. The former is the train *force density level* (FDL) and the latter the ground *line source response* (LSR). The FDL of the existing BNSF trains at one location near the MCFH will be measured, and the LSR from the proposed right-of-way into the hatchery will be measured at two or three locations. These data, along with any minor adjustments necessary to correct for anticipated speed or other differences, will be used to predict future vibration in the hatchery. The methodology produces results in the 6.3 Hz to 160 Hz 1/3-octave bands which encompasses all significant railroad vibration frequencies. The predicted vibration will be used to predict underwater acoustic levels inside the hatchery tanks.

To predict future noise from railroad operations, recorded noise levels from existing BNSF trains and reasonable estimates of the sound transmission loss afforded by the MCFH Headquarters building will be used after its construction and condition have been examined.

2.3 Measurement Equipment and Data Analysis

The FDL and LSR testing will use specialized equipment designed by and built by or for WI, in addition to commercially purchased geophones and data recorders. Noise and vibration from construction activities will use the same equipment used to measure the existing conditions. Data will be resolved on a 1/3-octave band basis for direct comparison with the established action levels.

2.4 Assessment

. The work plan assumes that assessment of predicted noise and vibration levels will involve comparison with existing levels. If the future vibration and noise are expected to exceed existing levels, the team will develop a research plan in cooperation with USFWS and MTFWP. Wilson Ihrig will be responsible for measurement of baseline levels and prediction of future levels. Shannon & Wilson and USFWS will be responsible for evaluation of appropriate acceptability criteria based on potential impacts to fish.

3.0 DEFINE ACCEPTABILITY CRITERIA

At a meeting between representatives of MTFWP, USFWS, and representatives of TRR held April 5, 2006, it was agreed that existing noise and vibration levels would be measured at the MCFH and compared to levels predicted during construction and operation of the rail. Although it is clear that fish hatcheries have been in successful operation for decades in locations with perceptible levels of both noise and vibration, actual effects of noise and vibration on fish are not completely understood. If it is concluded that construction and operation of the rail are likely to cause higher noise and vibration levels than currently exist in critical facilities at the MCFH, potential impacts and mitigation measures will be assessed. Specifically, bioassays will be performed that evaluate stress response due to increased vibration and noise by measuring levels of substances that indicate stress response in blood samples of shovelnose sturgeon (as a proxy for pallids) at various stages of development. The study will be performed by USFWS, with assistance from WI and SW, at the Fish Technology Center in Bozeman, or at other sites determined by the team. Dr. Molly Webb, research biologist for USFWS, has prepared a preliminary research proposal (attached in Appendix 2) and will work with WI and SW to develop testing protocols, if noise and vibration are expected to increase because of the TRR. Bob Snyder and Mike Rhodes of MTFWP will also be involved in preparation of the testing program.

SW will evaluate, in both natural settings and at the MCFH, potential stressors to pallid sturgeon and other species. Other species include walleye, sauger, largemouth bass, smallmouth bass, northern pike, and tiger muskellunge. Ecological characteristics of these fish, in terms of feeding preferences, habitat preferences, growth rates, predators, and distribution will be documented. The majority of this work will be completed from information gathered from technical literature or interviews. In addition, Murray Meierhoff of SW, an aquatic biologist, will visit the MCFH to observe conditions, interact with other team members, and develop information regarding the soils and geology in the vicinity of the proposed rail line. This task will include a review of vibration and noise data from published sources and/or developed by others.

4.0 COMPARE BASELINE AND PREDICTED LEVELS WITH ACCEPTABILITY CRITERIA THRESHOLDS

Based on the baseline, predicted levels, and acceptability criteria, the team will determine whether mitigation measures should be considered during the final engineering design phase. The work plan assumes that assessment of predicted noise and vibration levels will involve comparison with the acceptability criteria established under Task 3.0. If the future vibration and noise levels are expected to exceed acceptability criteria, the team will develop mitigation procedures.

5.0 DEVELOP MITIGATION MEASURES (IF NECESSARY)

If required by the assessment conducted above, the team will develop remedial measures to be incorporated in the final design engineering phase that maintain vibration levels at the MCFH at or below no-impact levels. This work will utilize the team's knowledge of railroad and construction operations in general, site-specific information on the geology of the area, ecological information regarding the pallid sturgeon and other species reared at MCFH, and vibration/noise data.

WI has been designing systems to reduce rail vibration since the 1970s, and is confident that successful mitigation measures can be designed for this application, if necessary. SW is also highly experienced in design and implementation of mitigation measures. Potential mitigation measures at the rail include resilient rail fasteners and rubber ballast mats, among others. At the hatchery, tanks may be isolated from vibration. Noise, if found to be an issue, could be mitigated by modifying the MCFH Headquarters building to increase the shell sound transmission loss. This can be done, if necessary, while retaining airflow through the building.

6.0 MONITOR NOISE AND VIBRATION FROM CONSTRUCTION AND INITIAL RAIL OPERATIONS

Once the previous tasks have been completed, the team will have a better understanding of the existing noise and vibration environment and expected future levels as a function of distance from the TRR right-of-way. At that point, the team will be able to design a responsible monitoring program to verify the predicted levels and/or monitor any mitigation measures that may have been implemented as a result of the efforts described above.

For planning purposes it is assumed the team will follow WI's normal procedure for monitoring vibration at critical sites, which consists of live (attended) monitoring and continuous unattended monitoring. The live monitoring would occur for the first few days of any new major construction activity (e.g., grading, compacting) and operations. WI will use the same high-sensitivity instruments used during the engineering site-work and, prior to construction, the team will have established a protocol with the contractor or operator to cease operations if the levels exceed the action levels. For long-term construction activities, after the first few days, monitoring would be done using portable seismographs that will be strategically placed based on the results of the vibration study. These seismographs can be used to trigger an alarm to alert the construction crew if action levels are exceeded, and can also be programmed to call up to four people with alerts.

7.0 REPORT

All measurements, analysis, findings, and conclusions generated by Womack & Associates, Wilson Ihrig, and Shannon & Wilson will be presented in a single technical report.

8.0 PERSONNEL

Qualifications and resumes of individuals involved in the project from Womack & Associates, Wilson Ihrig & Associates, and Shannon & Wilson are attached in Appendix 1.

APPENDIX 1
STATEMENTS OF QUALIFICATIONS AND RESUMES OF KEY PERSONNEL

WILSON, IHRIG & ASSOCIATES, INC.
ACOUSTICAL AND VIBRATION CONSULTANTS

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Wilson, Ihrig & Associates, Inc. is a world renowned acoustical and vibration consulting firm offering a complete range of professional services associated with acoustics and the control of noise and vibration. As an acoustical consulting firm specializing in transit system and railroad noise and vibration control, Wilson Ihrig draws from 40 years of experience with modern rail systems.

Wilson Ihrig was established in 1966 and currently employs a staff of 21, comprising 13 well-trained and experienced professional specialists in acoustics and vibration, two technicians, a field assistant, and five support personnel. Wilson Ihrig has full capability to provide all aspects of noise and vibration studies and design work for rail and other transportation projects.

Rail Transportation

Wilson Ihrig is a leader in rail transportation noise and vibration control, having worked on over 30 different railroad and transit systems in the USA, Canada, United Kingdom, Australia, Hong Kong, Taiwan, Brazil and Greece. For many of the U.S. transit systems, Wilson Ihrig has served as system wide acoustical consultant from the initial environmental impact phase through the preliminary and final engineering design phases. Wilson Ihrig has consulted on all aspects of noise and vibration studies and design work for rail and other transportation mode projects, including environmental assessments, equipment and facilities specifications, facility planning, station acoustics, vehicle noise and vibration control, and analysis and testing of track support systems. In addition to work directly for rail systems, Wilson Ihrig prepared the "Handbook of Urban Rail Noise and Vibration Control" for the Transportation Systems Center of UMTA (now FTA); and the "Wheel/Rail Noise Control Manual" under TCRP Project C3. Wilson Ihrig developed the prediction methodology currently prescribed for rail transit impact assessment in the Federal Transit Administration guidance manual, "Transit Noise and Vibration Impact Assessment." Today, Wilson Ihrig remains a leader in the rail vibration control field through its work incorporating Tire-Derived Aggregate (tire shreds) into track design for vibration control.

A specialty of Wilson Ihrig is the measurement and evaluation of groundborne vibration and noise from rail transit operations and other sources, including the projection of the expected level of audibility of noise radiated in buildings and the possibility of perception of the vibration by occupants. Wilson Ihrig has the background and experience for effective review of new project situations, both to determine expected groundborne noise and vibration and to determine the expected effectiveness of practical mitigation measures

Environmental Noise and Vibration Impacts Assessment

Wilson Ihrig's experience involving assessment of environmental noise and vibration impacts for transportation systems includes: Alternatives Analyses (AA); Draft Environmental Impact Statements and Reports (DEIS/DEIR); Final Environmental Impacts Statements and Reports (FEIS/FEIR); and Environmental Assessments (EA). Wilson Ihrig has gained considerable experience with the requirements of the California Environmental Quality Act (CEQA), the U. S. National Environmental Protection Act (NEPA) and with noise and vibration criteria established by other governmental and transit agencies. Wilson Ihrig's services include: environmental noise and vibration measurement programs; evaluation of noise and vibration impacts; preparation of technical reports for inclusion in environmental documents; and writing the noise and vibration section of Environmental Impact Reports and Statements.

Measurement and Analysis Capabilities

Wilson Ihrig has decades of experience in measurement, analysis, community impact assessment and design of mitigation for rail system noise and vibration. Wilson Ihrig is fully equipped to do all types of acoustical and vibration measurements, including real time analysis, digital processing of noise and vibration data, statistical analysis and extended surveys, and has available the means to completely evaluate transportation systems, industrial, community and building noise and vibration problems or acoustical characteristics. In addition, Wilson Ihrig's measurement and laboratory analysis equipment has been designed specifically for performing accurate and efficient measurements of rail system noise and vibration. Our many completed measurement programs provide an extensive data base for use in projections associated with environmental impact studies.

PROJECT EXPERIENCE

DM&E Railroad Powder River Expansion Project, Kansas City, MO
Burns & McDonnell
Wilson Ihrig performed a study analyzing the potential ground vibration impacts associated with the future operation of unit coal trains on the Dakota, Minnesota & Eastern (DM&E) Railroad as part of the Powder River Expansion Project. This study included a thorough review of applicable criteria for potential building damage, human response and vibration sensitive industrial, research and medical facilities. The study presented examples of existing ground vibration from train operations at locations in British Columbia, Nevada and California. Also presented were methods used to predict the groundborne vibration from trains and a review of mitigation methods that could be used to reduce the production of wayside ground vibration where necessary. The study concludes with an indication of possible distances of ground vibration impact from train operations with respect to human response and potential building damage, as well as recommendations for additional study to further define the potential impact from the DM&E Powder River Expansion Project.

Union Pacific/Southern Pacific Merger, Fairfax, VA
De Leuw, Cather & Company
Wilson Ihrig performed the environmental noise impact analysis for the proposed UPSP railroad merger in support of the project's DEIS prepared by the STB in accordance with NEPA requirements. The project involved determining the environmental impact associated with merging the activities of these two national railroads covering the western half of the United States. Wilson Ihrig's work involved extensive field reconnaissance to determine the location and quantity of noise sensitive receptors (residences, schools, hospitals) along the mainline routes of the two railroads and adjacent to their rail yards which include intermodal facilities. Field measurements were made by Wilson Ihrig to characterize train and yard noise and improve the noise model used to project off-site noise levels. Noise level predictions were made for potentially affected areas along the railroads' mainlines and adjacent to the rail yards. Noise mitigation was investigated for those areas where noise impacts were indicated by the STB noise criteria. Wilson Ihrig prepared the DEIS text and supporting documentation for the noise impact section and assisted in response to public and agency comments on the DEIS noise section.

CN Rail Environmental Assessments, Ontario, Canada
CN Rail
Development/Review of Provincial (Ontario) "Land Use Policy on Noise and Vibration Levels in New Residential Developments Adjacent to Railways". Wilson Ihrig conducted environmental noise and vibration assessments at over 20 residential areas in Toronto.

Central Puget Sound Light Rail Transit System North Link Preliminary Engineering, Seattle, WA
Puget Sound Transit Consultants
Wilson Ihrig prepared an impact assessment of groundborne vibration from the proposed Sound Transit Light Rail Transit on the University of Washington campus as part of the preliminary engineering phase of the North Link project. Work has involved predicting and mitigating low level, low frequency vibration from a planned subway route under the University of Washington campus, where there is concern that even low levels of vibration will interfere with cutting-edge, optical-based research apparatus. Wilson Ihrig has made vibration propagation and extensive ambient

vibration measurements on the campus, as well as predicted statistical train vibration levels in many laboratories.

Tektronix Campus Vibration Assessment, Portland, OR
Tri-Met Engineers
Wilson Ihrig performed an analysis of ground vibration impacts by the Tri-Met Westside Light Rail Transit on future semiconductor manufacturing and research activities at the Tektronix campus. The analysis included field measurement of trackbed vibration force density levels for the Tri-Met vehicle, and impulse response measurements to determine ground vibration propagation conditions at the Tektronix campus. The results were combined to predict ground vibration at distances up to 600 ft from the track alignment. The work included attendance of meetings between the Tri-Met Engineers and Tektronix.

New York Metropolitan Transportation Authority/Long Island Railroad - East Side Access
Parsons
Wilson Ihrig was the noise and vibration consultant on the Systems Engineering design team for the East Side Access (ESA) project which will bring the LIRR commuter trains into NYC via the Upper East Side of Manhattan and connect under Park Avenue from the north to Grand Central Terminal (GCT). Wilson Ihrig evaluated the groundborne noise and vibration impacts associated with operating commuter trains in new subway tunnels underneath the streets of Manhattan and Queens. The planned subway tunnel will pass underneath numerous residences and other noise and vibration sensitive receptors. As part of this process, Wilson Ihrig made extensive measurements of the vibration propagation characteristics of the geologic strata in Manhattan and vibration measurements to determine the response of buildings potentially affected by the project. Wilson Ihrig was responsible for developing the requirements for groundborne noise and vibration mitigation to be used on the project. Wilson Ihrig was also responsible for acoustic design issues in the LIRR facilities to be built in GCT, with station platforms to be located 140 ft below street level.

Kamloops Railroad Vibration, Canada
Canadian National Railways
Wilson Ihrig analyzed vibration data to determine the cause of excessive ground vibration adjacent to the CNR in Kamloops, Canada. Undulation in the rail due to roller straightener wheel runout was identified as the principal cause of high vibration, and replacement of the rail with lower rail height profile perturbation reduced ground vibration velocity levels about 10 to 15 dB. The problem was identified by narrow band analyses which revealed spectral peaks in wayside vibration coincident with profile wavelengths equivalent to roller wheel diameters.

California High Speed Rail Statewide Program EIR
IBI Group; P&D Consultants, Inc.; EIP Associates, CH2M Hill
Wilson Ihrig conducted the analysis for the regional, environmental noise and vibration impact studies for the California High Speed Rail Statewide Program EIR. The project consisted of five regional corridors:
Sacramento - Bakersfield (Central Valley)
Los Angeles – Bakersfield
Los Angeles - San Diego (Coastal Route)
Los Angeles - San Diego (Inland Empire)Bay Area – Merced
Wilson Ihrig conducted environmental studies based on GIS screening analyses of noise and vibration impacts in accordance with the FRA "High Speed Ground Transportation Noise and

Vibration Impact Assessment" guidelines. The analyses for the five rail corridors determined impacts to sensitive land along 700 miles of proposed High Speed Rail corridor. Specific representative cases were also analyzed in detail for all five corridors for evaluation of noise and vibration impacts to specific types of land use.

Bay Area Rapid Transit District (BART), San Francisco International Airport Extension Preliminary Engineering
Bay Area Transit Consultants
During the environmental and design phases, Wilson Ihrig made projections of the groundborne noise and vibration at residences and buildings adjacent to the BART SFO at-grade, tunnel and aerial alignment. Field measurements were conducted to measure the vibration propagation along the alignment and building vibration responses, using an instrumented hammer attached to the drilling string and inserted into a borehole. Wilson Ihrig also conducted measurements of the building vibration responses at a nearby mobile home park and at single family residences. This test entailed using a vacuum-powered hammer to impact the sidewalk or street in front of the building and measuring the vibration at the ground in front of the building and the floor within the building. The vibration measurements were compared to obtain a measure of the vibration response of the building relative to the ground vibration. During the construction phase, Wilson Ihrig assisted with vibration and noise monitoring at the historic cemetery buildings and structures, and medical and office buildings adjacent to the cut and cover tunnel. Wilson Ihrig made presentations to BART and the Construction Management team to discuss noise and vibration measurements, project limits, etc., and developed construction noise and vibration guidelines for the project, including the monitoring approach used to determine compliance with the allowable limits. Wilson Ihrig also trained personnel in the environmental compliance management team to conduct noise and vibration monitoring and then coordinated daily monitoring location assignments with the team.

Bay Area Rapid Transit District (BART), Warm Springs Extension
Parsons Brinckerhoff Quade & Douglas
As part of the Preliminary Engineering team, Wilson Ihrig was responsible for evaluation of noise and vibration impacts associated with the new 7.8 mile BART extension to Warm Springs (WSX). Projected BART train, operational noise impacts for the adjacent residential areas along the planned alignment and determined appropriate noise mitigation to achieve the project criteria. Wayside noise control included sound walls and sound absorptive treatment. Evaluated noise impacts from ancillary facilities and determined noise control for emergency ventilation fans. Based on extensive vibration measurements within the WSX corridor, projected groundborne vibration impacts to adjacent residences. Evaluated several alternative track-side vibration control measures for their effectiveness in controlling groundborne vibration and their feasibility. Recommended specific measures that could be used to achieve project vibration criteria. Evaluated cumulative noise impact associated with relocation of the freight railroad tracks within the corridor.

Silicon Valley Rapid Transit (SVRT) Line Segment, Preliminary Engineering
HNTB
Preliminary engineering design for the Line Segment of the 16.3 mile Silicon Valley Rapid Transit (SVRT) extension of the Bay Area Rapid Transit (BART) system to San Jose. This is a 9.8 mile segment of the planned extension of the SVRT Project starting at the end of the planned Warm Springs BART Extension Project. The Line Segment alignment includes portions at grade, within retained cut, and on embankment and aerial structure. Work involved prediction of ground vibration from operations using the FTA-approved model, measurement of the vibration propagation

characteristics from the proposed alignment to adjacent properties, including measurements inside existing residential buildings to determine building response, and determining the need for and type of vibration mitigation to achieve criteria. Work also included prediction of airborne noise impacts from BART train operations, and the determination of wayside noise control measures such as noise walls necessary to achieve the project noise criteria. The project also involved evaluating the potential impacts from construction noise and vibration and specifying areas where control measures may be needed.

Silicon Valley Rapid Transit (SVRT) Tunnel Segment Preliminary Engineering
Hatch Mott MacDonald/Bechtel JV
Preliminary engineering design for the Line Segment of the 16.3 mile Silicon Valley Rapid Transit (SVRT) extension of the Bay Area Rapid Transit (BART) system to San Jose. This is a 5.1 mile subway segment of the SVRT Project starting at a portal at the end of the Line Segment and extending through downtown San Jose to a portal before the yard leads and tail track. The project involved determination and evaluation of groundborne noise and vibration impacts. The work included vibration testing, modeling, and analysis. During the project, field measurements were conducted along the planned alignment to determine site-specific vibration propagation characteristics. Predictions of groundborne noise and vibration were obtained using the FTA-approved model. The model included the effects of the tunnel structure on the vibration emission characteristics from the tunnel to the surrounding soil strata. Also included in the model were the effects of different types of building structures encountered close to the alignment. Based on the model predictions, Wilson Ihrig provided recommendations for mitigation measures to achieve the project groundborne noise and vibration criteria. The project also involved evaluating the potential impacts from construction noise and vibration and specifying areas where control measures may be needed.

Los Angeles County Metropolitan Transportation Authority - Metro Red Line Project
Southern California Rapid Transit District; Engineering Management Consultant (PB/DMJM)
Wilson Ihrig has served as the acoustical consultant for both the preliminary and final design phases of this project. Wilson Ihrig tasks have included: survey of existing levels of noise and vibration; projection of noise and vibration levels at nearby buildings; preparation of systemwide criteria and specifications for the control of wayside noise and vibration from construction of the system, operation of the trains and ancillary equipment; preparation of criteria and guidelines for achieving a comfortable acoustical environment in the stations and vehicles.

Metropolitan Atlanta Rapid Transit System
Parsons Brinckerhoff-Tudor; Metropolitan Atlanta Rapid Transit Authority
Wilson Ihrig has served as the systemwide acoustical consultant for the MARTA system from the preliminary environmental review, through the system design and the initial operation of the system. Initially Wilson Ihrig was a subconsultant to PBTB (later PBT), the general engineering consultant and since 1979, the Wilson Ihrig contract has been directly with MARTA. The tasks have ranged from developing projected noise contours from the environmental review of the proposed system to performing vibration propagation measurements at locations along the proposed North Line. Work has included projection of noise and vibration levels at nearby buildings; preparation of systemwide noise and vibration criteria; measurement and analysis of operational noise and vibration; and line structure and station design reviews.

Washington Metropolitan Area Transit Authority - Metro System

De Leuw, Cather & Company
Wilson Ihrig has been providing acoustical consulting services on the design and evaluation of the WMATA Metro system since 1970. Some of the significant tasks that Wilson Ihrig has performed for WMATA include: environmental measurements of existing noise and vibration levels; development of noise and vibration criteria for community noise, vehicles, stations, and ancillary equipment; design of floating slabs; design of way-structures, aerial and subway, for control of wayside community impact; development of rail fixation performance specifications; development and revision of floating slab track support system design; car noise and sound insulation testing and design.

Mission Valley East LRT Project, San Diego
BRW, Inc.
The project involved measurement and analysis of soil vibration propagation characteristics, empirically deriving LRV source characteristics, and formulating special trackwork recommendations to control groundborne noise and vibration. Wilson Ihrig provided extensive support regarding construction noise and vibration impacts for San Diego State University buildings. This included identification of sensitive buildings, projection of construction noise and vibration at buildings, developed measures to achieve acceptable noise and vibration levels during construction, confirming performance of construction noise barriers, and demonstrated resulting noise levels to University and MTDB officials.

San Francisco Muni Third Street Light Rail Project
WPK Third Street Consultants
Wilson Ihrig conducted construction vibration and noise monitoring to determine compliance with construction specifications and city noise ordinance. Extensive measurements and analyses were conducted to determine the effects of soil, track structure, rail conditions, wheel conditions, dynamic building response and other factors on vibration levels from San Francisco Muni Light Rail Vehicle. Wilson Ihrig also made design recommendations for mitigating the impact of groundborne vibration to residences along the planned Third Street light rail alignment.

Valley Metro Rail Central Phoenix/East Valley Light Rail
PBS&J/WE Joint Venture
Wilson Ihrig work has involved Construction Administration, observations, criteria formulation, meetings, and noise and vibration analysis for construction phase. Wilson Ihrig is also conducting remote monitoring of vibration during construction.

Superconducting Super Collider Railroad Vibration Exposure
Lawrence Berkeley National Laboratory
Wilson Ihrig work involved measuring ground vibration produced by railroad trains passing over the proposed alignment of the Superconducting Super Collider in the State of Arizona. This work involved identification of low frequency ground motion caused by the moving static load of the train.

Palo Alto Medical Foundation Railroad Ground Vibration
Taylor Engineering
Acoustical and vibration consultation for expansion of Palo Alto Medical Foundation's proposed building along a railroad track. Wilson Ihrig measured and evaluated ground vibration from trains at

proposed site for the research facility and analyzed the design to minimize structural vibration transmission into medical building.

Ashley Creek US93 Widening, Kalispell, MT
Montana Department of Transportation / Big Sky Acoustics
Evaluation of potential adverse impact at the site of KGEZ radio station due to vibration generated by construction activities during the widening of US93 near Kalispell, Montana. Measurement of vibration-generating characteristics of most construction equipment to be used and of transfer functions between the road and spaces housing sensitive equipment at the radio station. Continuous vibration monitoring during key construction periods.

Transit Projects involving Environmental Impact Analysis

Santa Clara County Transit District - Tasman Corridor Light Rail Transit FEIR/FEIS
Michael Brandman Associates
Wilson Ihrig services on the Tasman Corridor Light Rail Project have included measurement and analysis of environmental noise and vibration impacts, characterization of noise and vibration from the existing light rail system in San Jose, determining vibration propagation characteristics of the soil, and developing noise and vibration control measures. The work was incorporated into the FEIR/FEIS.

Portland Tri-met Hillsboro Extensions EIS
Parametrix Inc.
Wilson Ihrig performed environmental noise and vibration impact analyses for the Hillsboro extension between S.W. 185th Ave and Hillsboro. This work involved a complete alternatives analysis with respect to noise and vibration impact, site noise and vibration surveys, reviews, and recommendations for noise and vibration control. The work was incorporated into the DEIS and FEIS for the project.

Bay Area Rapid Transit District (BART), Pittsburg/Antioch Corridor DEIR, FEIR
Bechtel Civil, Inc.
Evaluation of the potential impact from noise and vibration for 12 alternatives proposed for the 18 mile BART Pittsburg/Antioch Corridor. The following issues were addressed: noise and vibration impact of system operations and project construction, BART and LRT ancillary equipment, and highway and road traffic associated with the project.

Bay Area Rapid Transit District (BART), Dublin/Pleasanton Extension DEIR, FEIR
Woodward-Clyde Consultants (now URS)
Evaluation of the impact due to noise and vibration for various alternatives for the proposed 13.7 mile BART Dublin/Pleasanton Extension, including noise and vibration impacts of project construction, BART vehicle operation, BART ancillary equipment and highway relocation associated with the project.

Bay Area Rapid Transit District (BART), Warm Springs Extension DEIR, FEIR
DKS Associates
Evaluation of the environmental impacts due to noise and vibration for the 7.8 mile Warm Springs Extension of the BART Fremont line. Eight alternatives and several design options for a BART line and three non-BART alternatives were analyzed.

Research Projects

Development of Procedures for the Prediction and Control of Groundborne Noise and Vibration from Rail Transit Systems
U.S. Department of Transportation
For this project, Wilson Ihrig studied methods for the prediction and control of groundborne noise and vibration. Groundborne noise and vibration can be a major source of environmental impact from rail transit systems in both commercial and residential areas. The goals of this project were to: (1) develop procedures to more accurately predict groundborne vibration; and (2) develop optimized methods for controlling groundborne noise and vibration. The study has involved a detailed review of the state-of-the-art, both in the U.S. and abroad; development of mathematical models characterizing transit car trucks, vibration propagation in soil, and soil/structure interaction; development of field procedures for characterizing the dynamic properties of transit car trucks; measurements of groundborne vibration at three transit systems and at the Transportation Test Center in Pueblo, Colorado; and the development of a new prediction procedure for groundborne vibration.

Using the prediction procedure for future transit projects will allow much more accurate pinpointing of the areas where vibration control measures are required. In many cases, it should be possible to reduce the lengths of special vibration control measures such as floating slabs by a significant amount, simply because of more accurate predictions. As part of this project, the prediction procedure was applied to the BRRT B-Route section extending from Reistertown Plaza to the Beltway. The prediction procedure has since been applied to several new transit systems.

Handbook of Urban Rail Noise and Vibration Control
U.S. Department of Transportation
The Handbook of Urban Rail Noise and Vibration Control is an 800-page document covering all aspects of the prediction and control of urban rail noise and vibration. The entire handbook was researched and authored by Wilson Ihrig, drawing on the unparalleled experience of Wilson Ihrig in rail transit noise and vibration control. Much of the material included in the handbook was developed through Wilson Ihrig's numerous transit projects and had not been previously published. The document has been widely distributed since its publication in February 1982. It is generally acknowledged as the most authoritative and comprehensive source available on the topic of rail transit noise and vibration control and has been used by many different transit systems and consultants.

Topics covered in the handbook include: Criteria for acceptable levels of noise and vibration exposure of patrons, the community, and transit employees; Overview of the characteristics of urban rail noise and vibration; Detailed information on the procedures and equipment that should be used to measure rail transit noise and vibration; Control of airborne noise from different types of surface track; Prediction and control of groundborne noise and vibration; Acoustical design of transit stations; Control of fan and vent shaft and other ancillary equipment noise; Control of pressure transients.

Research Study for TCRP Project C-3 - Wheel/Rail Noise Mitigation
Transit Cooperative Research Program, Transportation Research Board, Washington, D.C.
Wilson Ihrig performed a research study for the Transit Cooperative Research Program (TCRP) investigating wheel/rail noise generation and control for rail transit systems. The goal of the study was to identify practical and cost effective noise control measures that can be applied systemwide by a wide spectrum of transit authorities, and develop procedures for selecting and implementing these technologies. To accomplish this goal, Wilson Ihrig determined, by compilation, analysis and evaluation of the available information, the state-of-the-art regarding practical procedures for reducing wheel/rail noise.

The project involved two phases: (1) determination of the practical state-of-the-art in wheel/rail noise control by an extensive literature review and contact with cognizant individuals in the North American and international transit industry who have conducted research in the field and who have direct experience with tests of methods and procedures, and (2) development of a wheel/rail noise control manual with an effective set of noise control procedures that can be used by the transit industry. The "Wheel/Rail Noise Control Manual", TCRP Report 23, and accompanying software were published in June 1997. The work for C3A involved testing and demonstration of wheel and rail vibration absorbers at participating transit systems. This involved coordination with the transit agencies to install and measure the effect of mitigation measures.

WILSON, IHRIG & ASSOCIATES, INC.
ACOUSTICAL AND VIBRATION CONSULTANTS

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JAMES T. NELSON, Ph.D., P.E.
Principal / Vice President

Education: Ph.D. (1988) in Engineering Science, Mechanical Engineering,
M.S. (1982), B.A. (1972) in Physics and Mathematics,
University of California, Berkeley
Professional Mechanical Engineer, California, License No. 19425

Affiliations: Member, Transportation Research Board,
Committee A1F04 on Transportation Related Noise and Vibration
Committee A2M04 on Rail Transit Design
Chairman of TRB Subcommittee on Rail Transportation Noise and Vibration
Member, National Council of Acoustical Consultants
Member, Acoustical Society of America
Member, American Society of Mechanical Engineers
Member, American Institute of Physics
Member, Institute of Noise Control Engineering

Awards: Pike Johnson Award for Best Paper, Transportation Research Board
Best Paper, Transportation Research Board Committee A1F04

Employment History: Wilson, Ihrig & Associates, Inc. (1973 to Present)

Qualifications: Dr. Nelson has been involved in every aspect of rail transportation noise and vibration control since joining WIA in 1973. His project experience includes ground vibration prediction, ground vibration propagation measurement, modeling subway structure vibration radiation, numerical analysis of track and rail vehicle dynamics, measurement of wheel vibration and flange forces, subway air pressure transient prediction and mitigation, direct fixation fastener specification, measurement of long distance sound propagation conditions, seismic ground disturbance surveys and preparation of noise elements for environmental impact studies. He was instrumental in developing and refining groundborne prediction procedures.

Dr. Nelson is a recipient of the Pike Johnson Award from the Transportation Research Board, and has presented technical papers worldwide.

Project Experience

Transit Cooperative Research Program, Project C3 (1994-1997): Principal Investigator for preparation of the "Wheel/Rail Noise Control Manual", TCRP Report 23, Transportation Research Board. This work involved summarizing the state of the art in wheel/rail rolling and curving noise.

Transit Cooperative Research Program, Project C3A (1997-2000): Principal Investigator for testing and demonstration of wheel and rail vibration absorbers at participating transit systems.

Long Island Railroad ACL Viaduct, New York (2004): Project director for noise and vibration assessment and development of specifications for new track for the ACL Viaduct.

Central Puget Sound LRT System Facilities Design (2004): Ground vibration impact assessment of proposed Sound Transit LRV on University of Washington, including field testing and theoretical modeling of ground vibration propagation.

Long Island Railroad East Side Access Project, New York (2001): Used a seismic reflectivity model to predict the vibration responses of schist granite and overlying soil layer.

Queensland Rail, Australia (2000-2001): Review of wheel/rail noise control procedures employed by the Queensland Rail. Principal issues concerned wheel squeal, lubrication techniques, maintenance issues, rail fastener stiffness, contact conditions, geometrics, track gauge, wheel and rail profiles, humidity, and other factors.

Union Pacific/Southern Pacific Merger Environmental Assessment (1996-1997): Assessed the noise impact related to merger of the Union Pacific and Southern Pacific railroads.

Los Angeles County Metropolitan Transportation Authority (1999): Performance of environmental noise and vibration measurements, measurement and prediction of vibration transfer functions from tunnel invert to multi-story structures, review of trackwork specifications for floating slab vibration isolation systems, measurement of floating slab responses, and prediction and control of subway air pressure transients. Development of specifications for a soft track vibration isolation system.

San Francisco Bay Area Rapid Transit System (1973-2005): Measurement of subway pressure transients, wheel shock, vibration and strain, and lateral flange forces, review of direct fixation track fastener, running rail, floating and ballast mat specifications for Dublin-Pleasanton, Pittsburg-Antioch, and Colma Extensions, advisor regarding BART A&B Car Rehab Program.

Washington Metropolitan Area Transit Authority (1973-2004): Performance of environmental noise and vibration surveys, predictions of groundborne noise and vibration, measurement of transit vehicle noise and ground vibration, prediction and control of subway air pressure transient magnitudes and rates of change, tunnel portal design, measurement of aerial structure noise for various direct fixation fasteners, development of a high frequency direct fixation fastener vibration isolation testing apparatus and procedure, qualification testing of direct fixation fasteners.

Metropolitan Atlanta Rapid Transit Authority (1975-1995): Prediction and control of subway air pressure transient magnitudes, prediction of vibration impacts at the Northside Hospital, prediction of pedestrian induced bridge vibration.

Portland Tri-Met Westside Extension, Portland, Oregon (1989-1999): Developed a vibration impact element for environmental documents, measuring wayside noise and vibration, analyzing embedded track designs, including finite element analysis, reviewing rail corrugation mitigation methods, recommending noise and vibration mitigation provisions, and attending public meetings. Recent work includes detailed characterization of ground vibration forces for embedded and ballasted track.

San Francisco Municipal Railway (1991-1992): Assisted MUNI engineers with noise control provisions for San Francisco Cable Car, including noise reduction for depression beams.

Resilient Rail Fastener Study for Elevated Structure Noise Control, New York City Transit Authority, U.S. Department of Transportation (1984-1988): Extensive testing in New York to determine the effectiveness of resilient rail fasteners in reducing elevated structure noise. Work included recommending stiffness characteristics, assistance in developing a specification for procurement of rail fasteners, field testing, and laboratory testing that included development of a high frequency test apparatus and procedure for evaluating fastener isolation characteristics.

Prediction Procedures for Groundborne Noise and Vibration from Rapid Transit Systems, U.S. Department of Transportation (1980-1984): Developed a comprehensive prediction procedure for groundborne noise and vibration from rail transit systems. Work included a review of the state-of-the-art, preparation of an annotated bibliography, theoretical and experimental studies, and field testing.

Subway Structure Vibration Radiation (1975-1986): Developed analytical model for far field seismic responses to point loads directed against the inner surface of a lined hollow tube in an infinite elastic medium. The model was applied to prediction of ground vibration from subway tunnels, and used for determining vibration coupling losses as a function of tunnel wall thickness. The model was implemented in Fortran at Wilson, Ihrig & Associates, Inc. for the U.S. DOT as part of the development of prediction procedures for rail transit systems.

Development of Transfer Function Testing of Soils (1980-1984): Transfer function procedures were developed for measuring dynamic Green's functions for soils. These procedures include a load cell and multiple geophone receivers at various distances. The data allow direct prediction of vibration responses in soils due to point sources, and, using numerical integration procedures, the data are used for prediction of the response due to line sources such as trains. The procedure is applied to surface as well as downhole sources. This work was performed at Wilson, Ihrig & Associates, Inc., for the US DOT.

Transportation Test Center, Pueblo, CO (1983-1990): Ground vibration propagation testing at the transit test loop, measurement of mechanical impedance of the MARTA C-Car prototype, measurement of ground vibration and trackbed force spectra for the MARTA C-Car prototype, Portland Tri-Met prototype, and the NFTA prototype vehicles.

Toronto Transit Commission (1975): Assisted in reviewing ground vibration data for the purpose of identifying reasons for efficient long distance ground vibration propagation in response to complaints at ranges up to 800 feet from subways. The work included a limited theoretical analysis of tunnel vibration radiation and propagation.

Baltimore MTA (1985-1988): Vibration propagation testing for predicting surgical theater vibration magnitudes, measurement of groundborne noise and vibration from BRRT vehicles.

Subway Air Pressure Transient Prediction and Control (1975-1986): A procedure was developed for predicting subway air pressure transients, using the low frequency acoustic response of the tunnel, friction factors for the tunnel wall and train sides, conservation laws for air flow about the train, and test data collected at various systems. The tunnel is modeled as an acoustic delay line with reflections, and includes effects due to cross passages and flared transitions. The model has been used for predicting pressure transients at the Washington Metropolitan Area Transit Authority, the Metropolitan Atlanta Rapid Transit Authority, the Baltimore MTA, and at the San Francisco Bay Area Rapid Transit Systems. The method can be used for assessing the influence of cross-passages and flared entrance transitions for controlling pressure magnitude and rate of rise.

Tunnel Pressure Transient Measurements (1974-1980): Tunnel wall and vehicle interior pressure during motion of rail transit trains in subways was measured at the San Francisco Bay Area Transit System. These data were used for validating a computer model developed by Associated Engineers, Inc. Custom instrumentation was designed and developed. Later measurements were performed at the Washington Metropolitan Area Transit Authority to determine the cause of intertunnel CMU wall and cross-passage door failures. Later, measurements were performed at the San Francisco Bay Area Rapid Transit System's transbay tube to determine the cause of death due to smoke inhalation during a fire.

Kamloops Railroad Vibration Study (1988): Performed analysis and review of vibration data to determine the cause of excessive ground vibration adjacent to the Canadian National Railway in Kamloops, Canada. Waviness in the rail due to roller straightener wheel runout was identified as the principal cause of high vibration, and replacement of the rail with lower rail height profile perturbation reduced ground vibration velocity levels about 10 to 15 dB. The problem was identified by narrow band analyses which revealed spectral peaks in wayside vibration coincident with profile wavelengths equivalent to roller wheel diameters. This work was performed at Wilson, Ihrig & Associates, Inc., for the Canadian National Railway system.

Centex Cement, Railroad Vibration Study, Beale AFB, Marysville, CA (1992): Prediction of vibration due to aggregate trains at the Beale AFB metrology and calibration laboratory. The work included measurement of long range ground vibration from freight trains.

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DEREK L. WATRY
Associate Principal / Chief Executive Officer

Education: M.S. (1991) in Mechanical Engineering, University of California at Berkeley
National Science Foundation Fellowship Recipient (1988-1991)
B.S. (1988) in Mechanical Engineering, University of California at San Diego (*Summa Cum Laude*)
M.B.A. (2000), Saint Mary's College of California (*Summa Cum Laude*)

Affiliations: Member, Acoustical Society of America
Member, National Council of Acoustical Consultants

Employment History: Wilson, Ihrig & Associates, Inc. (1992 to present)
University of California, Berkeley (1988 - 1992)

Qualifications: Since 1992, Mr. Watry has specialized in the control of noise and vibration from rail transit systems. He has been involved in projects concerning rail transit systems in the San Francisco Bay Area, Los Angeles, Washington, D.C., and Portland, Oregon. His project experience has ranged from the initial environmental phase through the final design of trackwork, and noise and vibration field and/or design work. He has made many measurements of various types of noise and vibration and also has experience measuring the vibration propagation characteristics of soils.

Project Experience

Hong Kong Mass Transit Railway (1997-2002): Assisted with extensive measurement program of noise from rail system on the Tsing Ma Bridge.

San Francisco Municipal Railway – New Central Subway Project (2003): Oversaw and participated in work to predict future groundborne noise and vibration levels from new subway system. Project involved developing innovative measurement technique to obtain subterranean vibration data using existing de-watering wells. Groundborne noise and vibration levels were predicted in nearby residences.

San Francisco Municipal Railway - Third Street Light Rail Project (2001): Calculated future vibration levels along new rail alignment, accounting for MUNI vehicle characteristics and speed, regional soil properties, and structural vibration amplification. Reviewed vibration criteria used for Environmental Impact Statement and analysis supporting EIS findings.

San Francisco Municipal Railway B N-Line Rail Replacement Conceptual Engineering Report (1998): Measured and assessed vibration in areas with reported high vibration levels. Worked with Parsons-Brinckerhoff track designers to determine replacement track designs and maintenance practices that will reduce future vibration levels. Made controlled measurements to assess the performance of a commercially available vibration isolation system, DS-ISO-RAIL.

San Francisco Municipal Railway B Noise and Vibration Measurements for Breda C.F. (1998): Measured wayside vibration levels to determine effects of modified Breda LRV2 primary suspension on ground vibration. Extensive testing program controlled for vehicle speed and loading, track fixation, and underlying soil conditions. Wayside noise measurements and analysis assessed effectiveness of modified propulsion system software at reducing tonal noise.

San Francisco Municipal Railway B LRV2 Noise Study (1997): Measured sound intensity from all propulsion system components to located primary source of wayside tonal noise.

San Francisco Municipal Railway B LRV2 Vibration Study (1997): Measured and assessed vibration levels around the MUNI systems. Empirically derived both Breda LRV2 and Boeing SLRV train force density levels and conducted modal analysis testing of vehicle truck dynamics. Work led to redesign of vehicle's primary suspension to reduce vibration. Conducted measurements to determine wood-frame building structural amplification.

Santa Clara VTA Vasona Corridor LRT Vibration Study (2000-2002): Final design vibration predictions and mitigation recommendations. Predictions accounted for VTA train, local soil properties, and specific building types along the corridor. Vibration mitigation requirements led to the design, development and testing of track resiliently supported by shredded, recycled tires.

San Francisco Bay Area Rapid Transit - San Francisco Powell Street Station (1999): Empirically characterized station acoustical environment and and recommended number of acoustically absorbing panels that could be removed without degrading PA system performance.

Caltrain CEMOF (Lenzen Yard) Project (2002): Measured the existing ambient noise, characterized the ambient noise sources, predicted and assessed sound levels from future yard activity for several alternative wall designs, and presented the findings to an Oversight Committee.

Central Puget Sound LRT System Facilities Design (2000-2005): Predicted and mitigated low level, low frequency vibration from a planned subway route under the University of Washington campus, including vibration propagation and ambient vibration measurements.

Los Angeles County Metropolitan Transportation Authority B Metro Red Line Project (1993-1995): Identified noise and vibration sensitive buildings and measured ambient noise and vibration for proposed alignment alternatives. Conducted analysis to determine groundborne noise and vibration levels due to transit trains. Empirically determined vehicle force density level. Formulated special trackwork recommendations to control groundborne noise and vibration.

Wilson, Ihrig & Associates B Research Project (1997): Measured and assessed the effectiveness of Clouth AVibrex 1000" Ballast Mat in reducing groundborne vibration.

San Francisco Bay Area Rapid Transit Extensions Program (1992-1998): Identified noise and vibration sensitive buildings and measured ambient noise and vibration for proposed train alignments.

São Paulo Metrô B Extensão da Linha Paulista (1997-1998): Coordinated and conducted field measurements and analysis of soil vibration propagation characteristics for metro rail extension.

FIRM PROFILE

> Client service – the ability to meet the needs and exceed the expectations of our clients with respect to performance, budget, and schedule – is one of the reasons that Shannon & Wilson has been in business for over 50 years.

Shannon & Wilson was established in 1954. We are an employee-owned environmental and geotechnical and natural resource consulting firm consisting of 220 scientists, engineers and support personnel in our offices in Seattle and Richland, Washington; Anchorage and Fairbanks, Alaska; Portland, Oregon; Saint Louis, Missouri; Denver, Colorado, and Jacksonville, Florida.

Our Natural Resources Group specializes in wetland studies, fisheries investigations, stream restoration, threatened and endangered species studies, wildlife studies, habitat evaluation, environmental documentation, and permitting. Our natural resources staff works with our engineers and hydrogeologists to address environmental issues that can impact projects. Our relationships with agencies help us acquire permits for projects that may impact wetlands, streams, threatened and endangered species, or sensitive areas in a timely and cost-effective manner.

Our experience is demonstrated through our success on hundreds of natural resource projects for public and private clients.

NATURAL RESOURCE SERVICES

Shannon & Wilson provides unique solutions for each specific project and individualized, client-focused service. We focus on the critical elements of a project to assure that it is accomplished on schedule and budget and to the satisfaction of all interested parties.

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Our range of natural resources services include:

- Permitting/Regulatory Compliance
- Wetlands
- Plant and Animal Surveys
- Fisheries/Stream Studies
- Habitat Surveys and Restoration
- Water Quality Analysis
- Stormwater/Watershed Management
- Biological Assessments
- SEPA/NEPA studies

SAINT LOUIS OFFICE

Since its founding in 1954, the firm has successfully completed over 20,000 projects, located in all 50 states and throughout the world. Approximately 3,000 of these projects have been completed by our Eastern Region headquarters in Saint Louis.

Shannon & Wilson offers a complete staff of professional geotechnical engineers and geologists, technicians, and support personnel. Our personnel are adept at developing project scope and planning exploration programs, directing field drilling and sampling operations, completing laboratory testing, and performing engineering analysis, all of which result in practical design and construction recommendations.

In addition to our design capabilities, Shannon & Wilson excels in construction observation and management, working on site with contractors and subcontractors and helping them identify and resolve construction problems. This has been a key to our success in engineering cost-effective, constructible designs. Often we act as the owner's design and site representative, reviewing plans and specifications, overseeing construction, approving invoices and quantities, reviewing change orders, and providing field direction.

MURRAY L. MEIERHOFF, CHMM
Vice President
Office Manager and Environmental Group Manager

EDUCATION

M.A., Aquatic Biology, University of Missouri - Columbia, 1977
B.A., Zoology, University of Missouri - Columbia, 1974

REGISTRATION

Master Certified Hazardous Materials Manager, Institute of Hazardous Materials Management, 1993
HAZWOPER Supervisor Training, 1987
Corps Wetland Delineation, Institute for Wetland & Environmental Education & Research

PROFESSIONAL ASSOCIATIONS

Adjunct Professor at Maryville University, 1999 - 2003
Gateway Society of Hazardous Materials Managers
Water Environmental Federation
Society of Wetland Scientists

PROFESSIONAL SUMMARY

Mr. Meierhoff has extensive academic background in aquatic ecology, ichthyology, invertebrate zoology, and aquatic botany. He has 20 years experience dealing with issues in aquatic biology, ecology, and limnology. He has conducted more than 30 biological surveys of lakes and rivers in Illinois, Missouri, Pennsylvania, Kansas, Mississippi, Alaska, and Iowa. These surveys have included assessments of water and sediment chemistry; nutrient balances; and populations of plankton, benthos, fish, and aquatic macrophytes. He has conducted work in support of site-specific water quality variances for clients with problem discharges of heated water, fluoride, chloride, and ammonia-nitrogen. He has also conducted ecological risk assessments in support of the Iowa Department of Environmental Quality efforts to characterize the hazards associated with the (then) top-priority CERCLA site in the state of Iowa.

RELEVANT EXPERIENCE

- Project Manager for studies was to characterize water-quality-related impacts to the fish and benthic macroinvertebrates populations in Saline Creek in northern Jefferson County, Missouri from wastewater treatment plant discharges on Saline Creek. Biological monitoring was conducted at six locations chosen to bracket the multiple WWTP discharges on the stream. Sampling locations were carefully selected to be comparable in habitat diversity. Our stream survey also included chemical sampling conducted around-the-clock, to characterize the diurnal dissolved oxygen and nutrient pulse in the stream.

- Project Manager for a water quality / aquatic biology investigation of an urban stream watershed for the City of Sunset Hills in Missouri. Impacts to receiving stream water quality and aquatic biology from non-point runoff from salt-treated streets in the winter were an issue in the development of a new city maintenance / storage facility. We collected snowmelt runoff samples to document the impacts of the street runoff before and after the completion of a new salt storage facility. Our testimony at a public hearing, and final report allowed the proposed developments to proceed as planned.

- Project manager for a habitat assessment to reduce fish attraction at an eastern Missouri casino complex. The river hydrology at the casino resulted in an accumulation of large woody debris under the boat, which attracted numerous fish species including shovelnose sturgeon. We developed a plan to enable the casino to minimize this accumulation, and worked with them to remove the existing debris with minimal impacts to the existing fish.

- Principal-in-Charge and Project Biologist for the Piasa Creek Watershed Restoration Project in Madison, Macoupin, and Jersey Counties, Illinois. The project area is a 78,000-acre watershed along the Mississippi River. Shannon & Wilson surveyed and recorded habitat and ecosystems within the watershed and identified areas for restoration. Both structural and non-structural measures were evaluated for reduction of sediment load.

- Field Team Leader for the collection of approximately 200 individual samples of water, soil, sediment, benthic macroinvertebrates, and fish from the island of Amchitka (in the Aleutian Islands) for the Alaska COE in September 1998. This project was an ecological risk assessment and study of water and sediment quality, benthic macroinvertebrates, and fish in seven streams on the eastern quarter of the island. These seven streams included five potentially impacted streams, and two reference (or control) streams. This portion of the island had been impacted by drilling programs and underground nuclear detonations conducted by the U.S. Atomic Energy Commission from 1965 to 1972. Potential contaminants included heavy metals from drilling additives, hydrocarbons from the drilling process, and radionuclides from the nuclear events. Since the entire island is uninhabited, our contract included full-scale staffing and provisioning of an independent field camp on the island, and complex health & safety issues due to the presence of unexploded WWII ordnance on the island.

- Project Manager for three aquatic biology / water quality investigations conducted for a major Missouri mining company. These investigations documented the impacts (if any) to the receiving streams from discharges associated with the mining processes. Benthic macroinvertebrates in the streams were collected and identified to determine the levels of impact to the receiving streams. Results from these investigations identified both mine-related and non-mine-related water quality impacts to the receiving streams. Our conclusions allowed the company to alter their processes to reduce the observed impacts, and to discuss management and discharge issues with other property owners in the watersheds.

- Project Manager for biological stream monitoring following an inadvertent release of rock fines into a pristine Ozark stream in southeast Missouri. This work successfully supported our client's position that impacts to the aquatic ecology of the receiving stream from the release were limited in duration and extent.

- Conducted site investigations in Alaska for hydrocarbon contamination at several locations on the Elliot Highway northwest from Fairbanks, AK. This effort included negotiations with the state regulatory agency regarding acceptable remedial measures for contaminated soil and groundwater in a permafrost area. Biological monitoring was conducted to estimate the downstream extent of impacts from spills of diesel fuel.

- Project Manager for biological and chemical stream monitoring at a coal preparation facility in south central Illinois, including characterizing the benthic macroinvertebrate and fish communities in a receiving stream. This monitoring program successfully supported a site-specific water quality variance for elevated concentrations of fluoride in the discharge. Our client realized savings of more than $500,000 by acquiring the variance rather than constructing a treatment facility to remove fluoride.

- Prepared water quality and aquatic ecology sections of an environmental impact statement for the Tennessee Department of Transportation for a proposed port and industrial park where at least 12 threatened or endangered species were found; and for the Pennsylvania Department of Transportation for a proposed realignment and replacement bridge in a historically sensitive area of Bucks County.

- Collected, identified, enumerated, and tabulated the phytoplankton, periphyton, rooted macrophytes, zooplankton, macrobenthos, fish, and other aquatic vertebrates found in the Salt River in northeastern Missouri for the University of Missouri at Columbia under contract to the U.S. Army Engineer District, Saint Louis.

- Initiated a fathead minnow bioassay program designed to test chemicals and mixtures of special interest to Iowa water quality.

- Reviewed and revised Iowa's water quality standards as a member of the Iowa Water Quality Review Subcommittee. This review is mandated by the USEPA for every state every third year.

- Planned and conducted a survey of the aquatic ecology of Cedar River in northeastern Iowa, downstream from the state's top-priority Superfund site. The survey included analyses of the water, sediment, macroinvertebrates, and fish of the Cedar River over a 20-mile reach of the river. The Superfund site included leachate releases containing nitro-anilines, organo-arsenates, and other heavy metals from a veterinary pharmaceutical producer.

- Project Manager for biological and chemical monitoring of an 8-acre lake near Chester, IL, following impacts to the lake from upstream agricultural applications of organo-phosphate pesticides. The non-target organism impact included a total fish kill in the lake, with the loss of a trophy bluegill fishery.

- Project Manager for biological and chemical monitoring of a one-acre lake in Saint Charles County, MO, following impacts to the lake from upstream disposal of pentachlorophenol. Impacts to the lake included a partial fish kill, and loss of fishery resource due to continued bio-accumulation of pentachlorophenol from the soils and sediments.

- Master's Thesis in Aquatic Biology entitled, "Seasonal Fluctuations in the Benthic and Planktonic Communities of the Salt River, Missouri."

WOMACK & ASSOCIATES, INC. STATEMENT OF QUALIFICATIONS

1.0 BACKGROUND AND EXPERIENCE

Ray Womack established a consulting practice in Billings in 1982 which grew into Womack & Associates, Inc. (WAI). The firm now has offices in Billings and Bozeman, and specializes in geotechnical engineering, engineering geology, and geomorphology. We work in a large geographical area, routinely performing projects throughout the western United States and abroad. Our work has consisted of a mix of commercial, residential, and industrial projects. We have provided geotechnical consulting services for many hotels, schools, roads, and high-end residences. Our industrial experience has been gained from work on large mine structures and cleanups at contaminated industrial sites, including many CERCLA (Superfund) projects. We have particular expertise in evaluation of slope stability and seismicity.

At present the staff consists of two geotechnical engineers and a drafter. Although we are a small firm, we have been involved in many large, complex projects, and we believe our background and experience prepare us very well to address the problems that occur at complex sites. Resumes for our professional staff are available upon request, and brief discussions of their experience follow.

Ray Womack, P.E., P.G., President and Principal Engineer, has 30 years experience as a geotechnical engineer and geoscientist. Mr. Womack holds degrees from Virginia Polytechnic Institute (BS-geophysics and geology) and Colorado State University (MS-geology). He is registered as a Professional Engineer in six states and as a Professional Geologist. He is a member of the Association of Engineering Geologists and the American Society of Civil Engineers. Mr. Womack has written many papers and presented technical courses dealing with landslides, risk assessment, and river mechanics.

Mr. Womack has conducted foundation investigations, stability analyses, and geologic hazards evaluations in 17 states, including most of the Rocky Mountain states. He has worked extensively in southern and eastern Africa, as well as Guatemala, Haiti, Kazakhstan and the Republic of Georgia. He has prepared foundation reports for hundreds of structures, including mine facilities, railroads, power plants, hotels, schools, and roads. He has been responsible for investigation of many landslides and other difficult sites. He has led geotechnical efforts at numerous environmental projects, including Asarco CERCLA projects in Tacoma, Washington; East Helena, Montana; Murray, Utah, and elsewhere.

David Cameron, P.E., has 21 years professional experience, including 14 years as a geotechnical engineer. He is a graduate of the University of Colorado at Denver (B.S., Civil

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Engineering). Mr. Cameron works under contract to WAI in Bozeman. He has been responsible for slope stability issues along the proposed 119-mile Tongue River Railroad and the Central Montana Railway. He prepared cover and liner designs for the hazwaste landfill at the Asarco Tacoma Smelter. Major mining projects have included the Cyprus Miami and Magma Pinto Valley copper projects in Arizona, the Chino and Ortiz projects in New Mexico, the Bullfrog Mine in Nevada, Grouse Creek and Black Pine mines in Idaho, Rock Creek and Zortman in Montana, and Freeport Indonesia in Irian Jaya.

2.0 GEOTECHNICAL ENGINEERING

WAI provides site investigation and design services for earthworks, dams, roads, railways, and other structures. Many of our projects have involved landslides and other slope stability problems. Monitoring instruments, including extensometers, tiltmeters, and slope indicators have frequently been installed. In seismically active areas, we have analyzed seismicity and liquefaction potential for sensitive structures. A short list of selected projects follows:

- Tongue River Railroad geotechnical investigation and design
- Beartooth Highway Emergency Repair
- BNSF Yellowstone River slope stability mitigation
- Central Montana Railway landslide mitigation
- Asarco Ray copper electrowinning facility settlement, Arizona
- Asarco Mission tailings impoundments, Arizona
- Asarco lead battery recycling plant, North Carolina
- Hazwaste landfill, roads, landslide mitigation, seismicity, Tacoma Smelter
- PPL Montana impoundments, Colstrip
- Bearpaw Reservoir, Montana DNRC
- BLM dams, near Zortman
- Stillwater Mine East Boulder Access Road, near Big Timber
- Western Energy settlement investigations, Colstrip
- Dinosaur National Monument landslide, Colorado
- Buffalo Jump landslide
- Cathedral Mountain landslide litigation
- Big Sky landslides
- Schools at Malta, Glasgow, Drummond, and Billings
- Jackson and Wilson Schools, Wyoming
- Teton Science School, Jackson, Wyoming
- Beaver Creek and Gros Ventre housing facilities, Grand Teton National Park

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- JY and Moose Visitor Centers, Grand Teton National Park
- Four Seasons Resort, Teton Village, Wyoming
- Renaissance Hotel, Teton Village, Wyoming
- Teton Lodge, Teton Village, Wyoming
- Teton Club, Teton Village, Wyoming
- Red Lodge Mountain slope stability and lined water storage
- Navajo Reservation bridges, New Mexico and Arizona
- Moonlight Basin, Big Sky

3.0 ENVIRONMENTAL PROJECTS

WAI has provided geotechnical and geological services on major environmental cleanups, including CERCLA sites in several states. These sites are large industrial facilities with numerous problems and complex geotechnical requirements. Several of the projects have been ongoing for more than nine years. The Asarco Tacoma Smelter CERCLA site has been particularly challenging, involving geotechnical design of a hazardous waste landfill on a sensitive site adjacent to Puget Sound. The site is seismically active and subject to serious potential settlement, liquefaction, and slope stability problems. Our experience and background on environmental projects includes the following:

- Hazardous waste landfill design
- Seismic and liquefaction analysis
- Slope stability
- Foundation design
- Geosynthetic covers and liners
- Site investigations

WAI has worked on the following environmental projects:

- Asarco Tacoma Smelter CERCLA site, Washington
- Asarco Murray Smelter CERCLA site, Utah
- Asarco East Helena Smelter CERCLA site
- Asarco Omaha Smelter CERCLA site, Nebraska
- Asarco Yak Tunnel CERCLA site, Leadville, Colorado
- Asarco Beckemeyer CERCLA site, Illinois
- Asarco Henrietta CERCLA site, Oklahoma
- Pacific Recycling CECRA sites, Billings
- Asarco lead battery recycling plant, North Carolina

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- Major refinery gasoline plume interception, Billings
- Pennsylvania Power and Light (PPL) interception drains, Colstrip, Montana
- PPL fly ash and process water impoundments, Colstrip
- Rosebud Power fly ash pond, Colstrip
- Columbia Falls aluminum landfill cover
- Getter Trucking facilities, Wyoming, North Dakota, Montana
- Lander and Winkleman Dome oil fields, Wyoming
- Hardscrabble oil field, North Dakota
- Four Eyes oil field, Montana
- Brush Lake oil field, Montana
- Injection wells, North Dakota and Montana

4.0 ACTIVE MINES

Ray Womack has worked on coal and hardrock projects in Montana since 1978. WAI has been involved in design, operation, and closure of many major projects in Montana and the western U.S. Our background includes the following areas of work:

- Slope stability--heap leach pads, waste repositories, landslides
- Reclamation--covers, liners, water treatment facilities
- Dams
- Major diversions
- Foundations for surface facilities

4.1 HARDROCK MINES

Hardrock mining projects include the following:

- Pegasus Zortman
- Stillwater platinum
- Asarco Rock Creek
- Noranda Crown Butte
- Phelps Dodge/Canyon Resources MacDonald and Sevenup Pete
- CR Kendall
- Basin Creek
- Hecla Grouse Creek, Idaho
- Stibnite, Idaho
- Echo Bay Republic, Washington

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- CR Briggs, California
- Sonora Mining, California
- Asarco Ray and Mission, Arizona
- Asarco Coy, New Market, and Young zinc mines, Tennessee
- Cambior Carlota, Arizona
- Bolnisi heap leach, Republic of Georgia
- Jezkazgan copper leach, Kazakhstan

4.2 COAL MINES

Coal projects include the following:

- Westmoreland Absaloka
- Montco
- Bull Mountains (Louisiana Land and Exploration)
- Wesco Cook Mountain
- Consolidation Coal Otter Creek
- Meridian Cook Creek
- Meridian Circle West
- Ft. Union, Wyoming
- Consolidation Coal Ash Creek, Wyoming

5.0 GEOMORPHOLOGY

WAI has performed stream channel investigations and remediation projects for mines, conservation districts, and landowners. Ray Womack has published technical papers and has served as an expert witness and consultant in litigations involving boundary disputes and erosion problems along rivers. His work on stream channel erosion has been cited in a number of textbooks. The company has recently prepared cumulative impact assessments for channel training projects along the Yellowstone River near Billings, the first study of its type to be performed in this region. We are currently doing similar assessments for proposed channel training projects along the BNSF railroad Yellowstone River corridor between Billings and the North Dakota line. Specific projects include the following:

- Yellowstone cumulative impact study, Yellowstone Co.
- BNSF Yellowstone cumulative impact study
- Clark Fork litigation, Missoula
- Yellowstone litigation, Sidney

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- Missouri River litigation, Culbertson
- Sun River litigation, Cascade County
- Careless Creek erosion, Musselshell County
- Two Medicine Canal blowout, Blackfoot Reservation
- Alder and McGinnis Canal failures, Blackfoot Reservation
- Douglas Creek erosion, Colorado
- Carter Gulch debris flows and channel reclamation, Zortman
- Ruby Gulch channel reclamation, Zortman

6.0 CLIENT LIST

6.1 INDUSTRIAL CLIENTS

Asarco • BNSF • Cambior • Canyon Resources • Central Montana Railway • Consolidation Coal • Darling International • Echo Bay Minerals • Exxon Billings Refinery • Getter Trucking • Hecla Mines • Koch Materials • Montana Power Co. • Montco • Nance Petroleum • Noranda • Pacific Recycling • Pegasus Gold • Pennsylvania Power and Light (PPL Montana) • Phelps-Dodge • Stillwater PGM • The Industrial Company (TIC) • Tongue River Railroad • Western Energy • Westmoreland Resources • Zortman Mining Inc.

6.2 PUBLIC CLIENTS

Billings Public Utilities Department • City of Lander, Wyoming • Montana Dept. Environmental Quality • Montana Dept. Fish Wildlife and Parks • Montana Dept. Natural Resources and Conservation • Montana Dept. Transportation • Northern Cheyenne Housing Authority • U.S. Bureau of Indian Affairs • U.S. Department of Justice • U.S. Forest Service • U.S. National Park Service • U.S. Public Health Service • U.S. NRCS • Wyoming Dept. of Environmental Quality

6.3 PRIVATE CLIENTS

Briarwood Country Club • Dreyfus Property Group • Grand Targhee Ski Resort • Leon Hirsch • Jackson Hole Ski Corporation • Michael Keaton • Moonlight Basin Ranch • Red Lodge Mountain Ski Area • Snake River Associates • State Farm Insurance • Travelers Insurance

6.4 ENGINEERS AND ARCHITECTS

A&E Architects • CTA Architects Engineers • Carney Architects • Charney Architects • CDM • Engineering Inc. • Fluidyne • Jonathan Foote Architects • Golder Associates • Hydrometrics •

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W. RAYMOND WOMACK, P.E., P.G.
Principal Engineer
Womack & Associates, Inc.

Slope Stability
Dams
Mining Structures
Foundations
Environmental Projects
River Mechanics

SUMMARY OF EXPERIENCE

Mr. Womack has 30 years experience in geotechnical engineering and engineering geology, providing site investigations, design, and construction supervision. Project experience includes earth fill and tailings dams; landfills; copper and gold mining projects; coal mines; railroads; commercial, municipal, and residential construction; and hazardous waste and ground water pollution sites in 17 states and 7 countries outside the US. Mr. Womack has particular expertise in investigation and mitigation of landslides and other slope stability problems, including seismic and liquefaction studies. He has presented short courses and technical papers, as well as provided expert consulting and witness services in litigations involving foundations, slope failures, and river changes. He has worked extensively in southern Africa, and has also been involved in mining projects in the Republic of Georgia and Kazakhstan.

EDUCATION AND TRAINING

Virginia Polytechnic Institute	B.S. (Geophysics and Geology), 1970
Colorado State University	M.S. (Geology), 1975

REGISTRATIONS & AFFILIATIONS

Professional Engineer in Arizona, Colorado, Montana, Washington, and Wyoming
Professional Geologist in Wyoming
Licensed Monitoring Well Constructor in Montana

American Society of Civil Engineers (ASCE)
Association of Engineering Geologists (AEG)
1988-1989 President, Billings Engineers Club
American Scientific Affiliation (ASA)

PROFESSIONAL HISTORY

Womack & Associates, Inc., Principal Engineer/Engineering Geologist, 1982-Present
Geowest, Inc., Billings, MT, Project Manager, 1979-1982
IntraSearch, Inc. (Spectrum), Billings, MT, Geological Engineer, 1978-1979
Partridge, de Villiers & Associates (South Africa), Engineering Geologist, 1975-1978

Womack, W.R., 2001, Response and recovery of the Missouri River downstream of Ft. Peck Dam, with resulting property boundary disputes *in* Applying Geomorphology to Environmental Management: Water Resources Publications, Ft. Collins, Colorado, p. 429-456.

Womack, W.R., and R. Perkins, 2000, Effects of management on river form and habitat in Yellowstone County: Assn. Montana Floodplain Managers Conference, Butte.

Womack, W.R., 1999, Yellowstone River geomorphology: Conference on Yellowstone River Problems and Control Efforts, Billings, Montana.

Womack, W.R., F.R. Greguras, G.S. Vick, D.K. Nation, and T. Aldritch, 1998, Hidden hazard: liquefaction assessment for a buried glacial stream valley at a Superfund site offshore of Tacoma, Washington: Proceedings for Geo-Institute ASCE Geotechnical Earthquake Engineering and Soil Dynamics III, Geotechnical Special Publication No. 75, Reston, Virginia.

Womack, W.R., J. Volberding, and L. Johnson, 1998, Geotechnical case study SevenUp Pete Joint Venture, McDonald Gold Project: Northwest Geology, v. 28, p. 53-89.

Cameron D.P., and B.R Bronson, 1997, Leach facility construction on placed rockfill overburden: Proceedings of the Fourth International Conference on Tailings and Mine Waste, Tailings and Mine Waste, Colorado State University, A.A. Balkema.

Womack, W.R., J. Volberding, and L. Johnson, 1997, Glacial geology and landslides at the SevenUp Pete site, Montana: Mine Design, Operations, and Closure Conference, Polson, Montana.

Womack, W.R., and D.J. van Zyl, 1997, Geological uncertainty and risk: Short course presented at Mine Design, Operations, and Closure Conference, Polson, Montana.

Womack, W.R., 1997, Historical perspective of river management activities and their cumulative effects: Conference on Yellowstone River Problems and Control Efforts, Billings, Montana.

Womack, W.R., 1996, Montana landslides; diagnosis, prevention, and cure: Short course presented at Montana Joint Engineers Conference, Fairmont.

Hutchison, I.P.G, M.L Leonard, and D.P. Cameron, 1995, Remedial alternatives identification and evaluation. Proceedings of the Summitville Forum, Colorado State University, A.A. Balkema.

Womack, W.R. and G. Rome, 1989, Irrigation waste water triggers severe natural channel erosion: Amer. Soc. Agri. Engineers International Summer Meeting, Quebec.

Womack, W.R., 1984, Detection of shallow abandoned room and pillar workings using high resolution earth resistivity: Proceedings of the National Symposium and Workshops on Abandoned Mine Land Reclamation, p. 42-62.

Womack, W.R., and S.A. Schumm, 1977, Terraces of Douglas Creek, northern Colorado: an example of episodic erosion: Geology, v.5, p. 72-76.

Womack, W.R., 1976, Applications of Thermal Infrared Scanning to Engineering Geology in South Africa: South African Symposium on Remote Sensing.

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SUMMARY OF EXPERIENCE

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IntraSearch, Inc. (Spectrum), Billings, MT, Geological Engineer, 1978-1979
Partridge, de Villiers & Associates (South Africa), Engineering Geologist, 1975-1978

TECHNICAL PRESENTATIONS AND PUBLICATIONS

Womack, W.R., 2006, Landslides triggered by Hurricane Stan in western Guatemala: investigation and mitigation in a developing environment: 40th Annual Symposium on Engineering Geology & Geotechnical Engineering, Utah State University.

Mokwa, R., W.R. Womack, and D.P. Cameron, 2004, Quantifying risks of construction in landslide-prone areas: Proceedings of ASCE Geotrans Conf., Los Angeles, Geotechnical Special Publication 126, p. 2010-2019.

Womack, W.R., 2004, River changes and property boundary disputes: Montana Bar Association CLE, Miles City, Montana, also presented at 2005 Montana Association of Registered Land Surveyors Conference.

Womack, W.R., 2004, Engineering volunteerism: Montana Geotechnical Group, MSU Engineering Festival, Bozeman, Montana.

Womack, W.R., 2003, Permitting within a corridor management plan: Great Northern Environmental Stewardship Association Meeting, Kalispell, Montana.

Womack, W.R., and D.P. Cameron, 2003, Risks and consequences of remobilization of ancient landslides: Short course presented at Geohazards Symposium, MSU Engineering Festival, Bozeman, Montana.

Womack, W.R., 2002, Lessons learned from failures and near-failures of water retention facilities in the coal fields of the Northern Great Plains: Mine Design, Operations, and Closure Conference, Polson, Montana.

Womack, W.R., 2002, Alteration of Yellowstone River form and habitat over the past 50 years: American Rivers Conference, Billings, Montana.

Womack, W.R., 2001, Response and recovery of the Missouri River downstream of Ft. Peck Dam, with resulting property boundary disputes: Applying Geomorphology to Environmental Management (ed D. Anthony, M. Harvey, J. Laronne, and M. Mosley), Water Resources Publications, Ft. Collins, Colorado, p. 429-456.

Boyd K.F., and W.R. Womack, 2001, Stream channel restoration and the illusion of function: Mine Design, Operations, and Closure Conference, Whitefish, Montana (Also presented at Assoc. Montana Flood Plain Managers Conference).

W.R. Womack, 2000, Effects of management on river form and habitat in Yellowstone County: Montana Flood Plain Managers Conference, Billings (Also keynote speech at Yellowstone River Roundtable, Billings).

Womack, W.R., 1999, Yellowstone River geomorphology: Conference on Yellowstone River Problems and Control Efforts, Billings, Montana.

Womack, W.R., F.R. Greguras, G.S. Vick, D.K. Nation, and T. Aldritch, 1998, Hidden hazard: liquefaction assessment for a buried glacial stream valley at a Superfund site offshore of Tacoma, Washington: Proceedings for Geo-Institute ASCE Geotechnical Earthquake Engineering and Soil Dynamics III, Geotechnical Special Publication No. 75, Reston, Virginia.

Womack, W.R., J. Volberding, and L. Johnson, 1998, Geotechnical case study SevenUp Pete Joint Venture, McDonald Gold Project: Northwest Geology, v. 28, p. 53-89.

Womack, W.R., J. Volberding, and L. Johnson, 1997, Glacial geology and landslides at the SevenUp Pete site, Montana: Mine Design, Operations, and Closure Conference, Polson, Montana.

Womack, W.R., 1997, Geological uncertainty and risk: Short course presented at Mine Design, Operations, and Closure Conference, Polson, Montana.

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Womack, W.R. and G. Rome, 1989, Irrigation waste water triggers severe natural channel erosion: Amer. Soc. Agri. Engineers International Summer Meeting, Quebec.

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Womack, W.R., and S.A. Schumm, 1977, Terraces of Douglas Creek, northern Colorado: an example of episodic erosion: Geology, v.5, p. 72-76.

Womack, W.R., 1977, Engineering geology for civil engineers: Senior level course at The University of the Witwatersrand, Johannesburg, South Africa.

Womack, W.R., 1976, Applications of thermal infrared scanning to engineering geology in South Africa: South African Symposium on Remote Sensing, Johannesburg.

Author of numerous private reports on geotechnical engineering, engineering geology, and river mechanics.

SLOPE STABILITY

PROJECT	LOCATION
Beartooth Highway Reconstruction	Montana
Dinosaur National Monument Landslide	Colorado
Hecla Grouse Creek Mine Landslides	Idaho
Stibnite Mine	Idaho
PD\Canyon Resources Seven-Up Pete and McDonald	Montana
Zortman Mine	Montana
ASARCO East Helena Smelter	Montana
ASARCO Tacoma Smelter Landfill	Washington
ASARCO Ray Mine	Arizona
ASARCO Murray Smelter	Utah
BNSF Shirley and Savage Projects	Montana
Crown Butte Power Line Corridor	Wyoming
Westmoreland Absaloka Mine	Montana
Stillwater Mine East Boulder Road	Montana
Cambior Carlota Mine	Arizona

Sonora Mine	California
Columbia Falls Aluminum Landfill	Montana
W.R. Grace Vermiculite Tailings	Montana
Consolidation Coal Ash Creek	Wyoming
Canyon Resources CR Kendall	Montana
Tongue River Railway	Montana
Central Montana Railway	Montana
ASARCO Young Mine Zinc Tailings	Tennessee
Billings Heights Sanitary Sewers	Montana
Red Lodge Sewer Outfall Failure	Montana
Wrongful Death Litigation, Butte	Montana
Rimrock Drilling Litigation, Billings	Montana
Mountain View Subdivision, Billings	Montana
Teton Wilderness Landslide	Wyoming
Bozeman Railway Stability	Montana
McClain Creek Slide	Montana
Buffalo Jump Slide	Montana
Cathedral Mountain Slide	Montana
Michael Keaton Residence, Bridger Bowl	Montana
Leon Hirsch Residence, Lima	Montana
Lee Residence, Cromwell Island, Flathead Lake	Montana
Stayner Residence, Big Sky	Montana
Faubert Residence, Big Sky	Montana
Lyman Creek Water Supply Project, Bozeman	Montana
Aspen Grove Subdivision, Big Sky	Montana
Skywood Preserve Subdivision, Big Sky	Montana
Beehive Subdivision, Big Sky	Montana
Moonlight Basin, Big Sky	Montana
Blue Grouse Development, Big Sky	Montana
Beaver Creek, Gallatin County	Montana
Sunwest Subdivision, Madison County	Montana
Bench Ranch, Sunlight Basin	Wyoming
Roger Altman Residence, Jackson Hole	Wyoming
Jackson Hole Ski Area	Wyoming
Red Lodge Mountain Ski Area	Montana

DAMS AND TAILINGS IMPOUNDMENTS

PROJECT	LOCATION
PPL Montana Saddle Dam	Montana
PPL Montana Main Dam	Montana
Hecla Grouse Creek Tailings	Idaho
Westmoreland Absaloka Mine Dams	Montana
ASARCO Young Mine Zinc Tailings	Tennessee
ASARCO Coy Impoundment Failures (karst)	Tennessee
ASARCO E. Helena Smelter Sludge Repository	Montana
Zortman Mine Dams	Montana
Echo Bay Republic Mine Dams	Washington
ASARCO Blackhawk Tailings	New Mexico
ASARCO Mission Tailings	Arizona

ASARCO Ray Mine Dams	Arizona
W.R. Grace Vermiculite Tailings	Montana
McNeil Slough Reservoir	Montana
Bearpaw Reservoir	Montana
Nilan Reservoir	Montana
Hauser Reservoir FERC Expansion Permit	Montana
Thompson Falls FERC Expansion Permit	Montana
Huntley Irrigation Dam	Montana
Worthen Meadows Reservoir, Lander	Wyoming
Chapek Reservoirs, Sheridan	Wyoming
Chevron Carter Creek Gas Plant Impoundment	Wyoming
Glaston Reservoirs, Big Timber	Montana
Upper and Lower Flagstaff Dams	Montana
BLM Reservoirs	Montana
Billings PUD Impoundment	Montana
Yellowstone Country Club, Billings	Montana
Yates Dam	Montana
Lebowa Dam	South Africa
Sterkspruit Dam, Transkei	South Africa
Transkei Dams(25 sites)	South Africa

FOUNDATIONS

PROJECT	LOCATION
Four Seasons Resort, Teton Village	Wyoming
Snake River Lodge, Teton Village	Wyoming
Teton Club, Teton Village	Wyoming
Teton Lodge, Teton Village	Wyoming
Gondola Restaurant, Teton Village	Wyoming
Bridger Center, Teton Village	Wyoming
Cody Center, Teton Village	Wyoming
Rendezvous Peak Lodge, Teton Village	Wyoming
Granite Ridge Subdivision, Teton Village	Wyoming
Grouse Creek Mill and Crusher	Idaho
ASARCO E. Helena Storage Tanks	Montana
ASARCO Lead Battery Recycling Plant	North Carolina
Murray Pacific Log Yard, Tacoma	Washington
Zortman Mine Water Treatment Plants	Montana
Zortman Mine Cable Belt Conveyor	Montana
Western Energy Housing Studies, Colstrip	Montana
ASARCO Ray SX-EW Plant	Arizona
Navajo Bridges, BIA	Arizona
Faith Chapel Church, Billings	Montana
Michael Keaton Residence, Bridger Bowl	Montana
Chambless Ranch, Bridger Bowl	Montana
Leon Hirsch Residence, Lima	Montana
Four Corners Ice Palace, Bozeman	Montana
Koch Materials, Laurel	Montana
Moonlight Basin, Big Sky	Montana
Russell and Karen Fagg Residence, Billings	Montana

Stone Crop Subdivision, Jackson Hole	Wyoming
Crescent H Ranch, Jackson Hole	Wyoming
Thurston Residence, Jackson Hole	Wyoming
Roger Altman Residence, Jackson Hole	Wyoming
Teton Springs Development	Idaho
Warbonnet Subdivision, Billings	Montana
Northern Cheyenne Housing	Montana
Sheridan V.A. Hospital	Wyoming
Spring Creek Subdivision, Bozeman	Montana
Safeco Insurance, Great Falls	Montana
State Farm Insurance, Bozeman and Miles City	Montana
Intermountain Foods, Bozeman	Montana
Aldworth Construction, Bozeman	Montana
Briarwood Subdivision, Billings	Montana
Drummond School	Montana
Independent School, Billings	Montana
Malta High School	Montana
Glasgow High School	Montana
Jackson Hole High School	Wyoming
Wilson High School	Wyoming
Homestead Post Office, Billings	Montana
Hysham Water Treatment Plant	Montana
Kandisi River Bridge	Kenya
Moffat College Library	Kenya
Bukaleba Clinic and School	Uganda
Pretoria Hospital	South Africa
Urban Beltway Roads and Bridges, Johannesburg	South Africa
Dwangwa Sugar Mill	Malawi

ENVIRONMENTAL AND MINING PROJECTS

PROJECT	LOCATION
ASARCO Yak Tunnel CERCLA Site, Leadville	Colorado
ASARCO E. Helena Smelter CERCLA site	Montana
ASARCO Tacoma Smelter CERCLA site	Washington
ASARCO Omaha Smelter CERCLA site	Nebraska
Murray Pacific Log Yard, Tacoma	Washington
Murray Smelter, Salt Lake City	Utah
Crown Butte Land Application	Montana
Zortman Waste Repositories	Montana
Stillwater Mine Land Application	Montana
ASARCO Lead Battery Recycling Plant EA	North Carolina
EXXON Refinery Interception Drain, Billings	Montana
PPL Montana Interception Drains, Colstrip	Montana
PPL Montana Fly Ash, Colstrip	Montana
Rosebud Power Fly Ash, Colstrip	Montana
NRCS Animal Waste Projects	Montana
Columbia Falls Aluminum Landfill	Montana
Getter Trucking Facilities EA	Wyoming, North Dakota, Montana
Lander Oil Field	Wyoming

Winkleman Dome Oil Field	Wyoming
Hardscrabble Oil Field	North Dakota
Four Eyes Oil Field	North Dakota
Brush Lake Oil Field	Montana
Landtech Injection Wells	Montana and North Dakota
Balco Injection Well and Pipelines	North Dakota
Pacific Recycling, Billings	Montana
Fremont County Abandoned Mines	Wyoming
Montana Abandoned Mines	Montana
Elkhorn Abandoned Mine/CERCLA	Montana
Alladin Tipple Reclamation	Wyoming
Underground Storage Tanks	Montana
Lewistown Clay Reclamation	Montana
Livingston Gravel Reclamation	Montana
Northern Tier Pipeline	Washington, Montana
Zortman Mine Goslin Gulch	Montana
Phelps-Dodge Seven Up Pete	Montana
Phelps-Dodge McDonald	Montana
Canyon Resources CR Kendall	Montana
Canyon Resources CR Briggs	California
Cambior Carlota	Arizona
Bolnisi Madneuli Mine	Republic of Georgia
Jezkazgan SX-EW	Kazakhstan
Montco Project, Tongue River	Montana
Wesco Cook Mountain	Montana
Meridian Cook Creek projects	Montana
Consolidation Coal Otter Creek	Montana
Westmoreland Absaloka	Montana
Western Energy and Montana Power Colstrip	Montana
Arch Youngs Creek	Montana
Bull Mountains	Montana
Meridian Circle West Project	Montana
Ft. Union mine	Wyoming
Consolidation Ash Creek	Wyoming
Carrizozo	New Mexico

RIVER MECHANICS

PROJECT	LOCATION
Yellowstone River Cumulative Impact Assessment	Montana
BNSF Yellowstone Channel Training Assessment	Montana
Clark Fork Litigation, Missoula	Montana
Yellowstone Litigation, Sidney	Montana
Missouri River Litigation, Culbertson	Montana
Horse Creek Erosion, Forsyth	Montana
Careless Creek Erosion, Musselshell County	Montana
Yellowstone Access Sites	Montana
Sweetgrass Creek Reclamation	Montana
Riverfront Park Litigation, Billings	Montana
Big Horn Litigation, Custer	Montana

APPENDIX 7

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

FD/43

Service Date and Delivered to EPA: March 17, 1994

Comment Due Date: May 9, 1994

Notice in the Federal Register: March 24, 1994

Supplement to Draft Environmental Impact Statement

Finance Docket No. 30186 (Sub. No. 2)

Tongue River Railroad Company - Construction and Operation - of an additional Rail Line From Ashland to Decker, Montana

Information Contact:

Dana G. White or
Elaine K. Kaiser, Chief
Section of Environmental Analysis
Interstate Commerce Commission
Washington, DC 20423
(202) 927-6214

Prepared by:

Section of Environmental Analysis
Interstate Commerce Commission

comments from ranchers, Native Americans, property owners, recreation users, and all other interested parties.

CHAPTER 5

ALTERNATIVE ALIGNMENTS

During TRRC's engineering surveys of possible alignments for its proposed Extension from Ashland to Decker, Montana, three other alignments were evaluated. These alignments were studied in addition to TRRC's proposed alignment, the Four Mile Creek Alternative, and the no action or "no build" alternative, which is discussed in Chapter 6.

The three additional alignments, which would basically follow all or portions of creek beds, are referred to as (1) Prairie Dog Creek Alternative, (2) Canyon Creek Alternative, and (3) Hanging Woman Creek Alternative. (See Map in Appendix A-2.)

The Prairie Dog Creek Alternative would leave the Tongue River Valley at milepost 22 and climb westerly approximately 960 feet in elevation toward the divide with Rosebud Creek. On reaching the divide, the alignment would turn south and tie in with the north end of the Four Mile Creek Alternative. TRRC rejected this alignment because its total length equalled 58 miles; ascending and descending grades would exceed 2 percent; and it would not meet TRRC's engineering or operational criteria for safe operations.

The Canyon Creek Alternative is similar to the Prairie Dog Creek Alternative except that it would leave the Tongue River

Valley at milepost 25.4 and then climb westerly towards the divide with Rosebud Creek. The high point on this alignment would be approximately 900 feet above the Tongue River Valley, where it would turn south to tie in with the northern part of the Four Mile Creek Alternative. TRRC rejected this alignment because the total length of the line equalled 54 miles; ascending and descending grades would exceed 2 percent; and it would not meet TRRC's engineering or operational criteria for safe operations.

The Hanging Woman Creek Alternative alignment would separate from TRRC's proposed alignment at milepost 14.8 just north of Birney, Montana. It would then proceed south following Hanging Woman Creek until a few miles north of the Montana/Wyoming border. The route would then turn west and climb toward the divide between Hanging Woman Creek and the Tongue River. The high point along the route would be approximately 600 feet above the Tongue River Valley. Upon crossing the divide, the route would then turn northwest and descend toward the East Decker Mine where the alignment would join the East Decker rail spur. TRRC rejected this alignment because the total length of the line would equal 56 miles; ascending and descending grades would exceed 2 percent; and it would not meet TRRC's engineering and operational criteria for safe operations.

Like the Four Mile Creek Alternative, these three routes would all be longer than TRRC's proposed alignment. Further, these routes also would have steeper topography than TRRC's proposed alignment and the Four Mile Creek Alternative. This would necessitate grades even steeper than the Four Mile Creek Alternative and involve even greater land disturbance from deeper cuts and fills.

Based on the rough topography of the project area and SEA's evaluation of the engineering designs (which included consultation with the Commission's engineering and operations experts), SEA believes that, even though rail line construction along these three additional alignments would be possible, none of these alignments would be feasible.

CHAPTER 6

THE NO ACTION ALTERNATIVE

As required by the regulations of the Council on Environmental Quality which implement the National Environmental Policy Act, Federal agencies must address the "no action" alternative in an environmental impact statement, 40 CFR 1502.14 (d). In the DEIS, SEA discussed the "no action" or "no build" alternative. Since TRRC has already obtained ICC authority to construct and operate a 89-mile rail line between Miles City and Ashland, TRRC could decide to construct and operate that portion of the line even if the Commission denies authority to TRRC to construct and operate the proposed Extension from Ashland to Decker, Montana.

By constructing and operating the 89-mile line, TRRC could serve at least five potential new coal mines in the Ashland area. In its application to construct and operate the Miles City to

APPENDIX 8

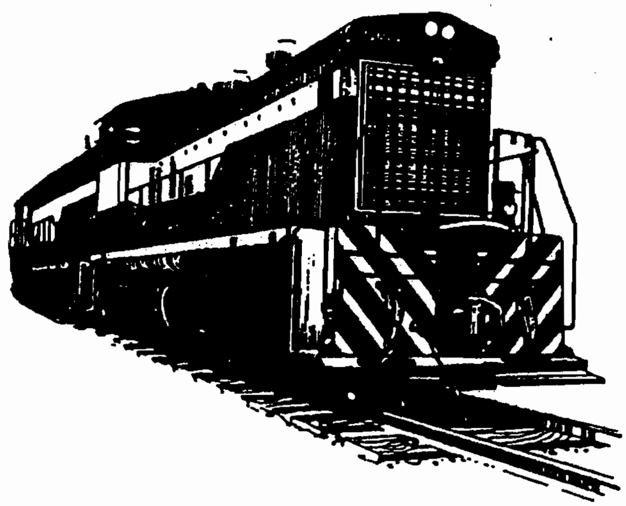
REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

Service Date: August 23, 1985

Final
Environmental Impact Statement

Finance Docket No. 30186

Tongue River Railroad Company
—Construction and Operation—
of a line of railroad in Custer, Rosebud, and Powder River Counties, Montana



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Office of Transportation Analysis
Section of Energy and Environment

EXECUTIVE SUMMARY

Conclusion

In assessing the environmental impacts associated with the construction and operation of a rail line to serve the Tongue River Valley, an in-depth and detailed analysis was conducted on the environmental effects of four possible routes: the proposed 89-mile rail line for the Tongue River Railroad (Proposed Rail Line), the Tongue River Alternative, the Moon Creek Alternative, and the Colstrip Alternative. This environmental analysis also examined the engineering and marketing considerations of each route because of the critical role these factors play for the Applicant in selecting the most feasible and practical route. On balance, given the environmental impacts associated with each of the four routes, it appears that two of the alignments, the Proposed Rail Line and the Colstrip Alternative, are feasible choices.

Due to its shorter length, the Colstrip Alternative would have the least environmental impact of any of the routes studied. Also, by virtue of its shorter length, it would affect the least number of landowners and would require the least acreage for rail construction and operation. This would help to minimize the rail line's impact on land use, which is a major concern to the affected landowners. Another major advantage of the Colstrip Alternative is that it is the only route which does not cross the Livestock and Range Research Station. Therefore, unlike the other routes, it would have virtually no environmental impact on this agricultural research facility.

The Proposed Rail Line also is a feasible route. Although the environmental impacts are greater than for the Colstrip route, they are comparable to those of the Tongue River and Moon Creek Alternatives. More importantly, the adverse environmental impacts attendant to the Proposed Rail Line can be mitigated in a reasonable manner. Although more acreage and landowners would be impacted by this route than by the Colstrip Alternative, the protective measures afforded property owners by Montana law and the mitigation measures outlined in the Mitigation Plan in Appendix B of this document would help to offset this difference.

As noted above, marketing and engineering considerations are critical to the Applicant in selecting the most feasible and practical route. From an engineering and marketing standpoint, the Proposed Rail Line has advantages over the Colstrip Alternative, as well as the other two routes. Apart from these marketing and engineering advantages, we believe that, coupled with full and good-faith implementation of the Mitigation Plan, the Proposed Rail Line is an environmentally acceptable route for the Tongue River Railroad.

impacts of the project in great detail. On January 19, 1984, the ICC issued a Supplement to the DEIS in response to optional considerations for the location of the northern terminus, submitted by the TRRC. The Supplement considered the environmental impacts associated with the proposed optional location for that facility.

Preliminary to preparation of these documents, a scoping and screening process was conducted by the ICC in cooperation with several federal, state, and local agencies with regulatory responsibilities for, or a special interest in, the project. During this process, the following entities were designated cooperating agencies: (1) the U.S. Department of Agriculture (USDA); (2) the U.S. Army Corps of Engineers; (3) the Federal Railroad Administration; (4) the Montana Department of State Lands (DSL); (5) the Miles City-Custer County, City-County Planning Board; (6) the Powder River County Commissioners; and (7) the Northern Cheyenne Indian Tribe. Input was sought and received from other state and federal agencies, as well as the public at large, throughout this process.

The intent of the scoping and screening process was two-fold. First, it was necessary, in accordance with NEPA, to identify those alternative routings and alternative modes of transportation that could be considered reasonable alternatives to the proposed railroad. Second, once again in accordance with NEPA, it was necessary to identify those issues and concerns specific to the proposal that should be included for consideration in an analysis of environmental impacts. Three alternative routes were identified as being worthy of detailed analysis in the document. Numerous issues were identified as requiring special attention and these are considered in the document.

Implications of the selection of a "No Action" Alternative also were examined during the scoping and screening process. It was determined that a "No Action" recommendation in response to the application would result in one of two scenarios. The first would assume that an alternate mode of transporting coal from the area would be more appropriate. The second would assume that no means of transportation is selected, and that coal would not be exported from the area. Due to various environmental, economic, engineering and legal considerations examined during the process, the possible alternative modes of transportation were eliminated. As a result, for purposes of this analysis, the "No Action" Alternative, representing no development of the area's coal resources, was depicted in the baseline conditions and projections described in the DEIS.

The DEIS analyzed potential impacts based on several possible levels of production. These "coal production scenarios," designated low, medium and high, were developed using projected coal demands from available market data, landholdings, ownership patterns and lease information, as well as other industry data.

The FEIS and all other documents mentioned will become part of the offical record in the proceedings before the ICC to grant or deny the Certificate of Public Convenience and Necessity to build and

The Proposed Rail Line provides a direct link with the existing Burlington Northern mainline at Miles City. From an engineering standpoint, this would be the most desirable route. The 0.2-percent ruling grade against load is smaller than any of the alternative routes. In addition to the lowest construction costs on a per mile basis, this factor could result in long term operational fuel savings.

The Proposed Rail Line is not as environmentally desirable as is the Colstrip Alternative Route. Environmental impacts associated with the Proposed Rail Line would be greater than those from the Colstrip Route, but would be comparable to those that are anticipated for the Tongue River Road Alternative Route and the Moon Creek Alternative Route.

The Tongue River Road Alternative Route would utilize an existing transportation corridor, thereby limiting, to some extent, the necessity to sever agricultural parcels and disturb irrigation systems. It would, however, result in the loss of approximately 17 acres of prime farmland to the right-of-way. From an engineering standpoint, the route would not be as desirable as the Proposed Rail Line. The 0.85-percent ruling grade against load would result in higher construction and ultimately higher operational costs. The potential for grade-crossing accidents along the Tongue River Road Alternative Route would be higher than for any of the other alternatives. The Tongue River Road Alternative Route follows the same alignment through the LARRS as the Proposed Rail Line, and would pose the same potential for impacts to ongoing research.

The Moon Creek Alternative Route was examined primarily as a means of limiting the potential impacts to the LARRS. It traverses only 2.5 miles of the southwest corner of that facility and would not be likely to affect significantly ongoing research activities. A 1-percent ruling grade against load renders this route less favorable in terms of engineering constraints, energy efficiency, and ultimate consumer costs. The Moon Creek Alternative Route would require the construction of a railroad bridge across the Yellowstone River. None of the other routes under consideration include a Yellowstone crossing. The resulting potential for impact to aquatic resources would be greater than any of the other routes.

The Colstrip Alternative Route, by virtue of the considerably shorter distance involved, would result in proportionally fewer environmental impacts than any of the other routes under consideration. It would avoid impacts to the LARRS entirely. However, increased rail traffic in the Colstrip and Forsyth areas would result in more vehicular delays. A slightly greater percentage of construction and operation impact population would be located in Colstrip. Rail line construction activities and train operations could contribute to existing air quality problems in the vicinity.

3.2. Tongue River Road Alternative

3.2.1. Construction

The 88-mile-long Tongue River Road alternative route would follow the alignment of the proposed rail line south through the Livestock and Range Research Station. It would cross to the east side of the Tongue River near the mouth of Pumpkin Creek and then would proceed south, paralleling the Tongue River Road. It would rejoin the route of the proposed rail line approximately 9 miles north of Ashland and would follow that alignment to the two terminus points. Either of the Ashland alignments discussed in section 3.3.1 could be included in this route (see Figure 3-1).

The construction of a rail line along the Tongue River Road would resemble that along the proposed route. More rugged topography along the Tongue River Road would dictate larger cuts and fills and a greater right-of-way width at certain points than would the proposed ROW. In addition, construction of the Tongue River Road alternative route would destroy some of the existing county road and would necessitate its relocation. The construction procedures, the sequence of activity, and the number of personnel needed to build the railroad along this alternative route would not differ significantly from those elements of the proposed rail line.

3.2.2. Operation

The operational characteristics for a railroad along the Tongue River Road would be similar to those of the proposed railroad. The destination points for coal would be the same for both lines. The average train speeds on the Tongue River Road line would be 36 mph for a loaded train and 39 mph for an empty train. The significant difference between the operation of a railroad on the Tongue River Road route and of one on the proposed rail line would be the necessary addition of two locomotives on the alternative. The rough topography encountered on the alternative alignment would require the use of four locomotives per train over most of the line.

3.2.3. Maintenance

Maintenance requirements for a railroad along the Tongue River Road would be the same as those requirements for the proposed railroad. Greater grade and curvature specifications on the Tongue River Road line would necessitate more frequent maintenance.

3.3. Moon Creek Alternative

3.3.1. Construction

The Moon Creek alternative route leaves the abandoned Milwaukee Road rail line 7 miles west of Miles City. This alternative would cross the Yellowstone River at that point and climb from the Yellowstone River valley, heading southeastward toward the Tongue River. The Moon Creek route would extend along the east side of Moon Creek, running through the Livestock and Range Research Station, and join the proposed rail line approximately 14 miles south of Miles City. Either of the Ashland alignments discussed in section 3.1.1 could be included in this route (see Figure 3-1).

The Moon Creek route would require the construction of a new, super span bridge across the Yellowstone River. It also would require the purchase and the rehabilitation of 7 miles of abandoned Milwaukee Road right-of-way west of Miles City and an existing bridge across the Yellowstone River near Miles City.

The construction of a rail line along Moon Creek would resemble that along the proposed alignment. Yet; the more rugged topography along the Moon Creek route would require larger cuts and fills and a greater right-of-way width at certain points than would the proposed rail line. The construction procedures, the sequence of activity, and the number of personnel needed to build the railroad along this alternative route would not differ significantly from those elements of the proposed rail line.

3.3.2. Operation

The operational characteristics for a railroad along the Moon Creek route would be similar to those for the proposed railroad. The destination points for coal would be the same for both lines. The average train speeds on the Moon Creek line would be 36 mph for a loaded train and 39 mph for an empty train. The significant difference between the operation of a railroad on the Moon Creek route and of one on the proposed rail line would be the necessary addition of three locomotives on the alternative line. The rough topography encountered on the Moon Creek route would require the use of five locomotives per train over most of the line.

3.3.3. Maintenance

Maintenance requirements for a railroad along the Moon Creek route would be the same as those requirements for the proposed railroad. Greater grade and curvature specifications on the Moon Creek line would necessitate more frequent maintenance.

3.4. Colstrip Alternative

3.4.1. Construction

The Colstrip alternative route would begin at the Burlington Northern spur line at Colstrip and would extend approximately 47 miles southeastward to the two terminus points at the proposed Montco Mine site and on Otter Creek. The line would cross Rosebud Creek and extend up the Greenleaf Valley to the Rosebud Creek/Tongue River divide. There it would descend into the Tongue River Valley. Either of the Ashland alignments discussed in section 3.1.1 could be included in this route (see Figure 3-1).

The construction of a rail line along the Colstrip route would resemble that along the proposed alignment. The more rugged topography along the Colstrip route, however, would require larger cuts and fills and a greater right-of-way width at certain points than would the proposed rail line. Moreover, the large cuts required on the Colstrip route probably would necessitate some blasting. The shorter length of the Colstrip route would require a maximum of 358 construction workers, located at two or three construction camps. Construction procedures and the sequence of activity would not differ significantly from those elements of the proposed railroad.

3.4.2 Operation

The operational characteristics for a railroad along the Colstrip route would be similar to those of the proposed rail line. The Colstrip route would not require an interchange yard at Miles City. Rather, it would use the existing facilities at Colstrip to transfer trains before proceeding downline. The Colstrip route would require TRRC trains to travel farther west than would the other routes, and would, therefore, increase the length of the trip to Miles City. It would, however, shorten the total distance traveled by trains going downline to the west. The average train speeds on the Colstrip line would be 26 mph for a loaded train and 39 mph for an empty train. The significant difference between the operation of a railroad on the Colstrip route and of one on the proposed rail line would be the required addition of two locomotives on the alternative line. The rough topography presented by the Colstrip alternative route would necessitate the use of four locomotives per train over most of the line.

3.4.3 Maintenance

Maintenance requirements for a railroad along the Colstrip route would be the same as those requirements for the proposed railroad. Greater grade and curvature specifications on the Colstrip line might necessitate more frequent maintenance.

APPENDIX 9

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

STATEMENT OF
ROBERT H. LEILICH
IN CONNECTION WITH
TONGUE RIVER RAILROAD SECTION 404(b)(1) SHOWING

I have served as the principal railroad operations and railroad economic consultant for the Tongue River Railroad Company (TRRC) since 1980. I have performed all of the train operation simulations and prepared verified statements and testimony in various TRRC proceedings before the Surface Transportation Board and Interstate Commerce Commission over the years. My qualifications are set forth in the attachment to this statement.

Principal alternatives to the Proposed Action north of Ashland were the Tongue River Road Alternative, the Moon Creek Alternative, and the Colstrip Alternative. Each of these alternatives has been described in some detail in the environmental documents prepared in the TRRC proceedings. The purpose of this statement is to offer some updated information on these alternatives in terms of their operational feasibility relative to the Proposed Action. My conclusion is that, judged in view of 2005 factors, the Proposed Action remains distinctly advantageous in terms of operating and related criteria.

Key Operational Considerations

Major factors influencing the economics of building and operating the proposed new railroad are:

- Large capital costs which must be amortized by the traffic the railroad carries. Major cost components include: excavation and embankment of the rail grade; bridge structures; drainage structures; trackwork and signals; and land acquisition.
- Operating costs, which include the capital and operating costs of locomotives (fuel and maintenance), train labor costs, track maintenance, and capital and maintenance cost of equipment.
- Time and service sensitivity of the traffic.

TRRC will open up the Ashland area to coal development, taking advantage of large, quality coal deposits in the Ashland area. The TRRC's Proposed Action alignment, which was approved by the ICC in the mid-1980's for the routing between Miles City and Ashland, is the key to achieving the lowest cost operation, as it is the least capital intensive and has the lowest operating and maintenance costs of all alignments studied over the years. In particular, once loaded coal trains are assisted over an adverse gradient in the vicinity of Spring Creek mine spur, only 9,000 horsepower, representing older SD40 type locomotives (as referenced in earlier studies), is required to take a fully loaded train, with a gross weight of approximately 17,000 tons, 115 miles to Miles City without further assistance.

While there are locations on the Proposed Action route that have gradients adverse to the movement of loaded coal trains that are approximately equal to those noted in other alternatives, each of the grades on the Proposed Action route can be classified as a "momentum grade" as opposed to a ruling grade. A "momentum grade" exists where the speed and/or inertia of the train provides much of the energy required to lift the train up and over the hill. In almost all cases on the TRRC, this is aided by the fact that when the front of the train is on an adverse grade, the rear of the train is on a downgrade and is actively helping to push the front part of the train up the hill. The engineering design of the Proposed Action takes full advantage of using "momentum grades" to reduce construction capital and operating costs.

A "ruling grade" is a gradient that cannot be surmounted by relying on momentum or inertia. On "ruling grades" enough additional power must be provided to carry the train over the hill. This is done by adding "helper" locomotives or adding additional power at the head end or middle of the train (the latter called "distributed" power). Obviously, the additional locomotives add considerable cost to the operation. For each of the alternatives (other than the previously approved alignment) described in TRRC's 404(b)(1) Showing, I believe that at least two and up to three additional locomotives would be required, which could increase locomotive capital, operating, and maintenance costs by up to 100 percent. If helper locomotives are necessary, it would add considerably to train operating labor costs. None of these costs add benefit to traffic that the railroad would handle and would add a significant cost burden to achieving profitable operation. In the following sections of this Statement, I will offer my views on why these alternatives are no more feasible when judged by 2005 operating criteria than they were when determined not to be feasible by the ICC in the 1980's.

Tongue River Road Alternative

Since this alternative was first studied and reported in the 1985 Environmental Impact Statement (EIS) nothing has changed that would improve the viability of this alternative. Even though new locomotives are more powerful today (two new locomotives can do the work of three) it does not alter the fundamental power needed to move trains. The length of adverse grade and reduced operating speeds for this alternative deny reliance on momentum for climbing the adverse grades that would be experienced. The TRRC would be faced with the difficult and expensive choice of adding more power to trains for their entire trip or stationing a fleet of helper locomotives and crews to handle loaded trains over ruling grade portions of the run. The higher construction capital costs, higher operating and maintenance costs, closer proximity to population, and several additional road crossings represent a significant economic liability for the TRRC to bear.

Moon Creek Alternative

The Draft EIS prepared in 1983 anticipated a connection with both the Milwaukee Railroad (Milwaukee) and the BN (now BNSF). Today, the Moon Creek alternative consists entirely of operating via the BNSF to a point about where it would have crossed the BNSF railroad as reported in the earlier EIS. Even under this plan, the proposed route adds significant time and miles to each train operated. Even worse, a severe ruling grade would impose the similar cost penalties as noted for the Tongue River Road Alternative. This alignment requires lifting loaded 17,000 ton coal trains 285 feet over a distance of 5.87 miles. Climbing this grade, alone, takes two additional SD-40 locomotive units and 330 gallons in additional fuel. If 30 million tons of coal is handled per year, this translates to about 742,000 additional gallons of fuel. At $2.40 per gallon, extra fuel costs for this grade translates to about $1.8 million per year and this does not count additional locomotive capital and maintenance costs, additional labor costs, or additional fuel, labor, and locomotive costs associated with the longer route. This, along with significantly higher construction, maintenance and operating costs eliminates this route as a viable alternative. Thus, the conclusion reached about the infeasibility of this route in the environmental documents prepared in the 1980's still stands.

Colstrip Alternative

The additional circuity of the Colstrip alternative route adds approximately 50 miles of travel to both loaded and empty trains – 100 miles per round trip between the Proposed Action connection at Miles City and a point about ten miles north of Ashland where the Colstrip Alternative Line would rejoin the Proposed Action route Though it takes advantage of a closer connection to existing track, construction through more difficult terrain, the rehabilitation of the Colstrip line to full heavy-duty main line standards, and much higher operating and maintenance costs defeat this option as a viable alternative. This alignment requires lifting loaded 17,000 ton coal trains 650 feet over a distance of 31,030 feet. According to 1997 track charts, about 14.5 miles -- roughly half the line -- of 112 pound rail should be re-laid to 132 pound rail or heavier to permit a safer 50 MPH speed limit. The entire line would have to be brought up to Class III standards versus the present Class II standard that is required for the present 40MPH speed limit.

To determine the steps that would need to be taken to improve the existing Colstrip spur line so that it would be brought up to mainline standards capable of handling the traffic anticipated for the TRRC line, I consulted with BNSF, the current operator of the Colstrip spur. I am advised that the total cost to upgrade the existing line would be in excess of $24 million. This figure is composed of the cost of replacement of the track that is less than 132 pounds (about $6.6 million at $400,000/track mile); rehabilitation of curves greater than 3 degrees with concrete ties ($1.5 million); construction of at least one siding ($4 million); addition of appropriate signaling as the spur currently has no signaling ($3.3 million); rehabilitation of ties on the portion of the line other than where concrete ties would be needed ($2.7 million); upgrading other curves with curve blocks ($.6 million); and various miscellaneous costs such as subgrade improvements, upgrades of crossing protection and improvement of ballast, as well as contingencies ($5.6 million).

To further investigate this alternative, I simulated the running of coal trains via the two alternative routes – both starting at the diverting point ten miles north of Ashland to where both routes would rejoin in Miles City near the warm water fish hatchery. (Note: trains via either route would pass close to the fish hatchery.) I used the same Train Performance Calculator (TPC) model that was used in prior studies for the TRRC.

Via the Proposed Action route, trains in the loaded direction would require three SD-40 type locomotives, take about one hour and twenty minutes and consume about 455 gallons of fuel. In the reverse direction, the empty returning train would take a few minutes less time and consume 492 gallons of fuel. (The loaded trains are running downgrade and the empty trains are running upgrade.)

Via the Colstrip Alternative, five or six SD-40's are required (depending on the final alignment) because of adverse gradients leaving the Tongue River valley, climbing higher terrain en route to Colstrip. Total running time for this roughly fifty mile longer route would be, for the loaded coal train, over two hours and forty minutes, assuming speed limits on the Colstrip route are all raised to 50 MPH. It would require about 1,600 gallons of fuel. The returning empty train would take two and one-half hours and consume almost 1,000 gallons of fuel.

For each round trip operated, the time penalty associated with the Colstrip Alternative would be roughly 2.5 hours for train labor and equipment (not counting the two or three extra locomotive units required). Locomotive capital and maintenance costs would be 65 – 100 percent higher.

The fuel consumption penalty per round trip between the two points studied would be about 1,653 gallons. Translated to the movement of 30 million tons of coal per year, the fuel penalty alone translates to about 3.6 million gallons per year between the two study points and does not count additional fuel that might be used by the extra locomotives outside of these limits. At $2.40 per gallon, this adds over $8.6 million in additional operating expense – just for fuel – each and every year. Labor and additional locomotive requirements would add additional millions of dollars.

If BNSF were able to provide the train crews to run trains over the TRRC it is possible via the Proposed Action plan for Sheridan, Wyoming based crews to run through from Decker / Spring Creek to Glendive, avoiding the stopping of trains in the vicinity of Miles City to change crews. Under most circumstances, crews could make this full run within the maximum federally mandated on-duty time of less than twelve hours.

Via the Colstrip alternative, the added time due to adverse grades and distance would likely eliminate the possibility of train crews running through because trains might not reliably make the trip within federal hours of service limits. In this case, it may be necessary to change crews at Forsythe – already a crew change point on the BNSF – to make the rest of the run to Glendive.

Although the railroad is essentially downgrade from Colstrip, the TRRC build-out to the Colstrip connection includes 6.25 miles of ruling gradient that requires helpers or additional locomotive power. North from Colstrip to the BNSF east-west mainline would require upgrading almost 29 miles of railroad to heavy-duty 50MPH mainline standards.

In short, the Colstrip route remains an infeasible alternative for the reasons described above.

Conclusion

While the capital, operating and maintenance cost numbers for all alternatives is different in 2005 than it was in the mid-1980's, the strong economic advantage of the Proposed Action compared to the three other alternatives remains. If anything, additional fuel penalty costs via other alternatives will be even greater as the cost of fuel has far outstripped improvements in locomotive fuel efficiency over the last 20 years.

Finally, the most significant changes that have occurred in the railroad industry over the last 20 years have been the elimination of four man crews and cabooses. Also, trains have become slightly bigger and the ratio of revenue tons carried relative to car weight has increased as the industry increased maximum gross weight limits from 263,000 to 286,000 pounds. While the labor and technology improvements have benefited the industry, shippers and consumers (extending the reach of quality western coal further east), these improvements do not diminish or otherwise change the relative advantages that the Proposed Action holds over the Tongue River Road, Moon Creek and Colstrip alternatives. In short, the superior operating, maintenance and economic advantages of the Proposed Action, which were discussed in the prior environmental documents, remain intact or even enhanced, and the other three alternatives remain infeasible from an operating, maintenance and economic perspective.

APPENDIX 10

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

[illegible] April [illegible], 1996

[illegible] Federal Register: April [illegible], 1996

Final Environmental Impact Statement

Finance Docket No. 30186 (Sub. No. 2)

Tongue River Railroad Company - Construction and Operation - of an Additional Rail Line From Ashland to Decker, Montana

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Executive Summary

The Tongue River Railroad Company (TRRC) applied to the Interstate Commerce Commission (ICC), now the Surface Transportation Board (Board), for authority to construct and operate a 41-mile rail line from a point south of Ashland to a connection with operating coal mines near Decker, MT. The ICC's Section of Environmental Analysis (SEA) conducted the environmental analysis for this proposal, including the potential environmental impacts associated with TRRC's preferred route, the Four Mile Creek Alternative, and the "no build" alternative. SEA previously completed a Draft Environmental Impact Statement (served July 17, 1992) and a Supplemental Draft Environmental Impact Statement (served March 17, 1994). The Board's SEA has now completed the environmental review process, and its conclusions are set forth in this document.

We have concluded that there are potentially significant environmental impacts associated with both construction alternatives. If the Board grants TRRC's proposal, we believe the Four Mile Creek Alternative would be environmentally preferable to the TRRC preferred route, because it would avoid the environmentally sensitive Tongue River Canyon. With the recommended mitigation conditions, construction and operation of the Four Mile Creek Alternative should meet applicant's project goals, but not have an unduly severe impact on the environment. In contrast, the "no build" alternative, although environmentally benign, would not meet the applicant's objectives for supplying a more efficient service for transportation of coal in the region.

DISCUSSION OF ALTERNATIVES

FOUR MILE CREEK ALTERNATIVE

a. Description of the Route. TRRC proposed the Four Mile Creek Alternative as the only acceptable alternative to its preferred route. That route would duplicate TRRC's preferred route, starting from the terminus on its previously-authorized, but not constructed, 89-mile line in Ashland, paralleling the river until the confluence of the Tongue River and Four Mile Creek. It then would leave TRRC's preferred route and extend southeast along Four Mile Creek, climbing steeply from the Tongue River. It would turn southwestward approximately three miles from the divergence point and continue on that course to its junction with TRRC's preferred route near the Tongue River Reservoir. The Four Mile Creek Alternative would be approximately 10 miles longer than TRRC's preferred route.

Like TRRC's preferred route, the Four Mile Creek Alternative would connect with the private rail line owned by the Spring Creek Coal Company, which provides rail service and connections for Decker-area coal shippers. The Four Mile Creek Alternative would avoid the environmentally sensitive Tongue River Canyon, which is located between the Tongue River Dam and the confluence of the Tongue River and Four Mile Creek.

b. Environmental Advantages. The Four Mile Creek Alternative would avoid a number of potential adverse impacts within the relatively narrow 10-mile Tongue River Canyon. As the river meanders through the canyon, it provides diverse habitat for aquatic and terrestrial wildlife. In particular, the area of the river immediately below the Tongue River Dam has been recognized as important habitat for migrating and wintering bald eagles. Additionally, since the mid-1980's, several bald eagles have nested in the cottonwood trees along this stretch of the river. Because this portion of the river does not freeze, it also provides important year-round habitat for bald eagles and waterfowl. The Four Mile Creek Alternative would avoid adverse impacts to nesting and wintering bald eagles and wintering wildfowl.

Because the canyon is narrow, any ranching and farming operations are close to the river. Some of these operations would be bisected by TRRC's preferred route. The Four Mile Creek Alternative would also avoid these impacts.

The Tongue River Reservoir State Recreation Area and the Tongue River provide popular recreational, fishing, hunting and scenic opportunities year-round. The region from the reservoir northwards along the river to its confluence with the Yellowstone River at Miles City is relatively undeveloped. Because of the canyon's narrow confines, the intrinsic biological, scenic and aesthetic resources along this approximately 10-mile stretch of the river are particularly noteworthy. They contrast with the surrounding arid and rugged hills and buttes. The Four Mile Creek Alternative would avoid impairing these resources.

Concerns were also raised about the potential impacts to the river from the construction of the five railroad bridges and the tunnel that would be required on TRRC's preferred route within the canyon. These concerns included potential channelization, erosion and silting, flooding, and impacts from potential spills during operations. The Four Mile Creek Alternative would avoid the need to construct the five bridges and the tunnel.

Throughout this environmental review process, two federal agencies have consistently recommended the Four Mile Creek Alternative, or the "no build" alternative, instead of TRRC's preferred route: the U.S. Fish and Wildlife Service (FWS),[6] the U.S. Environmental Protection Agency (EPA)[7]. SEA has relied on the advice and expertise of these agencies in analyzing potential

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[6] In its May 4, 1994 comments on the SDEIS, FWS reiterates its initial position regarding the Four Mile Creek Alternative:

> Impacts to fish and wildlife resources and to Tongue River recreation would be less; adverse impacts to Tongue River Reservoir State Recreation Area would be avoided; adverse impacts to the scenic canyon would be avoided; Tongue River crossings would be reduced to one; less channel disturbance and riparian habitat impacts; reduced pollution threats in terms of sedimentation, toxic spills, and herbicide use; reduced impacts to wintering bald eagles; and fewer adverse impacts on fish and wildlife.

[7] In its comments on the SDEIS dated May 9, 1994, EPA states:

> The EPA has determined that there are potential significant adverse environmental impacts associated with the TRRC's Preferred Alternative that should be avoided in order to adequately protect the environment. We believe the magnitude of these impacts would be less with the selection of the Four Mile Creek Alternative, and could be avoided altogether with the No Action Alternative. We believe that TRRC's proposed alignment would have more adverse consequences on the environment than either the Four Mile Creek Alternative or the No Action Alternative.

environmental impacts and in determining the environmentally preferable route.

c. <u>Environmental Disadvantages</u>. As discussed in the SDEIS, there could be potential safety risks associated with operation of the this route. Moreover, it would entail land disturbance from cut and fill procedures during construction, erosion and loss of soil, deforestation, loss of big game habitat, closer proximity to residences, more fuel consumption and increased air pollution. Because the route would traverse pronghorn habitat, the fenced right-of-way could inhibit pronghorn daily and seasonal migration.

TRRC's principal concern regarding safe operations is the steep descending 2.31 percent grade for loaded unit trains. In the SDEIS, we agreed that this grade could pose an increased risk for derailments compared to TRRC's preferred route. But we continue to believe that there are design and operating options by which TRRC could mitigate potential safety problems and that, despite the difficult grade, loaded train operations could be safely performed. SEA consulted with the Federal Railroad Administration (FRA), and it concurred that the Four Mile Creek Alternative could be operated safely.[8] TRRC has acknowledged that operations could be conducted, albeit not in line with its preferred design and operating parameters, and with a considerable increase in construction and operating costs.

As previously noted, this route would require cut and fill that could significantly alter and scar the area and change the natural land configuration for the duration of rail use. Thus, there would be a potential for erosion and soil loss within the Four Mile Creek drainage equal to or greater than that for TRRC's preferred route. The necessity of laying the right-of-way on the north-facing slopes of the Four Mile Creek drainage would mean removing ponderosa pine/juniper acreage, habitat for big game and breeding bird populations.

As described in the SDEIS, this route would cross more residential access roads than TRRC's preferred alignment and would be as close as 100 feet to two residences. And as described in the DEIS, the steep grade of this route would require more locomotives during rail operations, resulting in more fuel consumption and potentially more air pollution than operations over TRRC's preferred route.

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[8] Edward R. English, FRA, Director, Office of Safety Assurance and Compliance, letter of March 18, 1996.

APPENDIX 11

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

At the same time, as the Board has recognized, not all state and local regulations that affect interstate commerce are preempted. In particular, state and local regulations remain valid when they can be applied without interfering with the Federal law or the purposes of the Federal scheme, and localities retain certain police powers. Moreover, Federal environmental laws such as the Clean Air Act and the Clean Water Act are not preempted. State and local agencies play a significant role under these and other Federal environmental statutes. State and local entities can also raise their environmental concerns before the Board during the environmental review process for the requisite consideration in railroad construction cases. (See Auburn, 154 F. 3d at 1033.)

In short, the Board's environmental review process in this and every other rail construction case includes consultation with appropriate Federal, state, and local agencies and government entities and provides the opportunity for them and all other interested parties to request and comment on the environmental analysis and proposed environmental mitigation. If the Board imposes a condition that a railroad applicant meet the reasonable requirements from other government entities as a condition to a license, there is no conflict with the broad Federal preemption because the Board controls the process and can take steps later, if necessary, to ensure that the state law is not being applied in such a way that it unduly restricts a railroad's operations or unreasonably burdens or interferes with interstate commerce. Thus, none of the conditions previously imposed by the Board, or now recommended by SEA, are intended to restrict TRRC from seeking a determination from the Board (and/or an appropriate court) that the action of any other agency in denying a particular easement or approval, or in refusing to act on an application for such an easement or approval in a timely manner, is preempted under the Interstate Commerce Act.

Finally, as discussed in Section 1.6, "Participating Agencies," this Draft SEIS has been developed in consultation with three cooperating agencies: the Corps, BLM, and MT DNRC. To help the cooperating agencies fulfill their regulatory responsibilities and functions, and to avoid duplicative environmental analysis, SEA has included in this Draft SEIS environmental review and mitigation for certain issues specifically requested by the cooperating agencies, such as recommended conditions that would require TRRC's compliance with Section 404 of the Clean Water Act and acquisition of the necessary easements to cross lands that are owned or managed by BLM or MT DNRC.

Based on the information provided in this Draft SEIS and the future Final SEIS, the cooperating agencies and other agencies should be able to issue any necessary approvals without further environmental review. Furthermore, the imposition of any conditions requiring approvals from other government entities presupposes that the regulations will not be applied in a discriminatory manner and that any conditions the government entity imposes will not have the effect of unduly interfering with railroad operations or interstate commerce, and will not prohibit the construction and operation of a Federally-approved rail line.

Other New Mitigation Measures

Finally, in addition to the issue areas described above in which SEA has recommended new mitigation measures in this Draft SEIS, there are also newly recommended mitigation measures concerning safe train operating practices, land use, noise, geological considerations, hydrology and water quality, aquatic concerns, revegetation, and effects on the habitat of sensitive animal species.

Editorial Changes to Tongue River I and Tongue River II Mitigation

In compiling a comprehensive set of mitigation measures that would apply to the entire line in Tongue River I through Tongue River III, SEA has made proposed editorial changes, where appropriate, to clarify the meaning of the mitigation measures being carried forward from Tongue River I and Tongue River II and to avoid duplication. SEA also assigned responsibility for implementation of the mitigation if that responsibility was not clear. The substance and/or intent of the mitigation measures brought forward from Tongue River I and Tongue River II, however, generally remain unchanged.

Notation System for the Recommended Mitigation Measures

The comprehensive list of preliminary proposed mitigation measures is presented below using the following notation system:

1. New mitigation measures being recommended by SEA are identified in the list below by the note *[TRRC III, new]*.
2. Mitigation measures that are recommended by SEA to be retained from either Tongue River I or Tongue River II are identified in the list below by the note *[TRRC I (or TRRC II), {condition number}]*.
3. Mitigation measures recommended by SEA to be modified from Tongue River I or Tongue River II are identified in the list below by the note *[TRRC I (or TRRC II), {condition number}, modified {modification reason}]*.

Appendix J provides the complete list of mitigation measures as adopted in Tongue River I with an indication in the right margin of SEA's determination regarding the measure (i.e., recommended, recommended as modified, or recommended to be superseded).

Appendix K provides the complete list of mitigation measures adopted in Tongue River II with the same indications explained above.

In addition, for the mitigation measures from either Tongue River I or Tongue River II that are recommended to be superseded, the reasons for this recommendation are discussed, in order, in the section immediately following the list.

7.2 COMPLETE LIST OF THE PRELIMINARY RECOMMENDED MITIGATION

The following list of preliminary recommended mitigation measures has been compiled using appropriate measures adopted in Tongue River I and Tongue River II, revised and updated mitigation measures from Tongue River I and Tongue River II, and new mitigation developed in this Draft SEIS. The preliminary mitigation recommendations are listed by environmental issue area and are sequenced in the same order as that found in Chapter 4, except the Administrative Mitigation Measures, which are interspersed throughout the chapter.

7.2.1 Land Use Mitigation

Mitigation Measure 1 (Direct and Indirect Land Loss). TRRC shall negotiate compensation for direct and indirect loss of agricultural land on an individual basis with each landowner whose property will be affected as a result of the construction and operation of the line between Miles City and Decker. TRRC shall assist landowners in identifying and developing alternative agricultural uses for severed land, where appropriate. TRRC shall apply a combination of alternative land use assistance and compensation as necessary and agreed upon during right-of-way negotiations. *[TRRC II, Land Use Condition (1), modified by minor edits]*

Mitigation Measure 2 (ROW Fencing). TRRC shall construct fencing along the railroad right-of-way (ROW) where required to control livestock, as requested by the landowner. If fencing is requested, fence construction and type shall be used that allows movement of big game animals across the railroad ROW. The general fencing options to be used shall be developed by TRRC for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. In the event that a land owner does not agree with the Task Force's general determinations about fencing, the Task Force shall be consulted to determine mitigation on a case-by-case basis. *[TRRC I, Condition 10.1(5) and Land Use Condition (3), combined and modified to require the Task Force's involvement in the development of appropriate fencing types]*

Mitigation Measure 3 (Access Restrictions). TRRC shall install cattle passes (oval, corrugated metal structures, approximately 11 feet high and 12 feet wide at the base) along the railroad right-of-way to ensure passage of cattle under the rail line. TRRC shall work with landowners to identify appropriate locations for cattle passes and private grade crossings for equipment. *[TRRC II, Land Use Condition (4)]*

Mitigation Measure 4 (Displacement of Capital Improvements). Where capital improvements are displaced as a result of construction or operation of this rail line, TRRC shall relocate or replace these improvements or provide appropriate compensation based on the fair market value of the capital improvements being displaced. *[TRRC II, Land Use Condition (2), modified to provide additional clarity regarding fair market value compensation]*

Mitigation Measure 5 (Impacts During Construction). During final engineering, TRRC shall consult with individual landowners to minimize conflict between construction activities and ranching operations. *[TRRC II, Land Use Condition (5), modified by minor edits]*

Mitigation Measure 6 (Construction Areas). TRRC shall confine all construction activities to the railroad right-of-way and to the construction camps along the rail line, at locations to be negotiated between individual landowners and TRRC. *[TRRC II, Land Use Condition (6), modified by minor edits]*

Mitigation Measure 7 (Construction Camps). TRRC shall require its contractors to assure that its construction camps are orderly. Upon completion of construction, TRRC shall return the camps to their previously existing use. *[TRRC II, Land Use Condition (7)]*

Mitigation Measure 8 (Construction Liaison). TRRC shall appoint a representative, with direct access to management, to work with primary construction contractors, subcontractors, and affected landowners to address any problems that develop during construction. *[TRRC II, Land Use Condition (8)]*

Mitigation Measure 9 (Wildfire Suppression and Control Plan). Prior to construction of this rail line, TRRC shall develop a Wildfire Suppression and Control Plan for fires occurring on the right-of-way as a result of rail construction/operations or undetermined causes. TRRC shall observe the following measures in developing the plan:

(1) The plan shall be developed with the Montana Department of Natural Resources and Conservation's Eastern Land Office, as well as other appropriate governmental agencies and volunteer fire departments along the route.

(2) The plan shall be developed by TRRC after final engineering and overall operation plans are complete. This will afford planners the benefit of specific information regarding TRRC's operation, equipment, and personnel that might be of use in case a fire occurs.

(3) State-of-the-art techniques for fire prevention and suppression shall be evaluated and included in the plan, as appropriate.

[TRRC II, Safety Condition (4), modified to clarify that the above measures are those required for fire suppression]

Mitigation Measure 10 (Fire Prevention). To minimize the potential for railroad-caused fires, TRRC shall observe all general rail safety regulations promulgated by the Federal Railroad Administration regarding railroad operations. *[TRRC II, Safety Condition (4), modified to clarify that this measure is to help prevent fire]*

Mitigation Measure 11 (Fire Suppression). Prior to construction of this rail line, TRRC shall negotiate with local ranchers along the right-of-way the placement of fire suppression equipment so that it may be used to promptly extinguish fires during construction and operation of the line. *[TRRC II, Safety Condition (5), modified by minor edits]*

Mitigation Measure 12 (Fire Access Road). During construction and operation of this rail line, TRRC shall maintain a serviceable access road within, and access points along, the right-of-way at locations determined in consultation with the local fire officials, to permit entry to the railroad right-of-way of vehicles to aid in fire suppression. *[TRRC II, Safety Condition (6), modified by minor edit]*

Mitigation Measure 13 (Mobile Communications). Prior to beginning construction of this rail line, TRRC shall develop and install a mobile communications system between the local volunteer fire fighting units, train crews, and ranchers with property adjacent to the right-of-way to ensure adequate communication in emergency situations during construction and operation of this line. *[TRRC II, Safety Condition (7), modified by minor edit]*

7.2.2 Biological Resources Mitigation

Mitigation Measure 14 (Task Force). TRRC shall participate as a member of a Multi-agency/Railroad Task Force. The purpose of the Task Force shall be to approve the implementation and monitoring of biological (i.e., terrestrial and aquatic) mitigation measures for the entire rail line (Tongue River I, Tongue River II, and Tongue River III), with the exception of such issues concerning the Miles City Fish Hatchery.

Unless otherwise indicated in the mitigation conditions, TRRC is responsible for compliance with all biological mitigation conditions set forth below. As specified in the mitigation conditions themselves, TRRC shall prepare various surveys, plans and documents for review and approval by the Task Force. It is the responsibility of the Board representative on the Task Force to convene the Task Force when an appropriate issue involving terrestrial and aquatic matters arises. The Task Force, in conducting its review of any terrestrial and aquatic issues that are proposed to it, shall attempt to reach agreement and approval through consensus. However, if a consensus cannot be reached by the Task Force members, a vote will be taken and approval will be determined by a majority of the Task Force members present (at least one half of the members present plus one vote). If the Task Force is unable to reach a decision, either through consensus or by a majority vote, the Board representative on the Task Force will bring a recommended resolution back to the Board, at which time the Board will make a final decision.

Task Force members shall participate in the Task Force at their own discretion and expense and to the extent that their resources permit. Further, Task Force members may use additional resources available to them to accomplish mitigation. Other interested parties may be invited to participate as appropriate.

Those agencies who have agreed to participate on the Task Force include the Board, Montana Department of Fish, Wildlife and Parks (MT DFWP), Montana Department of Natural Resources and Conservation (MT DNRC), United States Fish and Wildlife Service (USFWS), Bureau of Land Management (BLM), and United States Corps of Engineers (Corps). TRRC has also agreed to participate. The Board will act as the lead agency to coordinate the Task Force. Each participating agency, as well as TRRC, shall designate representative(s) to work with the Task Force.

The Task Force will remain active until TRRC certifies to SEA that the rail line construction has been completed and that all construction mitigation measures have been implemented and for a period of two years of rail operations or any other period the Board may impose. *[TRRC II, Aquatic Condition A.9.1 General, modified to provide additional clarity, duration, and responsibilities to the Task Force]*

Mitigation Measure 15 (Material Changes). If there is a material change in the facts or circumstances upon which the Board relied in imposing specific environmental mitigation conditions, and upon petition by any party who demonstrates such material change, the Board may review the continuing applicability of its final mitigation, if warranted. *[TRRC III, new]*

Mitigation Measure 16 (Third-party Contractor). TRRC shall retain a third-party contractor to assist SEA in the monitoring and enforcement of mitigation measures on an as-needed basis until TRRC has completed project-related construction and for a period covering the first two years of railroad operations or for any oversight period the Board may impose. *[TRRC III, new]*

Mitigation Measure 17 (Reporting). TRRC shall submit to SEA on no less than a quarterly basis, beginning with the effective date of the Board's final decision in Tongue River III and continuing for the first two years of railroad operations, or for any other period that the Board may impose, reports documenting the status of implementation of the Board's final environmental mitigation conditions. *[TRRC III, new]*

Mitigation Measure 18 (Plant Species of Concern). TRRC shall conduct a field search of the alignment during final-phase engineering of this line to identify plant species of concern (Federal and state) and to implement appropriate mitigation measures during construction activities if such species are found. This field search shall be conducted during the appropriate time of year to identify any potential rare plant species. (The survey schedule shall be approved by the Task Force in accordance with the process set forth in Mitigation Measure 14.) TRRC shall prepare and implement a formal mitigation plan approved by the Task Force for minimizing impacts on species of concern. *[TRRC III, new]*

Mitigation Measure 19 (Reclamation). During construction of this line, TRRC shall implement reclamation and revegetation of the right-of-way (ROW) at the earliest possible time after clearing has been completed. Revegetation shall be implemented only in those ROW areas with adequate substrate and grade. Wherever possible, construction and attendant revegetation shall be expedited. The following generally accepted practices shall be employed in the reclamation process: *[TRRC II, Vegetation Condition A.9.3.2(1), modified to clarify where reclamation activities shall take place]*

(1) **Preconstruction Planning** – TRRC shall include the following elements in its reclamation planning:
- (a) Designation of sensitive areas.
- (b) Proposed time schedule of construction activities.
- (c) Right-of-way clearing and site preparation plans.
- (d) Preconstruction evaluation of soils to be disturbed. The soils' A horizon (the A horizon is the topmost soil layer that is commonly made up of unconsolidated organic matter (e.g., leaf litter) and is not saturated with water) shall be identified, removed, stored, and replaced prior to revegetation.
- (e) Erosion and sediment control plans.
- (f) Waste disposal plan.
- (g) Restoration, reclamation, and revegetation plan. *[TRRC I, Condition 10.3(1)(a); TRRC II, Vegetation Condition A.9.3.2.(1)(a), modified to include soils evaluation]*

(2) **Restoration/Reclamation Plan** – TRRC shall follow the following procedures in its restoration and reclamation plan:
- (a) Commencement of reclamation as soon as practicable after construction ends, with the goal of rapidly reestablishing ground cover on disturbed soils that could support vegetation, with all cut and fill slopes mulched and seeded as they are completed.
- (b) Avoidance of reclamation when soil moisture is high or ground is frozen.
- (c) Use of straw mats in the revegetation process to reduce erosion and to add carbon back into the soil system to promote the accumulation of soil organic matter.
- (d) Ripping and disking of soils prior to revegetation to prevent compaction of soils and to increase the ability of plant roots and water to penetrate the soil.
- (e) Analysis of site soil requirements and seasonal precipitation patterns to identify planting dates for optimal revegetation success.
- (f) Use of rapidly establishing plant species for thorough and rapid ground surface protection.
- (g) Retention of a reclamation specialist to determine specific procedures for reclamation on steep slopes or locations near waterways.

(h) Revegetation shall not be implemented uniformly along the entire rail line, but rather revegetation criteria shall be based on the circumstances present in specific construction areas to assure that habitat and functionality are maintained within each ecosystem. *[TRRC II, Vegetation Condition A.9.3.2(1)(b), modified to clarify where reclamation efforts would be successful and include additional measures]*

(3) **Revegetation Success Assurances** – To ensure revegetation success, TRRC shall implement the following measures:

(a) Development of an inventory and documentation of pre-existing conditions.

(b) The type and quantity of seed, fertilizer, and other soil amendments to be used shall be determined based on soil chemical and physical properties. TRRC shall use native species for revegetation, where possible, unless alternatives are approved, in advance of application, by the Task Force in accordance with the process set forth in Mitigation Measure 14. On BLM tracts, all seeds shall be from native species. Species to be used for revegetation may include, but are not limited to:

- western wheatgrass (*Pascopyrun smithii (Agropyron s.)*)
- green needlegrass (*Nasella viridula (Stipa v.)*)
- sideoats grama (*Bouteloua curtipendula*)
- little bluestem (*Schizachyrium scoparium*)
- blue grama (*Bouteloua gracilis*)

(c) Segregation of topsoil from subsoil and topsoil stockpiled for later application on the reclaimed ROW.

(d) Use of only seed of registered quality and germination success, that has been certified as weed-free.

(e) Use of appropriate seeding techniques, such as drill seeding on level terrain and broadcast seeding or hydroseeding on slopes, to ensure distribution of seed mixture on individual microenvironments.

(f) Use of mulch material that has been certified as weed free, such as straw and woodchips, as a temporary erosion measure and to minimize soil temperature fluctuations and soil moisture loss. Mulch shall be applied more heavily on slopes than on level terrain, and nitrogen levels shall be adjusted to reflect the increased demand during mulch decomposition.

(g) Cover and compaction of seeded area following seeding.

(h) Use of a minimum of 20 pounds per acre of pure live seed throughout the route, where applicable.

(i) For slopes and construction areas near waterways, employment of a variety of Best Management Practices, including the use of sediment traps/basins, berms, contour furrows, silt fencing, straw bale barriers, rock checkdams, slope drains, toe-slope ditches, diversion channels, sodding, and erosion control blankets and/or mulching.

(j) Monitoring of reclamation. Regrading shall be undertaken for revegetating areas not successfully reclaimed.

(k) Development of success criteria.

(l) Development of a timeline for completion of the revegetation plan as well as follow-up monitoring and enforcement of the revegetation plan and success criteria. *[TRRC I, Condition 10.3(1)(c); TRRC II, Vegetation Condition A.9.3.2(1)(c), modified to include examples of BMPs and Task Force approval]*

(4) Provisions for Areas of Special Concern

(a) On all slopes less than 3:1 (a slope of 3:1 signifies 1 vertical unit for every 3 horizontal units), BMPs shall be utilized to effectively and efficiently revegetate the surfaces. BMPs have been identified by the National Resource Conservation Service (NRCS) for Montana, and these BMPs will be the primary guidance for all revegetation on slopes less than 3:1. Each cut and fill slope shall be evaluated individually, and the practices shall be modified to meet the needs of each individual slope and conditions. In general, these BMPs will be utilized unless site-specific conditions warrant different management practices. Below is a list of general BMPs that could be utilized by TRRC for revegetation of slopes less than 3:1, depending on the site-specific conditions at each individual cut/fill slope.

1. Construction of furrows parallel to the slope contour to minimize erosion and stabilize seed beds by effectively reducing the length of the slope, which in turn will reduce the erosive properties of water by decreasing the water's kinetic energy.
2. Minimization of foot traffic and grazing of domesticated animals so that the emerging vegetation at the site will establish more quickly.
3. Weed control either by clipping or applying labeled herbicides so that decreased competition from invasive species will enable the intended species to maximize the use of limited soil, water, and nutrients.
4. Preparation of the site seed bed utilizing standard agricultural techniques (e.g., disking, ripping) to facilitate plant emergence. If the site has limited topsoil, additional salvaged soil shall be placed on the surface to facilitate the preparation of the seed bed and provide a minimum of 4 inches of soil for revegetation activities.
5. Practice of fertilization rates, species selection, and seeding rates on a site-specific basis by a range management specialist. All seeds utilized in the revegetation program shall comply with Montana State Seed Law and Regulations.
6. Use of varying seeding methods at the cut/fill sites, including broadcast seeding, hydroseeding, or traditional agricultural drilling methods. If the site is planted by broadcast or hydroseeding, the seeding rates shall be doubled to ensure adequate plant emergence.
7. Mulching on all slopes less than 3:1 to minimize erosion using mulches such as straw woven fabric or artificial mulches based on site-specific conditions.
8. Additional temporary measures to reduce run-on onto the revegetated site. On sites where run-on could be a significant contributor to erosion, temporary diversion devices may be warranted to route water around the revegetated area. These diversion devices shall be removed once the site has been successfully revegetated. Additionally, the diversion devices shall be constructed to minimize concentration of water that could cause excessive erosion on non-disturbed sites.
9. If the cut/fill slope material is primarily clinker or bedrock, the slope shall not be revegetated. *[TRRC II, Vegetation Condition A.9.3.2(1)(d)3, modified to include additional specifics regarding slopes] [TRRC II, Vegetation Condition A.9.3.2(1)(d)1; deleted here, inserted as modified as HYD-5]; [TRRC II, Vegetation Condition A.9.3.2(1)(d)2; deleted here, inserted as modified as SAF-10]*

Mitigation Measure 20 (Task Force Oversight of Revegetation Plan). TRRC's revegetation plans shall be subject to review and approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. If it becomes clear that the success criteria of the revegetation plans are not feasible, the Task Force shall approve appropriate alternate mitigation. Yearly monitoring schedules and funds shall be arranged prior to construction of each rail segment, and work plans shall be approved by the Task Force in accordance with the process set forth in Mitigation Measure 14 before final engineering is complete. *[TRRC III, new]*

Mitigation Measure 21 (Noxious Weed Control). TRRC shall construct the rail line in compliance with county weed control plans for Rosebud and Big Horn counties, Montana. Except for the portion of the right-of-way described in Mitigation Measure 87 in and near the Miles City Fish Hatchery, TRRC, in consultation with local ranchers, the county extension agents, and the Task Force, shall develop a reasonable written Noxious Weed Control Program prior to commencing any construction of the rail line. The program shall include requiring construction methods that minimize the introduction and spread of noxious weeds, including the use of sterile ballast, weed-free seed straw, mulching, and hydroseeding materials. TRRC shall also minimize digging in areas where the rhizomes of rhizomatous weed species such as leafy spurge might be cut and spread throughout the site.

(1) The noxious-weed-control program shall include a combination of mechanical and herbicide spray methods to control noxious weeds. TRRC shall use mechanical removal of weeds near watercourses wherever feasible, depending upon time of year. Spray sequences shall be utilized to ensure that weed plants do not reach maturity.

(2) TRRC shall keep and reference records of herbicide application dates to ensure that the noxious-weed-control program goals are fulfilled. TRRC shall submit a report of weed control activities to the Task Force annually during construction. In all cases, only trained, licensed personnel shall be involved in noxious-weed-control applications. *[TRRC II, Vegetation Condition A.9.3.2(2), modified to provide additional clarity regarding the noxious weed control requirements]*

Mitigation Measure 22 (Wetland Permit). TRRC shall adhere to the reasonable mitigation measures identified in the Conceptual Habitat Mitigation Plan (a document prepared to determine the appropriate habitat mitigation) as otherwise imposed by the U.S. Corps of Engineers in any Section 404 permit(s) issued by the Corps for construction of the line. *[TRRC III, new]*

Mitigation Measure 23 (Stream Survey). Prior to construction of each rail segment and once site access is granted, TRRC shall, in consultation with the Montana Department of Natural Resources, conduct surveys of ephemeral streams that would be crossed by the railroad to determine the potential impacts of erosion and sedimentation on state species of concern and consult with MT DNRC on appropriate mitigation. *[TRRC III, new]*

Mitigation Measure 24 (Biological Opinion). TRRC shall adhere to the mitigation conditions imposed by the U.S. Fish and Wildlife Service in a Biological Opinion, if any is issued for the TRRC line. If no Biological Opinion is issued, TRRC shall adhere to the mitigation measures in the Biological Assessment addressing construction and operation of the rail line. *[TRRC III, new]*

Mitigation Measure 25 (Aerial Survey). TRRC shall conduct an updated biological aerial survey during the winter before construction of each segment of the rail line begins. This aerial survey shall attempt to identify specific locations for ground surveys and any new winter ranges of species of concern. It shall also attempt to locate potentially active raptor nests especially in deciduous tree areas, while leaves are down. In addition, the aerial survey shall attempt to locate new prairie dog colonies along the route. Using the results of the surveys, TRRC will develop appropriate mitigation measures to minimize harm to species of concern, as needed, for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. *[TRRC II, Wildlife Condition A.9.3.1(1), modified to clarify that aerial surveys shall be required for species of concern and involvement of Task Force in developing any needed new conditions]*

Mitigation Measure 26 (Data Reconnaissance). Prior to the beginning of construction of each segment and once full access to the site of the railroad right-of-way is obtained, TRRC shall conduct aerial and ground-level surveys, as appropriate. Black-tailed prairie dog surveys shall be conducted to determine if construction of the line will traverse any additional prairie dog colonies. The surveys shall also determine the existence of black-footed ferrets. If black-footed ferrets are discovered, the Montana Department of Fish, Wildlife, and Parks shall be notified. Based on the surveys, TRRC shall develop appropriate means to mitigate the effects of construction and operation of the line on the black-tailed prairie dog and the black-footed ferrets for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14.

The surveys shall also locate habitat areas and nesting sites for the following species on the entire rail line. The surveys shall be conducted during the following time periods:

Big game (winter range)	December 1 to February 28
Sage/Sharp-tailed Grouse	March 15 to June 15
Raptors/Migratory Birds	May 15 to June 15
Bats	July 1 to July 31
Breeding Birds	May 15 to June 15
Reptiles/Amphibians	July 1 to August 31

TRRC shall identify big game winter range and active nests of sage grouse, sharp-tailed grouse leks (mating grounds) and raptors, particularly golden eagles and prairie falcons prior to the construction of any rail segments, on a map as part of the aerial and ground surveys. In each subsequent year of construction, additional surveys shall be conducted annually for the section (distance) of line that is to be built in that year. Due to the potential for nest initiation in the years after the initial survey, surveys shall be conducted according to standard survey procedures during summer to determine the presence of nests or of reptile and amphibian species. Pedestrian surveys shall be done to locate habitat areas as well as indicate recent activity. Using the results of the surveys, TRRC shall develop appropriate mitigation measures, as needed, for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. *[TRRC II, Wildlife Condition A.9.3.1(2),* *modified to better explain reason for distance-specific annual surveys and involvement of Task Force if new conditions are needed]*

(1) The purpose of the reconnaissance shall be to locate (a) big game winter range based on evidence, such as animal remains, hair, pellet groups, etc.; (b) sage grouse and sharp-tailed grouse leks; and (c) raptor nests, particularly golden eagles and prairie falcons. Any evidence of state or Federal threatened, endangered, or sensitive species shall also be documented during the reconnaissance. *[TRRC II, Wildlife Condition A.9.3.1(2)(a), modified to include Federally threatened, endangered or sensitive species]*

(2) Any specific-use sites that are identified during the reconnaissance shall be mapped, described in field notes, photographed and evaluated for significance. Nesting species of concern shall not be disturbed during reconnaissance. Nests shall be described as active or inactive. Results of the ground reconnaissance shall be presented and used by TRRC for developing mitigation measures to minimize impacts to sensitive wildlife and wildlife-use areas for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. This could include, but would not be limited to, restricting construction activities near nests during the nesting period; employing nest site monitors to gauge the level of disturbance and halt construction if disturbance is great; and requiring off-site habitat enhancement or replacement for unavoidable losses of sensitive wildlife resources. *[TRRC II, Wildlife Condition A.9.3.1(2)(b), modified to provide additional clarity and involvement of the Task Force and include other possible mitigation measures]*

(3) Surveys for sage and sharp-tailed grouse leks shall be conducted following the Montana Sage Grouse Conservation Plan of the Montana Sage Grouse Work Group. If a possible lek site is identified, observations shall be made between March 15 and June 15 to verify activity at each site. Surveys shall be conducted at dawn to listen for male activity at each lek and shall be completed at least five days apart.

The extent of each lek shall be mapped. Vegetative cover suitable for nesting and brooding habitat adjacent to each active lek shall also be mapped within a one-mile radius of the lek. Active leks shall not be destroyed by construction of the railroad. If impacts to active leks as a result of construction activities are unavoidable, TRRC shall seek approval from the Task Force in accordance with the process set forth in Mitigation Measure 14 as to whether avoidance of the lek site during the mating season (March and April), is adequate mitigation. If the Task Force determines that the permanent loss of the lek would be a significant and unavoidable impact, TRRC shall develop appropriate replacement compensation for potential loss of grouse habitat for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. If the success of lek site mitigation, as determined by the Task Force in accordance with the process set forth in Mitigation Measure 14, has not been resolved during the construction period, TRRC shall continue monitoring into the operational period and shall advise SEA of its progress, in accordance with the reporting requirements of Mitigation Measure 17. *[TRRC II, Wildlife Condition A.9.3.1(2)(c), modified to clarify possible mitigation options]*

(4) To reduce impacts of the Tongue River Railroad on prairie dog colonies, prior to construction, TRRC shall develop appropriate means to mitigate the effects of construction and operation of the Tongue River Railroad on the black-tailed prairie dog for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. *[TRRC II, Wildlife Condition A.9.3.1(2)(d, e and f), modified to clarify]*

Mitigation Measure 27 (Night Survey). TRRC shall conduct nighttime surveys in conjunction with the ground reconnaissance required by Mitigation Measure 26 between July 1 to July 31, prior to construction of each segment of the rail line, for the purpose of identifying the location of any bat species of concern. *[TRRC III, new]*

Mitigation Measure 28 (Construction Surveys). TRRC shall utilize monitors during construction to identify and clearly mark areas containing sensitive biological resources for avoidance and to educate construction contractors and the employees that will be involved in rail construction activities about sensitive resources and the areas to be avoided during the rail construction activities. *[TRRC III, new]*

Mitigation Measure 29 (Destruction of Habitat). Active habitats for species such as nests, brooding locations, and migratory corridors, etc., shall not be destroyed during construction of the railroad. If impacts to these areas (short of destroying them) are unavoidable, TRRC seek approval from the Task Force in accordance with the process set forth in Mitigation Measure 14 as to whether avoidance during a species' active season would be adequate mitigation. If the Task Force determines that the permanent loss of habitat is a significant and unavoidable impact, TRRC shall develop appropriate replacement compensation for this potential loss of habitat in accordance with the process set forth in Mitigation Measure 26. In addition, if the Task Force determines that there has been significant habitat alteration after construction, TRRC shall develop appropriate habitat compensation for alteration of habitat in accordance with the process set forth in Mitigation Measure 26. *[TRRC III, new]*

Mitigation Measure 30 (Construction Activity Coordination). Rail construction activities shall be coordinated and timed to protect wildlife to the maximum extent possible. As part of these efforts, all reasonable attempts shall be made to minimize construction at big game wintering sites from December through March. *[TRRC II, Wildlife Condition A.9.3.1.1(1) clarified]*

Mitigation Measure 31 (Compensation Program). TRRC shall include the following mitigation measures as part of final right-of-way negotiations with private landowners along the ROW:

(1) TRRC shall participate in the development of a reasonable compensation program for lost wildlife habitat along the rail line prior to beginning construction on any portion of the rail line. The goal of the compensation program shall be to ensure that there is no net decrease in wildlife-habitat values resulting from the project. Habitat values of acreage lost shall be assessed using the U.S. Fish and Wildlife Service's Habitat Evaluation Procedure. TRRC shall be responsible for acquiring land (through purchase, conservation easements or other measures) and enhancing the wildlife-habitat value on that land to achieve the no-net-loss goal, and developing and implementing a monitoring plan to evaluate success of enhancement measures. Monitoring shall continue through

the oversight and reporting period described in Mitigation Measure 17. The process of valuing habitat loss, acquiring and enhancing new lands, and implementing the monitoring plan shall be done by TRRC with prior approval of the Task Force in accordance with the process set forth in Mitigation Measure 14. The process of valuing habitat loss for individual species or habitat types shall include an as needed analysis of potential "habitat fragmentation", i.e., assessment of the direct loss of wildlife habitat, reduction in the size of existing habitat patches, creation of more edge-type habitat, and creation of barriers that block movement of wildlife between patches. An example of appropriate habitat compensation could include the purchase by TRRC of "cutoff" land parcels containing good wildlife habitat, and the donation of these lands to the Montana Department of Fish, Wildlife, and Parks for beneficial wildlife management. *[TRRC I, Condition 10.1(1); TRRC II, Terrestrial Condition A.9.3(1), modified to clarify the goal of the compensation program]*

(2) TRRC shall construct ponds adjacent to the railroad grade, or use the railroad grade as a dam where practicable. These ponds could include "dugout" type ponds and "bypass" ponds designed to be filled during high flows where appropriate. *[TRRC II, Terrestrial Condition A.9.3(2)]*. For the construction of ponds, the railroad embankment (berm) shall form one (high) side of a depression. In its development of options for wildlife passage across the railroad right-of-way, TRRC shall consider ponds as a possible obstruction passage. Ponds shall also include erosion control features where appropriate. *[TRRC III, new]*

(3) If adjacent landowners agree, TRRC shall provide public access, in appropriate locations, if any, along the rail line right-of-way. *[TRRC II, Terrestrial Condition A.9.3(3), modified to clarify that access would only be provided if the adjacent landowners agreed]*

(4) TRRC shall grant conservation easements along the rail line where appropriate. *[TRRC I, Condition 10.1(4); TRRC II, Terrestrial Condition A.9.3(4), modified by minor edits]*

Mitigation Measure 32 (Pronghorn Antelope). TRRC shall prepare surveys that identify locations of pronghorn concentration, distributions, and movement for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. This survey program shall be conducted prior to the beginning of construction of each segment of the rail line. TRRC shall present the results of the study to the Task Force for its review and shall consider conducting a radio telemetry study (funded by TRRC) if preliminary surveys indicate heavy pronghorn use within the project area.

Once potential impacts have been fully determined following the above mentioned studies, TRRC shall work with the Task Force to develop appropriate measures, as needed, to minimize impacts from the railroad. The following measures shall be considered and implemented, as appropriate:

(1) establishment and enforcement of fencing standards along the railroad right-of-way that will allow movement of pronghorn while excluding livestock, as needed;

(2) identification of optimal passage-site locations for pronghorn movement across the railroad;

(3) use of grillwork as needed to exclude livestock while allowing movement of pronghorn across railroad at optimal locations;

(4) follow-up monitoring on an annual basis to evaluate effectiveness of passage.

Monitoring shall continue through the oversight and reporting period previously identified in Mitigation Measure 17. In the unlikely event that this follow-up monitoring shows that the above mentioned mitigation measures are inadequate and the Task Force concludes that impacts to the wildlife's ability to migrate are resulting in a decline in species population, TRRC shall develop additional mitigation options for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. *[TRRC II, Wildlife Conditions (1) and (2), modified to provide additional clarity regarding survey requirements and specify potential mitigation measures that are appropriate for species]*

Mitigation Measure 33 (Speed Limits). Prior to construction of each rail segment, TRRC shall post and strictly enforce speed limits on all construction access roads to minimize roadkills of wildlife due to increased traffic from construction workers temporarily living in the area. TRRC shall also advise all rail construction personnel that the purpose of these speed limits is to protect wildlife. *[TRRC III, new]*

Mitigation Measure 34 (Aquatic Resource Sampling). Prior to beginning construction activities in locations where the railroad would cross the Tongue River, or where extensive riprapping would occur, TRRC shall conduct a three-part study plan to identify aquatic resources. The results of this study shall be utilized in the development of mitigation plans for the river crossing and riprap areas for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. This study shall include (1) a stream habitat survey to identify existing habitat features and values; (2) benthic macroinvertebrate sampling to identify community composition and numbers; and (3) a fish spawning survey to determine the importance of the area to spawning of fish. TRRC shall undertake the three-part study methods outlined below. *[TRRC I, Condition 9.1(1); TRRC II, Aquatic Condition A.9.2(1), modified to provide clarity regarding the timing and location of the study]*

(1) **Stream Habitat Survey.** The stream habitat survey shall utilize methods described in Methods for Evaluating Stream, Riparian, and Biotic Conditions by William S. Platts, Walter F. Megahan, and G. Wayne Minshall. Stream transects shall be established and impact zones shall be identified in appropriate locations to evaluate existing conditions and to monitor changes during construction. Along each transect, the following variables shall be measured:

(a) Stream width.
(b) Stream shore depth.
(c) Stream average depth.
(d) Pool quality and forming feature (in feet).
(e) Riffle (a ripple in a stream or a current of water) (in feet).
(f) Run (in feet).

(g) Substrate (mineral or organic material that forms the bed of a stream).
(h) Stream bank soil alteration rating.
(i) Stream vegetative stability rating.
(j) Stream bank undercut and angle.
(k) Vegetation overhang.
(l) Embeddedness. *[TRRC II, Aquatic Condition A.9.2(1)(a), modified to include identification of impact zones]*

(2) **Benthic Macroinvertebrates**. TRRC shall collect quantitative samples of benthic macroinvertebrates immediately upstream and downstream of each proposed location of disturbance during rail construction activities. The collected specimens shall then be counted and identified following the Montana Department of Environmental Quality's Rapid Bioassessment Protocols for Sampling and Sample Analysis Standard Operating Procedures. *[TRRC I, Condition 9.1(1)(b); TRRC II, Aquatic Condition A.9.2(1)(b), modified to clarify the most useful techniques for sampling benthic macroinvertebrates]*

(3) **Fish Survey**. Prior to construction of each rail segment, TRRC shall conduct a fish survey and fish habitat survey. The fish survey shall be conducted to estimate population and to monitor potential mortality or emigration due to construction impacts. Mark-recapture methods shall be incorporated in each survey.

TRRC's fish habitat survey shall be conducted to determine habitat value, quantity, and utilization. In general, methods shall follow the methods used in recent work on the Tongue River for comparative purposes. Methods used in the comparative analysis may include those from Community Structure and Habitat Associations of Fishes in the Lower Tongue and Powder Rivers (R. Trenka 2000). Sampling shall occur before and after construction in impacted areas to allow quantification of effects, if any. The establishment of reference sites in areas outside of immediate impact zones, identified in the Stream Habitat Survey described above in Section 1, shall be used as a control to which impacted area surveys may be compared. All major habitat types shall be represented, and the total number of sites shall depend upon how many habitat types are identified by the Stream Habitat Survey. For each major habitat type at each bridge location, at least three affected sites and one reference site shall be surveyed. Sampling gear shall be adapted to each habitat type and standardized for both before and after construction surveys to allow for meaningful data comparisons. At each fish habitat survey site, the following shall be recorded:

(a) Habitat type.
(b) Sampling gear used (hoop net, fyke net, electrofishing, seines, etc.).
(c) Species present (number, age class, length, and weight).
(d) Relative abundance by species.
(e) Catch per unit effort (before and after construction).

If determined to be necessary by the Task Force, a spawning habitat potential survey shall be conducted at each proposed bridge location as well as in areas of proposed riprapping and other perennial, intermittent, and ephemeral draws that the railroad crosses. Sampling periods for the spawning survey shall be early spring after ice breakup, after peak runoff, and in the fall. *[TRRC II, Aquatic Condition A.9.2(1)(c), modified to broaden the purpose of the surveys]*

Mitigation Measure 35 (Aquatic Mitigation Techniques). With the exception of construction of the portion of the rail line described in Mitigation Measure 88 (Miles City Fish Hatchery), prior to construction of each rail segment and once aquatic resource sampling is completed and detailed data on the aquatic resources to be affected has been obtained, TRRC shall develop appropriate mitigation measures for approval by the Task Force in accordance with the process set forth in Mitigation Measure 14. These mitigation measures may include the following, as appropriate:

(1) Preparation of a construction schedule which, if possible and practical, provides for instream work at those times that are (a) least critical to the specific fishery or aquatic resource occurring at a site, and (b) least conducive to sediment transport. These periods may differ by stream and species affected.

(2) Development of special procedures for the handling of displaced materials and petroleum products during construction in order to prevent introduction of such materials into the aquatic system.

(3) Filtering of silty water, which would result from dewatering for footing construction, through settling pond systems.

(4) Assuring that riprap is washed and essentially silt free.

(5) Double-shifting of work crews at river crossing sites to minimize the duration of construction activities in or near river or stream banks. *[TRRC II, Aquatic Condition A.9.2(2), modified by minor edits]*

7.2.3 Soils and Geology

Mitigation Measure 36 (Stormwater Pollution Prevention Plan). TRRC shall prepare a Stormwater Pollution Prevention Plan (SWPPP) and an Erosion Control Plan using Montana Department of Environmental Quality Guidelines Best Management Practices (BMPs) and shall obtain coverage under the Montana Pollutant Discharge Elimination System General Permit for Storm Water Discharges Associated with Construction Activity. Prior to construction of each rail segment, TRRC shall determine which BMPs shall be employed at different locations in the project area.

The SWPPP shall identify areas that have a high potential for soil erosion due to topography, slope characteristics, facility activities, and/or other factors. (Generally, areas with little or no vegetative cover, 0-25 percent on slopes greater than or equal to 15 percent, have a high potential for soil erosion.) To determine areas of high erosion potential, TRRC shall consult with the County Natural Resource Conservation Service, research, as appropriate, published soil survey reports, and/or conduct soil/geologic studies.

The SWPPP may include the use of sediment basins, berms, filter strips, covers, diversion structures, sediment control fences, straw bale dikes, seeding, sodding, and/or other control structures or BMPs. The SWPPP shall identify and locate the BMPs to be used during and after construction to control sediment discharges to surface waters. The SWPPP shall include a description of storm water BMPs appropriate for the rail line, which TRRC shall implement. The SWPPP shall also include a schedule for implementation and address the following:

(1) Individual(s) responsible for preventing pollution and for implementing storm water management BMPs.
(2) Risk identification and assessment/material inventory.
(3) Spill prevention and response procedures.
(4) Storm water management.
(5) Sediment and erosion prevention.
(6) Visual inspections.
(7) Record keeping and internal reporting.
(8) Non-storm water discharges. *[TRRC III, new]*

Mitigation Measure 37 (Saline and Sodic Soils). TRRC shall, to the maximum extent feasible, avoid saline and sodic soils in its construction of the rail line. Where possible, saline or sodic soils shall be buried, and topsoil more conducive for revegetation left on the finished surface to aid in revegetation efforts and reduce erosion. *[TRRC III, new]*

Mitigation Measure 38 (Geotechnical Investigations). Prior to beginning construction of this line, TRRC shall conduct geotechnical investigations to identify soils/bedrock in cut areas with the potential for slumping to occur following construction. In areas with a potential for slumping, TRRC shall include, as appropriate, engineering controls such as flattened slopes, adequate drainage, retaining structures, geotechnically designed stabilization techniques, terracing and surface water-runoff control. *[TRRC III, new]*

Mitigation Measure 39 (Slumping). If slumping occurs during construction of this line, TRRC shall institute remedial actions immediately following a slope failure. These actions shall include, as appropriate, implementation of emergency sediment control structures such as furrows, removal of slumped material to a location that will not allow erosion and transport of this material to any waterways, implementation of measures to promote revegetation, and a geotechnical evaluation, if feasible, to determine the best way to prevent additional slumping. Remedial action also may involve, as appropriate, the installation of drains or adding material to the toe of the slump to stabilize it. *[TRRC III, new]*

Mitigation Measure 40 (Erosion). Prior to beginning construction of this line, TRRC shall perform an analysis to determine the potential for erosion (wind and water) at proposed cut and fill locations. The analysis shall compare slope lengths and gradients to determine the optimum gradients and mitigation measures for minimizing erosion at each proposed cut and fill location. *[TRRC III, new]*

Mitigation Measure 41 (Sediment Delivery). Prior to beginning construction, TRRC shall assess the potential for construction and operation of the rail line to generate, transport and deliver sediments to a given body of water. Contributions of sediments shall be measured as "bedload," or material that is transported along the bed of a stream rather than in suspension.

Woman pebble counts (woman pebble is a methodology for sampling and categorizing substrate) may be used for sediment data. *[TRRC III, new]*

Mitigation Measure 42 (Soil Survey). Prior to any construction of this line, TRRC shall conduct a soil survey along the alignment, including a review of soil survey data from Big Horn and Rosebud counties. As part of this survey, TRRC shall obtain, query, review, and interpret digital soil survey maps for the area within 300 meters of the rail alignment. Soils with similar characteristics along the route shall be grouped, and detailed descriptions of each grouping shall be prepared. The descriptions shall include information regarding the soil group's distribution, structure, permeability, and erodibility. After completing its survey, TRRC shall prepare a series of reports to be made available to SEA depicting the soils for the entire alignment. *[TRRC III, new]*

7.2.4 Hydrology and Water Quality Mitigation

Mitigation Measure 43 (Water Quantity and Quality). To assure that overall water quantity and quality are not unnecessarily altered or diminished by this project, TRRC shall submit detailed information about its plans and construction, for review and approval, to applicable agencies, including the U.S. Corps of Engineers, local conservation districts, and the Water Protection Bureau of the Montana Department of Environmental Quality prior to any construction of this line. *[TRRC II, Hydrology and Water Quality Condition (1), modified to reflect current state agency]*

Mitigation Measure 44 (Streambed Crossings). During design, TRRC shall consult with and meet the reasonable requests of Montana Department of Natural Resources and Conservation, Montana Department of Environmental Quality, the US Army Corps of Engineers, and the local conservation districts for bridge crossings over the streambed of the Tongue River. *[TRRC II, Hydrology and Water Quality Condition (2), modified to reflect current state agency]*

Mitigation Measure 45 (Permitting and Bank Stabilization). TRRC shall consult with the US Army Corps of Engineers (Corps) and the Environmental Protection Agency (EPA) to implement the Corps' permit requirements under Section 404 of the Clean Water Act and EPA's riverbank stabilization methods at bridge crossings and riprap areas in order to prevent or reduce the impacts of soil erosion and sedimentation loading to area streams and the Tongue River. Appropriate methods may include placing or planting logs, trees, and other vegetative plantings with rock riprap along bridge sites and stream-encroachment areas. To prevent unnecessary degradation of water quality due to erosion, revegetation efforts shall begin as soon as possible after construction is completed in a given area. *[TRRC II, Hydrology and Water Quality Condition (3), modified to provide additional clarity regarding riverbank stabilization methods]*

Mitigation Measure 46 (Streambed Crossing Construction). Rail construction activities involving stream crossings, including bridges and culverts and activities requiring stream-bank encroachments (riprap, for example), shall occur during periods of low or no flow in the streams affected. *[TRRC II, Hydrology and Water Quality Condition (6)]*

Mitigation Measure 47 (Bank Stabilization). In constructing this line, TRRC shall stabilize banks with naturally occurring trees, shrubs, and grass. Riprap or gabions shall be used only as a supplement where such methods would improve fish habitat, or in cases where engineering requirements so dictate, such as downstream from culverts. *[TRRC II, Vegetation Condition A.9.3.2(1)(d)1, modified for minor edit]*

Mitigation Measure 48 (Tongue River Crossing). TRRC shall design the crossing of the Tongue River so that it does not require a center abutment, and so that the side abutments are placed outside of the riparian zone. The side abutments shall be located to provide adequate passage for wildlife (10 feet above the ordinary high-water mark). *[TRRC III, new]*

Mitigation Measure 49 (Culverts). TRRC shall ensure that all culverts and other drainage structures installed at non-perennial stream crossings during construction of this line comply with the design criteria of the American Railway Engineering and Maintenance of Way Association, established in the year 2000. This means that at a minimum, culverts shall be designed to discharge a 25-year flood without static head at entrance and a 100-year flood using the available head at entrance, the head to two feet below base of rail, or the head depth of 1.5 times the culvert diameter/rise, whichever is less. Additionally, TRRC shall incorporate the culverts into the existing grade of the streambed to avoid, to the maximum extent possible, changing the character of the streambed and impacting migrating amphibians and reptiles. *[TRRC II, Hydrology and Water Quality Condition (4), modified to reflect current industry practice and include migrating species]*

Mitigation Measure 50 (Perennial Streams). Where possible, TRRC's final alignment shall be designed to avoid the floodplain of perennial streams. Where the railroad grade infringes upon the floodplain, TRRC shall install drainage structures to assure that the grade does not restrict or reroute the 25-year flood. *[TRRC II, Hydrology and Water Quality Condition (5), modified to reflect current Montana Floodplain and Floodway Protection Act (MCA 76-5-401 through 406) requirements]*

Mitigation Measure 51 (Bridge Design). Prior to beginning construction of this line, TRRC shall prepare an analysis for the Montana Department of Natural Resources and Conservation, documenting that the final design for any bridges constructed over rivers and perennial streams located in a designated 100-year floodplain shall not increase the upstream elevation of the 100-year flood by more than 0.5 feet or significantly increase flood velocities. If TRRC's analysis concludes that any bridge would increase the upstream elevation of the 100-year flood by more than 0.5 feet or significantly increase flood velocities, TRRC shall redesign the bridge to reduce these impacts to a less than 0.5 foot increase in the 100-year flood elevation. *[TRRC III, new]*

7.2.5 Cultural Resources Impact Mitigation

Mitigation Measure 52 (Programmatic Agreement). To protect cultural and historic resources, TRRC shall comply with the provisions of the revised Programmatic Agreement for the entire line entered into for this project. *[TRRC II, Cultural Resources Condition (1), modified to reflect that SEA has prepared a revised Programmatic Agreement]*

7.2.6 Transportation and Safety Mitigation

Mitigation Measure 53 (Construction-worker Transportation). During construction, TRRC shall encourage its contractors to provide laborers with daily transportation to the work site from a central location. *[TRRC II, Transportation Condition (1)]*

Mitigation Measure 54 (Access Road). To the extent possible, TRRC shall confine all construction-related traffic to a temporary access road within the right-of-way (ROW). Where traffic cannot be confined to this access road, TRRC shall ensure that contractors make necessary arrangements with landowners or affected agencies to gain access from private or public roadways. The access road shall be used only during construction of the railroad grade, after which construction shall be confined to the ROW. *[TRRC II, Transportation Condition (2)]*

Mitigation Measure 55 (Memorandum of Agreement). As agreed to by TRRC and the Montana Department of Transportation (MDT), TRRC shall enter into a memorandum of agreement (MOA) with MDT evaluating project-related safety needs. The MOA shall establish duties and responsibilities of the parties relative to construction of the rail line and possible encroachment on interstate and non-interstate facilities maintained by MDT. The MOA shall also include the evaluation of each crossing for safety needs and potential traffic problems during construction and operation, including passage of emergency vehicles. Based on these evaluations, the MOA will set forth specific safety measures, such as warning signal and devices, and appropriate measures to alleviate any traffic problems, such as grade separations. A construction traffic plan will also be prepared by TRRC for review and approval by MDT. *[TRRC I, Condition 4.3(2) and TRRC II, Transportation Conditions (3 and 5), combined and modified to reflect current state agency and MOA]*

Mitigation Measure 56 (Tongue River Reservoir Dam). During construction of the rail line, TRRC shall provide 24-hour-a-day access to the Montana Department of Natural Resources and Conservation for the maintenance of the Tongue River Reservoir Dam either via the construction of temporary roads and/or flagging devices or by other reasonable alternatives. *[TRRC II, Tongue River Dam Reconstruction Condition (1), modified to reflect completion of dam reconstruction]*

Mitigation Measure 57 (Speed Limits). All TRRC vehicles and equipment, and vehicles and equipment owned and operated by TRRC contractors working on the project, shall strictly adhere to speed limits and other applicable laws and regulations when operating such vehicles and equipment on public roadways. *[TRRC I, Condition 4.2 (3), modified by minor edits]*

Mitigation Measure 58 (Traffic Control Devices). TRRC shall comply with the Montana Department of Transportation's Manual of Uniform Traffic Control Devices for work zone safety. *[TRRC II, Transportation Condition (4), modified to reflect current agency requirement]*

Mitigation Measure 59 (Safety Meetings). TRRC shall adhere to applicable Federal and state construction safety regulations and Best Management Practices to minimize the potential for construction-related accidents. TRRC shall require its construction contractors to conduct safety meetings for their workers to ensure that each person understands safety measures and procedures. *[TRRC II, Safety Condition (1), modified to clarify that TRRC shall use Best Management Practices]*

Mitigation Measure 60 (Emergency Response Plan). Prior to beginning construction of this rail line, TRRC shall develop an internal Emergency Response Plan consistent with Montana State plans required under Title 10, Montana Code Annotated. This plan shall include a roster of agencies and specific persons to be contacted for specific types of emergencies during rail construction, operations and maintenance activities, procedures to be followed by particular rail employees, emergency routes for vehicles, and location of emergency equipment. *[TRRC II, Safety Condition (2), modified for minor edits]*

Mitigation Measure 61 (Emergency Response Coordination). TRRC shall establish cooperative relationships with the Federal, state, and local agencies with responsibility for disaster/emergency response in the area. TRRC shall provide operational plans and copies of the Emergency Response Plan identified above, when it is available in draft form, to all such agencies and incorporate their comments as appropriate in its final Emergency Response Plan. The agencies to be contacted shall include, at a minimum, Disaster and Emergency Services Division of the Department of Military Affairs, Helena; rural fire departments along the route of the entire line; local ambulance and emergency medical services and air evacuation services in Billings and Sheridan; the Montana Department of Environmental Quality, specifically including the Remediation Division; Montana Department of Fish, Wildlife and Parks; Montana Department of Natural Resources and Conservation; the Northern Cheyenne Tribe; the Bureau of Land Management; U.S. Fish and Wildlife Service; and other local agencies or other groups identified by these agencies and entities as key to disaster response. *[TRRC II, Safety Condition (3), modified to clarify that all such agencies shall receive a copy of the plan]*

Mitigation Measure 62 (Spill Prevention). TRRC shall develop, in cooperation with appropriate Federal, state, and local agencies, a plan to prevent spills of oil or other petroleum products (gasoline, diesel fuel, solvents), during construction, operation, and maintenance of this rail line.

TRRC's Spill Prevention Plan shall include measures pertaining to oil spills set forth in the mitigation plan in the Tongue River II DEIS. The plan developed by TRRC shall include conditions that shall be imposed on companies and contractors involved in construction of the Tongue River rail line. The plan shall provide emergency notification procedures, including a priority list of specific names and phone numbers of designated contacts (government and private) that are to be notified in case of events such as a fuel spill, range fire, or medical emergency during construction, operation and maintenance of the rail line. The following items shall be included in the plan:

(1) Procedures for reporting a spill.
(2) Definition of what constitutes a spill.
(3) Methods of containing, recovering, and cleaning up a spill.
(4) A list of equipment needed to remediate a spill and its location.
(5) A list of all governmental agencies and management personnel to be contacted, including but not limited to the following:

(a) Disaster and Emergency Services Division of the Department of Military Affairs, Helena. (This is the most important contact to develop a coordinated response.)
(b) Rural fire departments along the route.
(c) Local ambulance and emergency medical services, as well as air evacuation services in Billings and Sheridan.
(d) Montana Department of Environmental Quality, especially the Remediation Division.
(e) Montana Department of Fish, Wildlife, and Parks.
(f) Montana Department of Natural Resources and Conservation.
(g) Northern Cheyenne Tribe.
(h) Bureau of Land Management (BLM) or U.S. Fish and Wildlife Service. BLM would have fire suppression responsibilities on public land for fires handled by Type I Interagency Management Teams and Type II Geographic Area Teams.
(i) Other local agencies or groups that are identified by the agencies and entities above as key to disaster remediation.

(6) Assurances that techniques and procedures to be employed in cleanup are the best practicable technology currently available.

[TRRC II, Safety Condition (8), which incorporates by reference Sections A.7.3.(1) a, A.7.3(2) a-i, and A.7.3(4), modified (1) to incorporate language of sections referred to and to clarify that the above measures apply to the entire rail line, and (2) to clarify roles of BLM and USFS.]

Mitigation Measure 63 (Construction Sites). TRRC shall remove all litter, debris, and soils associated with petroleum spills prior to reclamation of construction sites. A state-approved landfill shall be used. *[TRRC II, Vegetation Condition, A.9.3.2(1)(d)2, modified by minor edit]*

Mitigation Measure 64 (Oil and Fuel). Prior to construction of this line, TRRC shall develop appropriate guidelines to be used by individual rail construction contractors, including (1) steps to use during refueling to guard against overflows, (2) storage of fuel in metal storage tanks surrounded by impervious dikes that are capable of containing greater than the capacity of the tank, (3) removal of waste oil to appropriate sites, and (4) maintenance of equipment in good running order during performance of construction and routine maintenance activities. *[TRRC II, Safety Condition (9), modified by minor edit]*

Mitigation Measure 65 (Herbicide Spills). If a herbicide spill occurs, TRRC shall respond by immediately containing the spill, notifying the appropriate Federal, state, and local agencies, and implementing appropriate clean-up procedures. *[TRRC II, Safety Condition (10), modified to provide additional clarity regarding TRRC's actions]*

Mitigation Measure 66 (Train Operations). TRRC shall adhere to all reasonable Federal, state, and local requirements regarding train operations, including requirements that relate to maximum durations of crossing blockage, speed limits within and outside of incorporated areas, and candlepower for train lighting. *[TRRC I, Condition 4.3(3), modified to clarify the intent and responsible parties]*

Mitigation Measure 67 (Descending Grades). If a train's speed reaches 5 mph more than the train's maximum authorized speed on descending grades of 2 percent or more, TRRC's trains shall come to a complete stop as quickly as possible, using an emergency application of the train's air brakes.

(1) After the train has stopped, the train shall be secured by applying additional hand brakes, and once secured, the train shall be inspected and no further train movement shall be made until authorized by a designated railroad employee.
(2) TRRC shall conduct an immediate investigation into the cause of any incident in which the train's speed reaches 5 mph more than the train's authorized maximum speed and shall initiate appropriate corrective action.
(3) Event recorder data shall be routinely inspected to ensure full compliance with these requirements. *[TRRC III, new]*

Mitigation Measure 68 (Hazardous Materials Transport). In the event that TRRC should transport hazardous materials, TRRC shall comply with the requirements of the Hazardous Materials Transportation Act (49 USC 1080 et seq.) and its governing regulations. TRRC shall also comply with the Federal Railroad Administration (FRA) hazardous materials regulations for rail transport (including 49 CFR 174), along with FRA's general rail safety regulations (49 CFR 209 to 236). *[TRRC III, new]*

7.2.7 Air Quality Mitigation

Mitigation Measure 69 (Fugitive Dust). When vegetation is removed from the right-of-way, TRRC shall clear the smallest possible amount of cover to minimize impacts of wind erosion and fugitive dust. *[TRRC II, Air Quality Condition (2), modified to clarify the intent of the measure]*

Mitigation Measure 70 (Revegetation). Where devegetation has taken place, TRRC shall begin revegetation as soon as possible. Where immediate revegetation is not possible, TRRC shall implement alternative stabilization measures such as matting and mulching. *[TRRC II, Air Quality Condition (3)]*

Mitigation Measure 71 (Site Watering). TRRC shall suppress dust at all work areas by using water trucks, and shall make water available to local landowners, governmental agencies, or associations for the purposes of dust suppression. TRRC shall conduct dust suppression activities regularly and frequently during the dry periods. *[TRRC II, Air Quality Condition (4)]*

Mitigation Measure 72 (Open Burning). TRRC shall conduct any open burning in strict accordance with local or other applicable regulations, and shall obtain all necessary permits and observe all necessary safety precautions. *[TRRC II, Air Quality Condition (5)]*

Mitigation Measure 73 (Inspection and Maintenance). TRRC shall subject all heavy equipment and vehicles used in the construction, operation, and maintenance of the railroad to a regular inspection and maintenance schedule to ensure that operation complies with manufacturer's specifications and that equipment is running as cleanly and efficiently as possible. *[TRRC II, Air Quality Condition (1)]*

7.2.8 Noise and Vibration Mitigation

Mitigation Measure 74 (Construction Timing). To the extent practicable, TRRC shall schedule major noise-producing construction activities during the weekday and daylight hours to limit disturbances during more sensitive times of day. *[TRRC II, Noise Condition (1)]*

Mitigation Measure 75 (Construction Equipment). All equipment used for construction shall comply with all reasonable Federal, state, and local noise regulations and ordinances. *[TRRC I, Condition 6.1(3), modified to clarify that all equipment used in construction shall comply with reasonable noise regulations]*

Mitigation Measure 76 (Dam Vibration). Prior to construction of the Western Alignment, TRRC shall conduct a seismic analysis based on local geology and specific blasting plans to quantify the risk of construction-related activities to the Tongue River Reservoir Dam. TRRC shall consult with Montana Department of Natural Resources and Conservation during the development of the geotechnical-drilling/blasting plans for construction of those portions of the Western Alignment located within two miles of the dam, to limit peak particle velocity and minimize vibration impacts that may occur. *[TRRC III, new]*

Mitigation Measure 77 (Speed Limits). During operation, TRRC shall minimize speed of trains in incorporated areas and in the unincorporated community of Ashland, to minimize noise. *[TRRC I, Condition 6.1(4), modified to provide additional clarity]*

Mitigation Measure 78 (Quiet Zone) TRRC shall consider establishing a community quiet zone for the proposed project corridor, if the Secretary of Transportation determines that the creation of a community quiet zone and the cessation of the use of train horns at rail crossings would not present a significant risk with respect to loss of life or serious personal injury. This measure shall be based upon the rules outlined in the Federal Register, Department of Transportation Federal Railroad Administration *Use of Locomotive Horns at Highway-RailGrade Crossings; Interim Final Rule* (December 18, 2003). *[TRRC III, new]*

Mitigation Measure 79 (Schools). In the case of schools in the Ashland area, including the St. Labre school, where activities during the normal school day could be interrupted by construction or maintenance noise, TRRC shall make every attempt to consult with school officials to schedule its construction and maintenance activities in a manner most acceptable to those who would be impacted. This could include scheduling weekend or evening rail construction or maintenance work in some cases. *[TRRC I, Condition 6.1(2), modified by minor edits]*

Mitigation Measure 80 (Recordation of Noise Contours). In order to prevent unintentional development within the 65 dBA contour, TRRC shall provide a copy of a map to each county and city planning department with jurisdiction along the proposed rail line, depicting the 65 dBA contour. The planning departments can make this information available to landowners so that they can make informed decisions about future development. *[TRRC III, new]*

7.2.9 Socioeconomic Mitigation

Mitigation Measure 81 (Community Issues). TRRC shall appoint a representative to consult with the affected county and local governments for the purpose of assisting impacted communities in addressing potential social and economic problems. To accomplish this, TRRC shall provide all practical assistance to the government planning agencies involved. *[TRRC I, Condition 3.1, modified to clarify TRRC as the party responsible for this measure]*

Mitigation Measure 82 (Northern Cheyenne Tribe). TRRC shall appoint a liaison between TRRC management and the Northern Cheyenne Tribe to ensure that tribal members receive an equal opportunity to apply for and secure temporary construction and full-time operational jobs with the railroad. *[TRRC II, Social and Economic Condition (2)]*

Mitigation Measure 83 (Mine Development). TRRC shall make available to local governments and to the Northern Cheyenne Tribe all public data and studies that it is aware of concerning the facilities and services that may be required as a result of mine development in the area. *[TRRC II, Social and Economic Condition (1)]*

7.2.10 Miles City Fish Hatchery Mitigation

Mitigation Measure 84 (Protection of MCFH Water Supply Pipelines). As agreed to by TRRC and the Montana Department of Fish, Wildlife and Parks, TRRC shall relocate, as necessary, portions of the water supply pipelines from the Yellowstone River and Tongue River so that each pipeline crosses the rail right-of-way at a right angle or perpendicular to the rail alignment. To ensure structural integrity of the water supply pipelines, the portion of each pipeline lying perpendicular beneath the rail alignment shall be encased in a reinforced concrete pipe (RCP). The RCP shall be of sufficient size to allow for inspection and maintenance of the water supply pipelines. Access to the pipelines beneath the rail alignment shall be provided by installation of reinforced concrete manholes, located on each side of the rail alignment. The RCP manholes shall meet or exceed the American Railway Engineering and Maintenance of Way Association's standard specifications for installation of utilities underneath railway embankments. The design plans for the relocated section of the water pipelines and all associated elements shall be prepared by TRRC and provided to Montana Department of Fish, Wildlife, and Parks for review and approval prior to being constructed. *[TRRC III, new]*

Mitigation Measure 85 (Weed Control on MCFH). As agreed to by TRRC and Montana Department of Fish, Wildlife and Parks, TRRC shall use only mechanical means of weed control in its right-of-way adjacent to the MCFH between the points where the rail line crosses Interstate 94 to the connection with the Burlington Northern-Santa Fe Railroad Company main line. If it becomes necessary to utilize herbicides to control noxious weeds along the right-of-way in this area, herbicides will only be used with prior approval from the MT DFWP, as to the type of herbicide, application rate, means of application, wind speed and direction. *[TRRC III, new]*

Mitigation Measure 86 (MCFH Continuing Consultation). TRRC shall continue to make itself available to consult with Montana Department of Fish, Wildlife and Parks to reach consensus on any remaining issues concerning the environmental effects on MCFH from railroad construction and operations, for up to a period of six months after the effective date of the Board's final decision on TRRC's application in Tongue River III. TRRC shall use its best efforts to achieve resolution of any outstanding issues during that period. If no resolution is achieved during that period, the requirement for continued consultation shall cease unless both TRRC and MCFH agree that the period should be extended and so advise the Board in writing. At the end of the consultation period (whether extended by mutual agreement or not), TRRC shall advise the Board of its positions in writing. Montana Department of Fish, Wildlife and Parks is invited to provide its position, and either TRRC or MT DFWP (or both) may request that the Board develop a condition designed to mitigate any remaining concerns of MT DFWP related to the environmental effects on MCFH that the Board determines warrant mitigation. *[TRRC III, new]*

Mitigation Measure 87 (MCFH). TRRC shall adhere to the reasonable mitigation conditions imposed by the Montana Department of Fish, Wildlife and Parks in any easement granted by the State allowing TRRC to cross the MCFH. *[TRRC III, new]*

7.2.11 Fort Keogh Livestock and Range Research Station (LARRS) Mitigation

Mitigation Measure 88 (Department of Agriculture). TRRC shall adhere to the reasonable mitigation conditions imposed by the U.S. Department of Agriculture (USDA) in any easement granted by USDA allowing TRRC to cross the LARRS property line. *[TRRC III, new; the USDA is currently preparing new mitigation conditions that would apply to TRRC for crossing the LARRS property. To avoid any inconsistency between the USDA mitigation conditions, SEA is recommending TRRC I Condition 2.2.2 be superseded by this general condition.]*

7.2.12 Spotted Eagle Lake Mitigation

Mitigation Measure 89 (Tree Buffers). As agreed to by TRRC, TRRC shall provide a tree buffer between the Spotted Eagle Lake recreation area and the railroad right-of-way in order to reduce the impact of train noise upon those pursuing recreational activities and to moderate the visual impact to that area. *[TRRC I, Condition 6.1(6), modified to clarify the tree buffer requirement at the Spotted Eagle Lake recreation area.]*

APPENDIX 12

REVISED DRAFT
TONGUE RIVER RAILROAD SECTION 404(B)(1) SHOWING

WATERS OF THE U.S.
CONCEPTUAL HABITAT MITIGATION AND MONITORING PLAN
TONGUE RIVER RAILROAD

Prepared for:

Tongue River Railroad Company, Inc.
P.O. Box 1181
Billings, Montana 59103

Prepared by:

WESTECH Environmental Services, Inc.
3005 Airport Road
P.O. Box 6045
Helena, Montana 59604

CONTENTS

Page

CONTENTS

Page

CONTENTS

FIGURES

Figure **Page**

1.0 PROJECT DESCRIPTION

1.0 PROPOSED PROJECT AND PURPOSE

1.1.1 Project Description

The Tongue River Railroad Company, Inc. (TRRC) is proposing to construct approximately 116 miles of rail line from Miles City, Montana to near Decker, Montana. The new railroad would begin at the southwestern edge of Miles City, where it would tie into the existing Burlington Northern-Santa Fe (BNSF) mainline. From Miles City, the route would bear south along the west side of the Tongue River to a point approximately 10 miles north of Ashland, Montana. The route would then cross the Tongue River and continue south along the east side of the river. Near Ashland, the route would divide, with one branch following approximately eight miles southeast along the Otter Creek drainage to Terminus Point 2, while the main branch would continue south along the east side of the Tongue River Valley about nine miles south of Ashland to Terminus Point 1. This portion of the TRRC line was considered the "proposed action" in the Interstate Commerce Commission's (ICC) 1985 Final Environmental Impact Statement (FEIS) for the Tongue River Railroad and is referred to as the Miles City to Ashland segment. This route was approved by the ICC in 1986 ("Tongue River I").

From Terminus Point 1, the railroad would continue south along the east side of the Tongue River valley for about 21 miles. This portion of the route was considered part of the "proposed action" in the Surface Transportation Board's (STB) 1996 FEIS for the Tongue River Railroad Additional Rail Line from Ashland to Decker, Montana and is referred to as the 21-mile segment. This portion of the route along with the Four Mile Creek Alternative was approved by the STB in 1996 ("Tongue River II").

From a point about 21 miles south of Terminus Point 1, the TRRC line would follow the Western Alignment (instead of the Four Mile Creek alignment), which is a "proposed action" currently under NEPA consideration by the STB. The Western Alignment is about 17 miles long and would cross to the west side of the Tongue River, then gradually leave the Tongue River valley as it would proceed south to the final terminus near Decker, Montana.

The 21-mile segment combined with the Western Alignment is referred to as the Ashland to Decker segment.

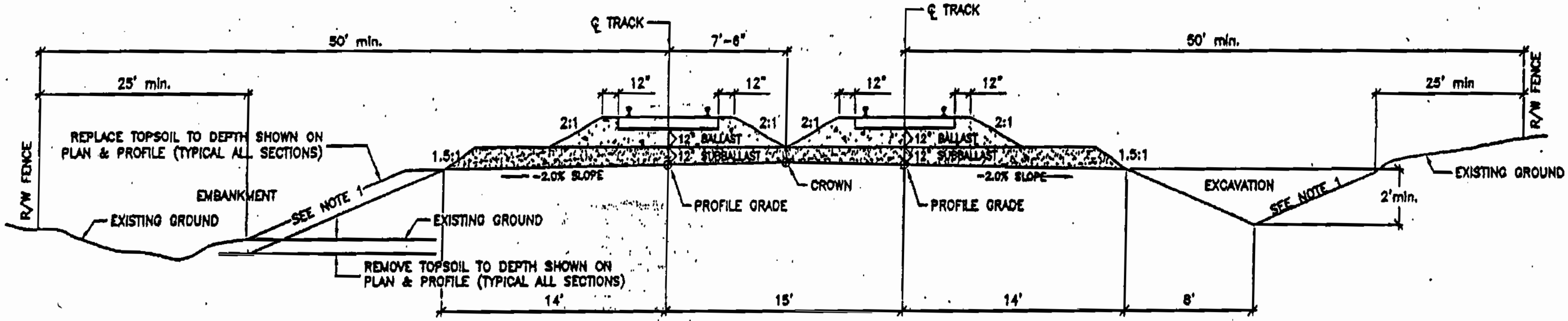
The project includes the railroad and necessary facilities for the construction and operation of the railroad. These facilities include sidings, possible terminal facilities, signal and communication systems, relocated roads, bridges and culverts, construction camps, equipment laydown and construction centers, borrow areas and temporary construction access roads.

Railroad Construction

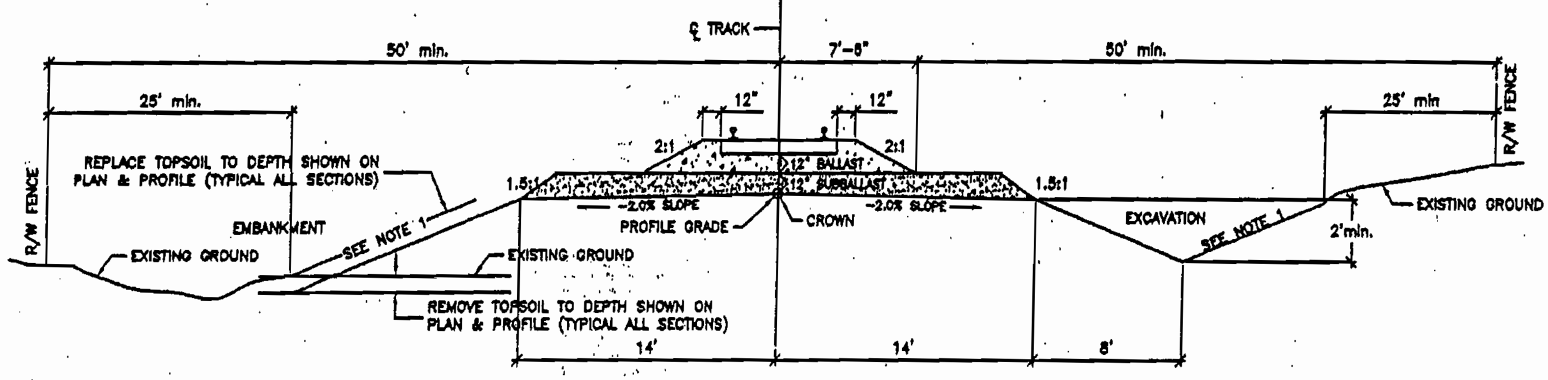
Figure 1 shows typical cross sections of a single track and a single track with siding. The ROW width would average approximately 200 feet, ranging from 100 to over 300 feet depending on cut and/or fill requirements. Cut and fill slopes would generally be constructed at angles between two horizontal to one vertical (2H:1V) and one and one-half horizontal to one vertical (1.5H:1V). Steeper slopes may be appropriate in some areas based on soil conditions and to reduce surface disturbance. The 136-pound continuous welded track would rest on 12 inches of subballast, 12 inches of ballast and concrete ties.

Sidings

The sidings also would be constructed with 136-pound continuous welded rail on 12 inches of compacted granite ballast and 12 or more inches of graded rock as subballast. Initial design specifications for the railroad include the construction of seven passing sidings, each



SINGLE TRACK WITH SIDING



SINGLE TRACK - TANGENT

NOTES:

1. FILL AND CUT SLOPES SHALL BE AS INDICATED ON PLAN & PROFILE.

Prepared By

Mission Engineering, Inc.

Civil Engineering • Transportation Design • Mine Planning
Phone (406) 248-3233 Fax (406) 248-3383
730 East Main, Ste. 206, Billings, MT. 59105

SCALE: 1" = 10'
DATE: APRIL 1999
DRAWN BY: MEI
CHECKED BY: MEI
FILE: TYP XSEC.DWG

TYPICAL CROSS SECTIONS
RAILROAD CONSTRUCTION

TONGUE RIVER RAILROAD

FIGURE 1

approximately 8500 feet long (between clearance points). Planned design will provide for capacity to meet TRRC's needs for a number of years. The 8500 foot length would accommodate potential future increases in train size, and also allow for comfortable stopping margins. Siding locations and the number of sidings would be based on minimizing train delays in both (particularly the loaded) directions. One of these sidings would be located on the Western Alignment.

In addition to passing tracks, additional set-out tracks would be constructed for set-out and storage of maintenance-of-way (MOW) equipment, bad-order cars, and other operational equipment. At least one of these would be on the Western Alignment. Each set-out track would be at least 550 feet in length, sufficient to accommodate permanently-coupled carsets that may operate on this line. Set-out tracks would be provided at each double (passing) track location and at four additional locations along the main line.

Terminal Facilities

New terminal facilities may be constructed at Miles City. These facilities would consist of buildings for train and engine crews, dispatching, headquarters operation, limited servicing and maintenance, and MOW activities. Three additional sidings, 7800 feet long, would be constructed to handle yard activities. Construction of the Miles City terminal depends upon whether the TRRC and the BNSF reach an agreement that would allow the BNSF to operate over TRRC tracks. A new terminal would not be required if such an agreement is reached since the BNSF would operate its own facilities.

Signal and Communication Systems

Signal System: The railroad would be dispatched and operated under a Track Warrant Control System with identical rules and procedures used by BNSF. Under this system, train control signals would be located only in advance of the facing points of main line power or spring switches. Power would be provided by batteries, charged by solar power panels. No power or communication lines are proposed to be constructed along the TRRC's ROW. The signal system and the operating rules and procedures under the Track Warrant Control System will conform to the best railroad industry practices to maximize safety to personnel and equipment.

Communication System: The communication system would consist of two radio frequency channels as assigned by the Federal Communications Commission (FCC) in an application to be submitted prior to commencing operations. Repeater stations (signal boosters) would be located as appropriate to assure continuous communications with train crews with no signal loss under extremely adverse weather conditions. Repeater stations may be located every 10 to 20 miles, or less in some areas. All repeater stations would be battery powered, with batteries charged by solar panels. All other communications would be via commercial or leased telephone lines. Repeater stations would be sited to avoid placement of fill in Waters of the U.S.

Road Relocation

Portions of public and private roads would be relocated along short sections of the railroad. Road relocations would be necessary to minimize curvature, minimize the number of road crossings and accommodate landowner access across the ROW.

Culverts and Bridges

Culverts would be placed according to the final engineering design. Coated with either a galvanized or bituminous coating (not "asbestos-bonded" material), culverts would be designed to safely withstand a 25-year flood peak flow with one pipe diameter of headwater. They would be designed so water from a 100-year flood event will not overtop the track.

Bridge construction would entail the driving of sheet pilings around the proposed pier locations to provide cofferdams for the placement of the bridge foundations. With foundations and piers in place, prestressed concrete beams would then be set on the piers and abutments to form bridge decking. Bridges would be constructed at the two crossings of Tongue River and at Otter and Hanging Woman creeks.

Construction Camps

There may be two construction camps. The primary construction camp would be an approximately 10 acre leased site in or near Ashland. The camp would include provisions for approximately 200 recreational vehicle (RV) trailer hookups (electric power, water, and sewage connections). The camp would also include a bunk facility and a kitchen, dining room and restrooms/showers to serve 200 persons. In total, the camp could house 400 persons (although its capacity would be more than 400 because each trailer could accommodate more than one person). No permanent foundations would be required as all structures would be temporary. Solid and sanitary wastes would be collected and transported to a licensed landfill or sewage treatment facility. No disposal would occur on site.

A smaller (five-acre) construction camp would be located at the southern end of the railroad near the connection with the Spring Creek Mine Spur. It would consist entirely of about 100 trailer hookups with a single central facility for restrooms, showers, and laundry. A small convenience store would be located on site. As with the larger camp in Ashland, this complex would not involve the use of permanent structures and would not entail on-site disposal of solid or sanitary wastes. Following completion of the railroad construction, both camp areas would be restored pursuant to agreements with the individual landowners.

Equipment Laydown and Construction Centers

Three equipment laydown and construction centers would be utilized including a 15-acre area near Miles City, a five-acre area near Ashland, and a 10-acre area near the Spring Creek Mine spur. These three centers would operate only during construction. The two larger centers at either end of the line would contain a track welding shop, engineering and construction offices, materials stockpiles, and fuel and equipment storage. The site near Ashland would be primarily devoted to equipment and fuel storage. Fuel storage and loading would occur in bermed sites with an impervious barrier to avoid ground and surface water contamination.

Borrow Areas

Project design would maximize a cut/fill balance where fill material would be generated from cuts thus minimizing the need for off-site borrow areas. Likewise, subballast would be obtained from suitable cut areas or would be imported from commercial suppliers. Ballast would be obtained from commercial sources. If material suitability or volume, or haul distance precluded use of on-site materials for all needs, off-site borrow areas would be developed. Off-site borrow areas would be located to avoid placement of fill in Waters of the U.S. and would be permitted in accordance with applicable federal, state and local requirements.

Construction Access Roads

During construction a road may be built within the proposed ROW. Most heavy equipment would be confined to this temporary road. Where the proposed rail line is isolated due to the Tongue River, other stream crossings, or large parcels of private land, temporary construction access roads, 20 feet in width, may be built. The location of the roads would be negotiated with affected landowners or land management agencies. After construction, the temporary construction roads would be reclaimed unless otherwise requested by landowners.

Final Design

The proposed route and associated facilities are based on preliminary design engineering. Prior to construction, final design engineering, including ROW staking and a detailed geotechnical investigation would be completed. Project elements discussed above would be finalized based on the pre-construction design survey. Any design modifications would take into account avoiding or minimizing the placement of fill into Waters of the U.S.

1.1.2 Purpose

The purpose of the Tongue River Railroad is to provide for the transport of coal from existing and future coal mines in southeastern Montana and to provide an alternative, shorter routing for coal from Wyoming mines. The Tongue River Railroad would provide a more efficient means of transporting coal from existing mines in the region and would enable development of proposed low sulfur mines in the Ashland area. Without the Tongue River Railroad, there would be no economically viable transportation for the proposed mines.

The TRRC line will connect with BNSF at the northernmost point at Miles City and at its southernmost point at Spring Creek/Decker. Use of TRRC's line would reduce the present transportation distance for coal mined in the upper Powder River Basin (both in Montana and Wyoming) by approximately 160 to 175 miles on 750 to 1000 mile one-way hauls to electric utilities in the upper Midwest and Great Lakes regions (or round-trip mileage savings of 320 to 350 miles). Significant savings in transportation, maintenance and equipment costs would result.

Construction of the Tongue River Railroad also will provide, for the first time, rail service to the largest remaining undeveloped reserves of low-sulfur, high Btu sub-bituminous coal in the United States. This coal is needed to help utilities comply with the sulfur limitation in the U.S. Clean Air Act Amendments of 1990.

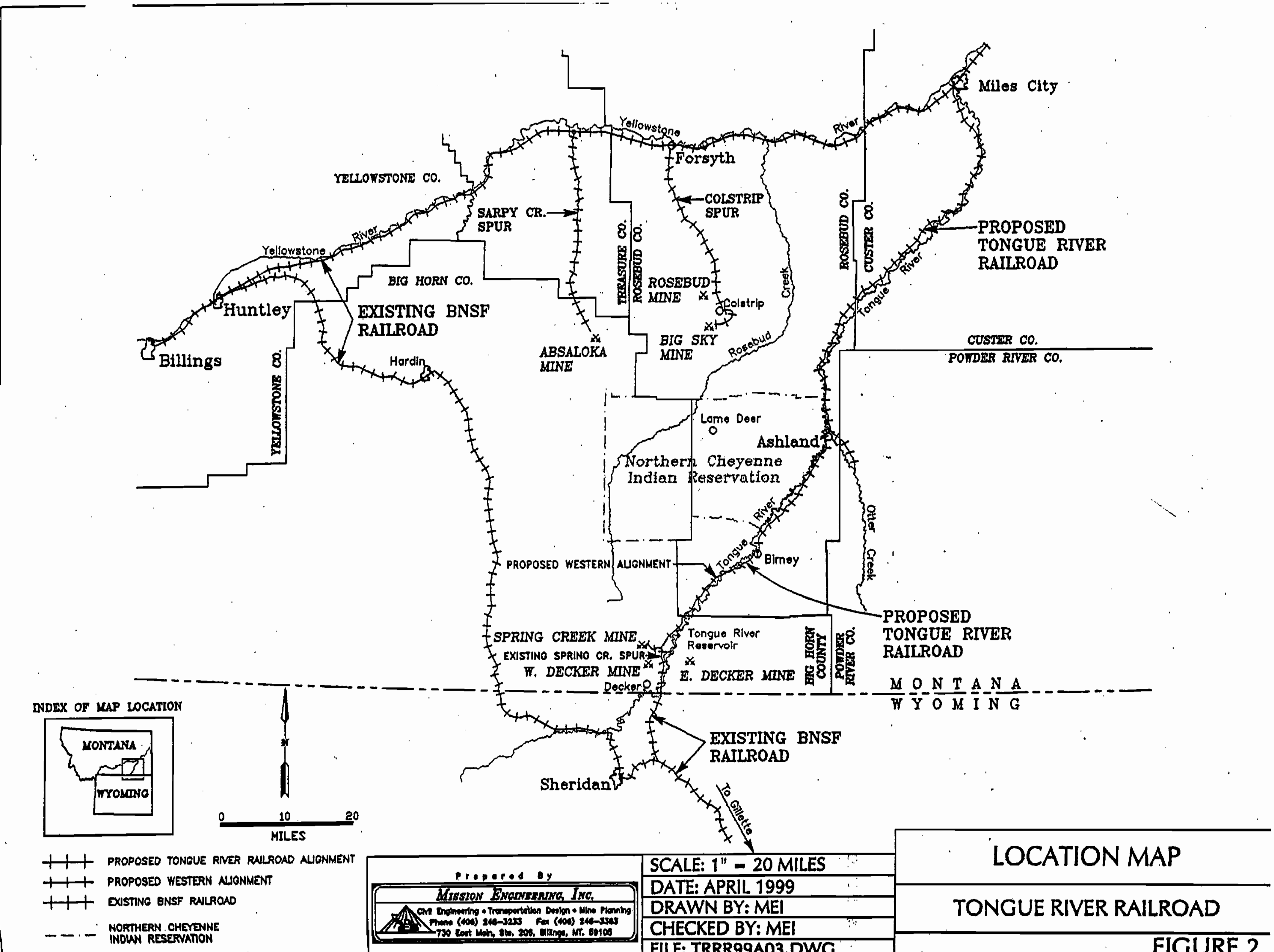
The U.S. Clean Air Act Amendments of 1990 has created a strong market for low-sulfur coal which can be burned in electric utility boilers without the need for costly flue gas desulfurization units. The Powder River Basin of Wyoming and Montana contains the great majority of the U.S. reserves of low-sulfur coal. Existing mines near Decker will yield less production as their resources dwindle, but this can be offset by new mine development in the Ashland area. The Tongue River Railroad is essential to the development of the Ashland area mines, which have no alternative means of economic transport without the railroad.

Wyoming and Decker area mines also could use the Tongue River Railroad. The three existing low-sulfur coal mines in the Decker area (East and West Decker and Spring Creek) currently transport their production to Midwestern utilities by way of the BNSF line through Sheridan, Wyoming and Hardin and Forsyth, Montana. The Tongue River Railroad would allow this coal to be shipped directly to Miles City thereby saving up to 350 miles on each round trip coal train to the Midwest. In addition to Decker area coal, BNSF currently transports some Wyoming coal over the circuitous Sheridan-to-Forsyth route to these upper Midwestern markets. At least some of this Wyoming coal is likely to move over the TRRC line as well.

Thus, the Tongue River Railroad is a critical element in the future of Montana coal production and will produce benefits that will accrue to the state and to local governments from the tax revenues associated with this production. The TRRC has thus attracted broad political support in Montana, as well as support from BNSF and from the utilities that would benefit from the coal transported by the Tongue River Railroad.

1.2 LOCATION

The general location of the project is shown on Figure 2, and a written description is included in Section 1.1. A more detailed location is shown on the Waters of the U.S. maps attached to this plan (map pockets). These maps depict the route location, state and federal surface ownerships, general topography, roads, drainages, locations of Waters of the U.S. (from the initial photo-interpretation analysis), sections and townships.


Miles City
Yellowstone
River
Forsyth
YELLOWSTONE CO.
SARPY CR. SPUR
COLSTRIP SPUR
PROPOSED TONGUE RIVER RAILROAD
Yellowstone
River
BIG HORN CO.
TREASURE CO.
ROSEBUD CO.
ROSEBUD MINE
Colstrip
Creek
ROSEBUD CO.
CUSTER CO.
Tongue
River
Huntley
EXISTING BNSF RAILROAD
Billings
YELLOWSTONE CO.
Hardin
ABSALOKA MINE
BIG SKY MINE
Rosebud
CUSTER CO.
POWDER RIVER CO.
Lame Deer
Ashland
Northern Cheyenne Indian Reservation
River
Otter Creek
PROPOSED WESTERN ALIGNMENT
Tongue
Birney
PROPOSED TONGUE RIVER RAILROAD
SPRING CREEK MINE
EXISTING SPRING CR. SPUR
W. DECKER MINE
Decker
Tongue River Reservoir
E. DECKER MINE
BIG HORN COUNTY
POWDER RIVER CO.
MONTANA
WYOMING
INDEX OF MAP LOCATION
MONTANA
WYOMING
EXISTING BNSF RAILROAD
Sheridan
To Gillette
0 10 20
MILES
PROPOSED TONGUE RIVER RAILROAD ALIGNMENT
PROPOSED WESTERN ALIGNMENT
EXISTING BNSF RAILROAD
NORTHERN CHEYENNE INDIAN RESERVATION
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DATE: APRIL 1999
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CHECKED BY: MEI
FILE: TRRR99A03.DWG
LOCATION MAP
TONGUE RIVER RAILROAD
FIGURE 2

Access to the northern terminus of the route at Miles City is reached by exiting Interstate 94 at the western Miles City exit (exit no. 138), traveling Business Route 94 (Highway 10/12/312) north to the southern edge of the Eastern Montana Fairgrounds and then southeast to the BNSF tracks and Miles City Fish Hatchery.

The middle portion of the route is reached by traveling U.S. Highway 212 to Ashland. The proposed route crosses the highway about 0.85 mile east of the eastern edge of Ashland.

The southern terminus is reached by exiting Interstate 90 just north of Sheridan, Wyoming, traveling north on Wyoming Highway 338 for about 14 miles to the Montana/Wyoming border, thence north on Highway 314 to the terminus with the Spring Creek railroad spur.

Road access along the route is sporadic and is provided mainly by Highway 312, the Tongue River Road (FAS 332, FAS 447, FAS 566) and other county roads, private roads and trails. Roads are depicted on U.S. Geological Survey (USGS) maps and Bureau of Land Management (BLM) Surface Management Status topographic maps of the area (Miles City, Forsyth, Lame Deer, and Birney). The BLM maps are the basis for the Waters of the U.S. maps and are attached to this plan (map pockets).

1.3 RESPONSIBLE PARTY

The party responsible for this mitigation plan, mitigation implementation, monitoring, maintenance and any necessary contingency measures is:

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Contact: Doug Day, Project Manager

This mitigation plan was prepared under the direction of Tongue River Railroad Company, Inc. by:

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Contact: Dean Culwell, Restoration Ecologist

Assistance in preparing this plan was provided by TRRC and:

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Phone (406) 248-3233

Contact: Dan Hadley, Project Engineer

1.4 DESCRIPTION OF JURISDICTIONAL AREAS

An initial analysis of Waters of the U.S. was conducted in 1998 using available National Wetlands Inventory (NWI) maps and interpretation of 1997 aerial photography (WESTECH Environmental Services 1998), hereafter "Initial Waters Report". Methods used for the analysis and limitations of the analysis are discussed in the Initial Waters Report. The majority of the Waters of the U.S. along the proposed ROW are non-wetlands, primarily ephemerally or seasonally flowing drainages with a defined bed and bank but without associated wetlands. Wetlands are relatively uncommon and are found along the Tongue River, larger tributary streams and on the periphery of ponds. Open water is found in the channels of major drainages (Tongue River, Otter and Hanging Woman creeks) and in ponds, primarily constructed for livestock watering, within or adjacent to the ROW. Although non-wetland incised drainages outnumber wetlands by a ratio of about 5 to 1, most non-wetland waters are small compared to wetlands and open water sites. Total acreage of wetlands and open water is greater than non-wetland incised drainages by a ratio of about 5 to 1. Table 1 summarizes the number of sites and acreages by type.

1.4.1 Non-wetland Waters

Non-wetland Waters include incised drainages, channels of major streams and rivers and standing water portions of deep ponds. These sites lack wetland vegetation.

__Types__

Non-wetland Waters were typed based on the "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin and others 1979). The type for each site is listed in Table 2.

Incised Drainages (Riverine-Intermittent-Streambed)

Incised drainages potentially meeting U.S. Army Corps of Engineers' (COE) criteria are common in the dissected topography of the Tongue River Valley and are crossed frequently by the proposed railroad. The Waters of the U.S. maps (map pockets) show the locations of these drainages. Within the standard 400-foot wide evaluation corridor, 276 non-wetland drainage sites were identified totaling about 6.5 acres. Since the width of the evaluation corridor (200 feet either side of the centerline) substantially exceeds the average ROW width of 200 feet, acreage of non-wetland Waters impacted should be substantially less. Assuming an average ROW width of 200 feet (half of the corridor evaluated), a total of 3.2 acres of non-wetland Waters would potentially be impacted by construction of the 116-mile rail line.

Most ephemerally flowing drainages with a small drainage basin are classified as R4SBA while drainages with larger drainage basins are classified as R4SBC. These alphanumeric designations refer to intermittent riverine streambeds that are temporarily or seasonally flooded. Footnote 3 to Table 2 presents the classification system.

Major Drainages (Riverine-Lower Perennial-Open Water)

Major drainages crossed by the standard 400-foot wide evaluation corridor include the Tongue River (two crossings and six sites within 200 feet of the centerline), Otter Creek (one crossing and two sites within 200 feet of the centerline) and Hanging Woman Creek (one crossing). These riverine sites are classified as lower perennial since the gradient is low and water velocity is generally slow. Open water too deep to support emergent vegetation is generally present in the deeper portions of the channel. The non-open water portion of major drainages frequently support palustrine wetlands (emergent, scrub-shrub or forest) along the banks or on lower terraces.

Twelve riverine-lower perennial-open water sites as discussed above were identified within the 400-foot wide evaluation corridor comprising about 15.8 acres. Except for the four crossings, most of these sites are more than 100 feet from the centerline and are unlikely to be filled by railroad construction. The four crossings, two of the Tongue River and one each for Otter Creek and Hanging Woman Creek would be crossed by bridges further reducing fill in this type.

Palustrine-Open Water

Palustrine-open water sites are usually associated with man-made impoundments and generally have water too deep to support emergent vegetation. Seven sites have been identified including ponds at the Miles City Fish Hatchery and deeper stockwater ponds within the 400-foot ROW. About 4.2 acres are present in the evaluation corridor.

Functional Assessment

The primary function of incised drainages without associated wetlands is the transport of temporary or seasonal surface water to receiving drainages. Smaller drainages without floodplain terraces generally transport high sediment loads, especially if channels are unvegetated. Larger streams have developed terraces dominated by non-wetland riparian vegetation (often silver sagebrush) that serve as sediment traps. Silver sagebrush terraces provide forage for pronghorn and mule and white-tailed deer, and nesting and forage for sage grouse, sharp-tailed grouse and a variety of non-game wildlife.

Major drainages with open water for most or all of the year (Tongue River, Otter and Hanging Woman creeks) serve as important general fish habitat, primarily for warm water species. These drainages are also important habitat for water-dependent birds and animals including waterfowl, beaver, snapping turtles and amphibians.

Although the Tongue River provides regular use habitat for bald eagles, no known active nests are located within a half mile of the ROW. The lower Tongue River also provides habitat for the sturgeon chub, a federally proposed threatened species. The Tongue River is habitat for several state listed sensitive species including blue sucker, snapping turtle and spiny softshell turtle.

Palustrine-open water types serve as important general wildlife habitat receiving moderate to substantial use. The Miles City Fish Hatchery ponds provide intensive specific fish habitat. Stockwater ponds serve several functions including general wildlife habitat, livestock watering, flood attenuation and storage, sediment retention and dynamic surface water storage.

1.4.2 Wetlands

Wetlands were typed based on the "Classification of Wetlands and Deepwater Habitats of the United States" (Cowardin and others 1979). The type for each site is listed in Table 2. Since NWI maps and mapping criteria were used for the initial analysis of Waters of the U.S., some sites identified in that analysis may not meet all three COE parameters for wetlands: wetland hydrology, hydric soils and hydrophytic vegetation. NWI mapping does not require that all three parameters be present whereas COE criteria require a positive indicator for each of the three parameters. A final pre-construction survey would be conducted to identify and delineate Waters of the U.S. using COE methods (Environmental Laboratory 1987).

<u>Types</u>

Palustrine wetlands identified within the standard 400-foot corridor include emergent, scrub-shrub and forested types. The riverine beach/bar type was shown on the NWI map at the southern crossing of the Tongue River.

Palustrine - Emergent (PEM)

Twenty-four (24) sites were identified as palustrine - emergent totaling about 5.4 acres within the evaluation corridor. Most PEM sites occur along drainages as an herbaceous fringe, in stream oxbows, low areas in the channel, or in or on the periphery of ponds. This type is dominated by herbaceous wetland species including prairie cordgrass, sedges, rushes, foxtail barley, common cattail and various forbs. Species composition varies considerably with hydroperiod and soil conditions (e.g. salinity).

Palustrine - Scrub/Shrub (PSS)

The palustrine - scrub/shrub type was identified at four sites totaling 1.6 acres within the evaluation corridor. The type occurs along major streams (e.g. Otter Creek).

Palustrine - Forested (PFO)

Nine (9) forested palustrine sites were identified along the ROW within the standard 400-foot evaluation corridor comprising about 4.3 acres. Most of these sites occur on the Tongue River floodplain or at the mouths of tributary drainages. Plains cottonwood is usually the dominant tree at these sites.

Palustrine - Flat (PFL)

NWI maps identified two palustrine flats on the southern portion of the ROW within the standard 400-foot evaluation corridor totaling less than 0.1 acre.

Riverine - Lower Perennial - Beach/Bar (R2BB)

The R2BB type occurs along the Tongue River and was shown on the NWI map within the standard 400-foot wide evaluation corridor only at the southern crossing of the Tongue River. Estimated acreage within the corridor at this site is about 0.2 acres. The site occurs on an inside bend of the river and was mapped by the NWI as seasonally flooded sands.

<u>Functional Assessment</u>

Palustrine wetlands provide the following functions:

Habitat for federally listed Threatened or Endangered (T/E) species: the forested palustrine type provides regular use habitat for the bald eagle.

General wildlife habitat: all palustrine types provide moderate to substantial use for non-aquatic and aquatic/semi-aquatic wildlife. Palustrine flats may receive less wildlife use because of their small size.

Flood attenuation and storage: flowing water from overbank flooding is detained for short periods especially by the scrub/shrub and forested types.

Sediment retention and removal: emergent, scrub/shrub and forested types retain sediment from channel flow and overbank flooding.

Food chain support: all vegetated palustrine types produce food for living organisms.

The riverine - lower perennial - beach/bar type varies seasonally with deposition and removal of river sediments. This type serves as general wildlife habitat and food chain support.

2.0 PROPOSED MITIGATION

2.1 AVOIDANCE

The primary approach to avoid impacts to Waters of the U.S. was to select a route from identified practicable alternatives that resulted in both the least amount of WUS filled and that minimized impacts to other resources. This approach is described in detail in TRRC's "Draft Tongue River Railroad EIS Section 404(b)(1) Showing" hereafter "Draft 404(b)(1) Showing".

The Draft 404(b)(1) Showing identifies alternatives that were evaluated for the Miles City to Ashland segment and the Ashland to Decker segment as well as the five alternatives for the entire TRRC line from Miles City to Decker considered in the Initial Waters Report. The Draft 404(b)(1) Showing concludes that the TRRC Preferred Alignment is the least environmentally damaging and best practicable alternative that meets the design and operational criteria for the railroad.

Table 3 is from the Initial Waters Report and presents a comparison of Waters of the U.S. potentially impacted by construction of the TRRC Preferred Alignment and the four alternatives for the entire line. It demonstrates that acreage of Waters of the U.S. potentially impacted by construction of the TRRC Preferred Alignment is less than other alternatives considered (Tongue River Road, Moon Creek, Colstrip and Four Mile Creek).

Additional avoidance to Waters of the U.S. has been achieved by refinements to the alignment previously considered in Tongue River I and Tongue River II associated with routes approved by the STB and its predecessor, the ICC. Along the Miles City to Ashland portion of the route, there are five locations where the originally proposed alignment and the currently proposed alignment differ nearly one-half mile or more. The net effect of these alignment refinements has been to increase the distance of the railroad from the Tongue River and its floodplain. In one case, the refinement avoids direct impact to a large stock pond near Yank Creek (approximately Milepost 25.3).

On the northern 21 miles of the Ashland to Decker portion of the route, one alignment refinement near Birney has shifted the railroad east, away from the Tongue River. An evaluation of alignment refinements is presented in the "Analysis of Changed Circumstances" reports (Radian International LLC and others 1998a and 1998b).

2.2 MINIMIZATION

Methods to minimize disturbance to Waters of the U.S. include: 1) alignment refinements; 2) stream crossing techniques; 3) design criteria; and 4) mitigation to reduce indirect impacts.

2.2.1 Alignment Refinements

As discussed above under 2.1 AVOIDANCE, TRRC has refined portions of the alignments considered in Tongue River I and Tongue River II. In addition to avoiding some Waters of the U.S., these refinements also serve to minimize fill placement in the Tongue River floodplain. By moving the alignment away from the Tongue River, impacts to tributary drainages also are minimized since the wider mouths of tributary drainages are avoided and crossings occur in narrower upstream segments of the streams.

TRRC has evaluated additional alignment refinements to further avoid or minimize impacts to Waters of the U.S. However, additional refinements do not meet design, operational or safety criteria for the project. Unlike other linear projects such as pipelines, powerlines, or, to a lesser extent roads, railroad alignments are less conducive to realignment. Curvature, grade, and cut and fill balance affect the feasibility of additional rail route modifications.

2.2.2 Stream Crossings

The placement of fill in major stream crossings would be minimized by using bridges. Bridge crossings are proposed for the two crossings of the Tongue River, and for Otter and Hanging Woman creeks. Drainages with ephemeral or seasonal flow would be crossed using culverts and fill. Figures 3 to 7 depict typical plans for stream crossings and fill placement.

Construction of all stream crossings, including bridges, culverts and activities requiring stream bank encroachments (riprap, for example), would occur during periods of low flow in the streams affected.

2.2.3 Design Criteria

Design criteria that would be used to minimize disturbance include:

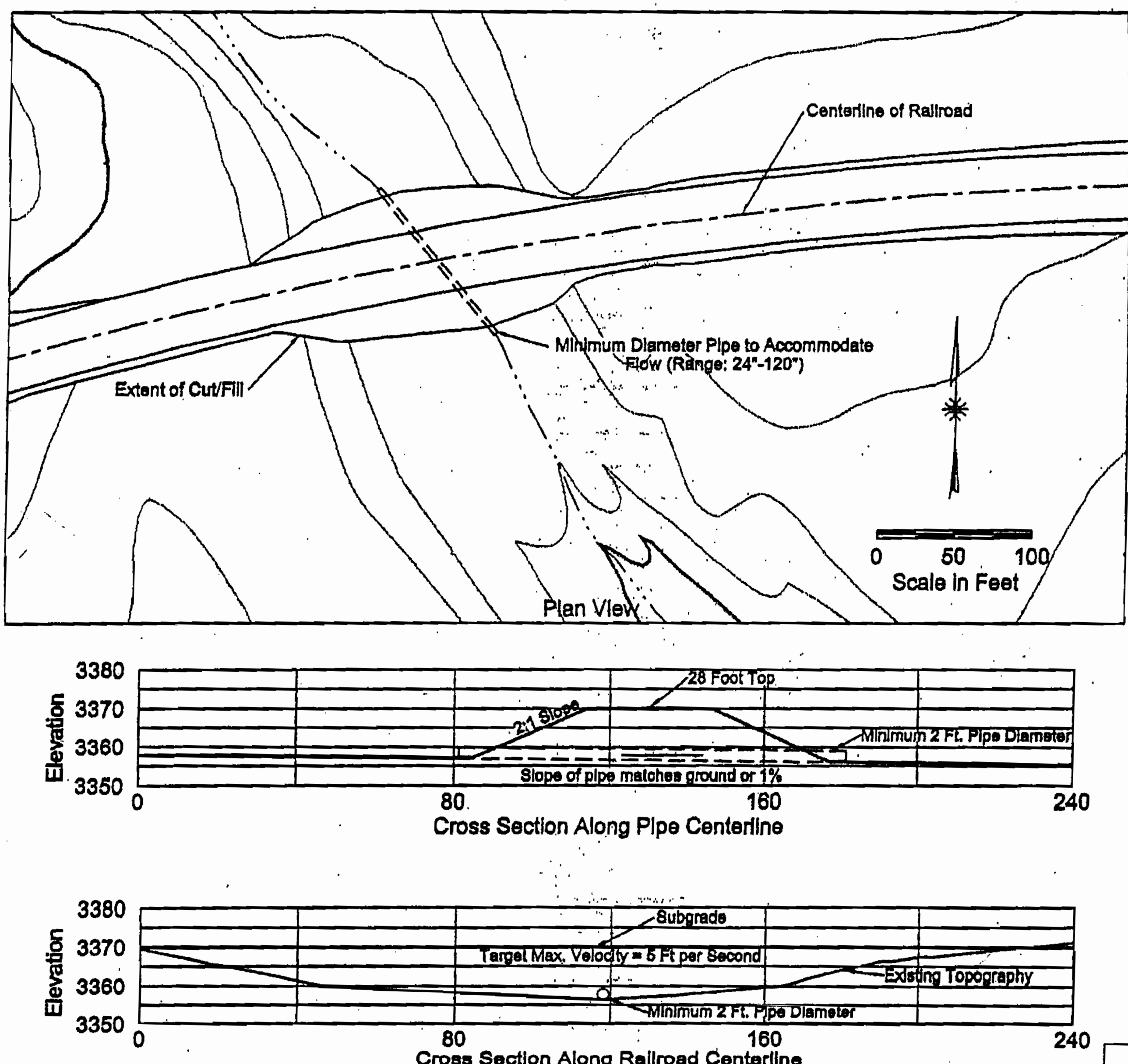
- evaluate whether steeper cut or fill slopes may be appropriate to minimize disturbance width in wetlands. TRRC would construct the steepest slope that would be stable for operations and not pose an erosion problem. For example, if a 1.75H:1V slope would be stable and would reduce fill placement, it would be constructed rather than a flatter 2H:1V slope.

- locate ancillary facilities and sidings to minimize fill placement in Waters of the U.S.

2.2.4 Mitigation to Reduce Indirect Impacts

Measures that would be implemented to reduce the probability of indirect impacts include:

- avoid fill placement in perennial streams by constructing bridges with clear spans and concrete abutments (Figure 7) where possible. If clear spans are not feasible on longer stream crossings, concrete piers could be installed. The use of concrete structures rather than earthen fills would reduce potential downstream sedimentation.



NOTES:

1. Design flow velocity is 5 feet per second.
2. Downstream end treatments to be used (contingent on necessity):
   - Manufacturer's end section
   - Rock splash pad
   - Rock trench
3. Culvert slope matches ground slope or is reduced to 1%.
4. Design discharges:
   - Pass 10-year peak with inlet control
   - Pass 25-year peak with 2 pipe diameters upstream head
   - Safely pass 100-year peak without overtopping the track

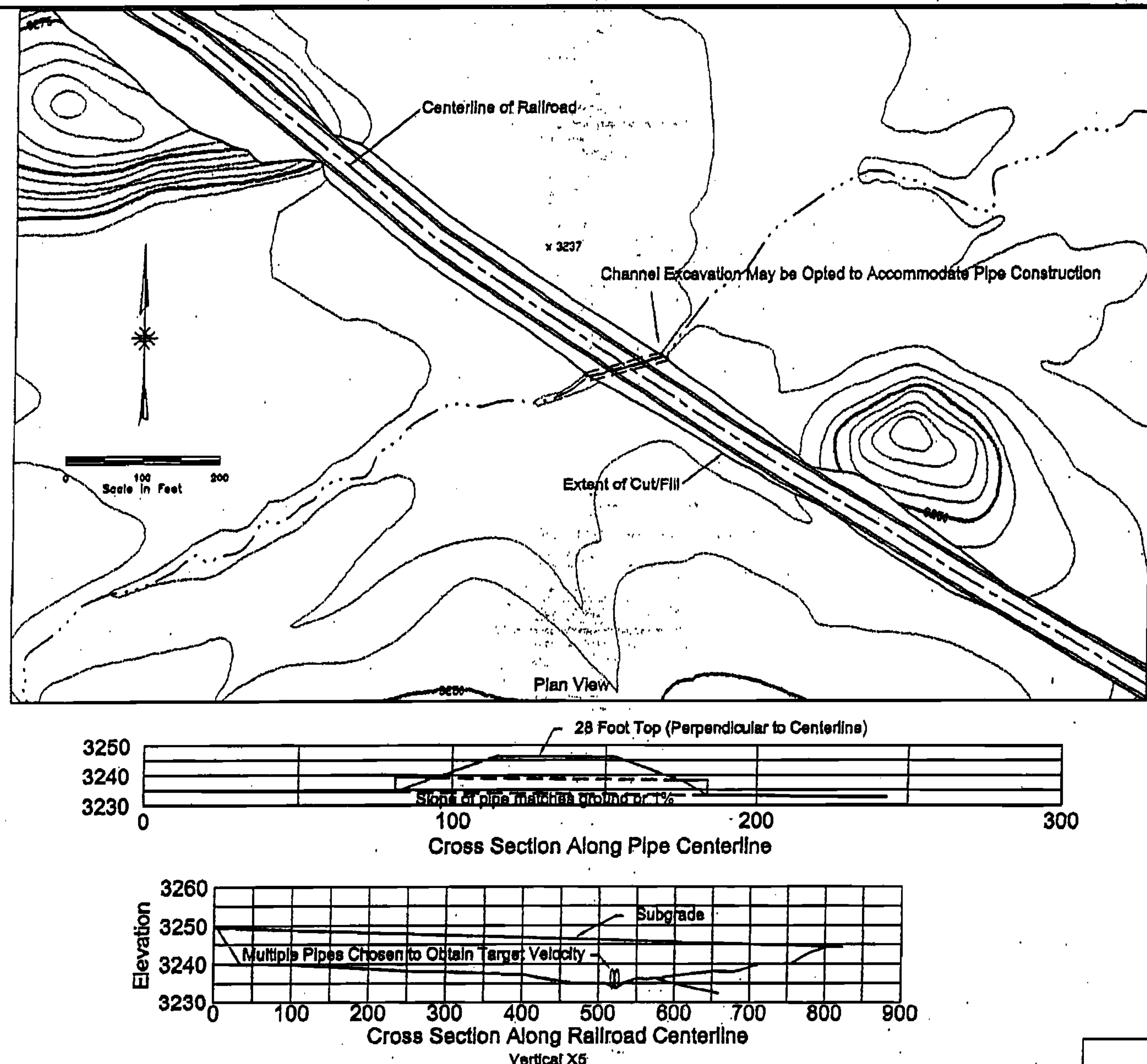
Prepared By
Mission Engineering, Inc.
Civil Engineering • Transportation Design • Mine Planning
Phone (406) 248-3233 Fax (406) 248-3367
730 East Main, Ste. 206, Billings, MT. 59105

SCALE: AS NOTED
DATE: APRIL 1999
DRAWN BY: MEI
CHECKED BY: MEI
FILE: SIMPLCHN.DWG

TYPICAL SIMPLE DRAINAGE CROSSING

TONGUE RIVER RAILROAD

FIGURE 3



NOTES:

1. Design flow velocity is 5 feet per second.
2. Downstream end treatments to be used (contingent on necessity):
   - Manufacturer's end section
   - Rock splash pad
   - Rock trench
3. Culvert slope matches ground slope or is reduced to 1%.
4. Design discharges:
   - Pass 10-year peak with inlet control
   - Pass 25-year peak with 2 pipe diameters upstream head
   - Safely pass 100-year peak without overtopping the track

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DATE: APRIL 1999
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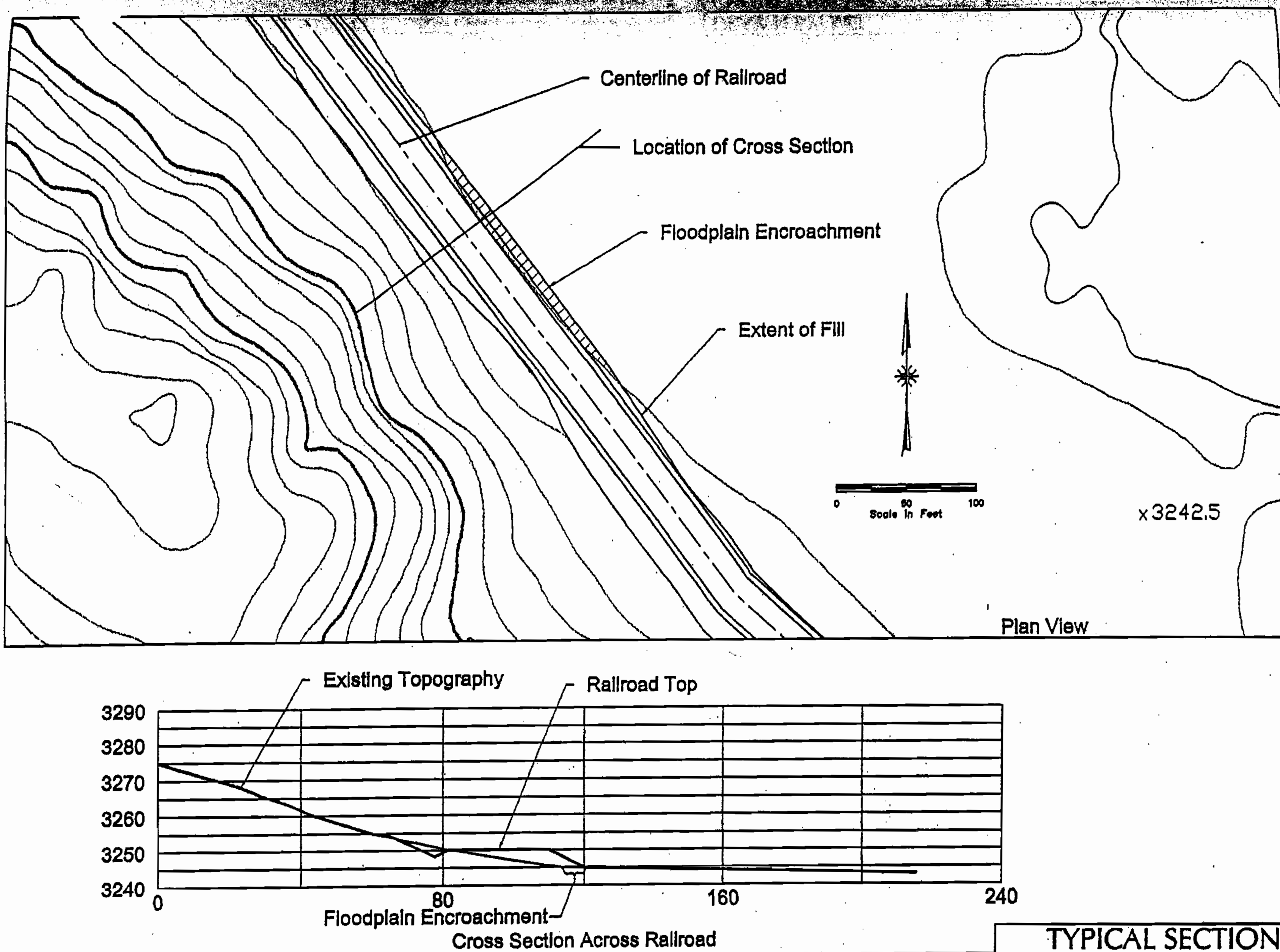
FILE: COMPCHAN.DWG

TYPICAL CROSSING OF DRAINAGE WITH FLOODPLAIN

TONGUE RIVER RAILROAD

FIGURE 4



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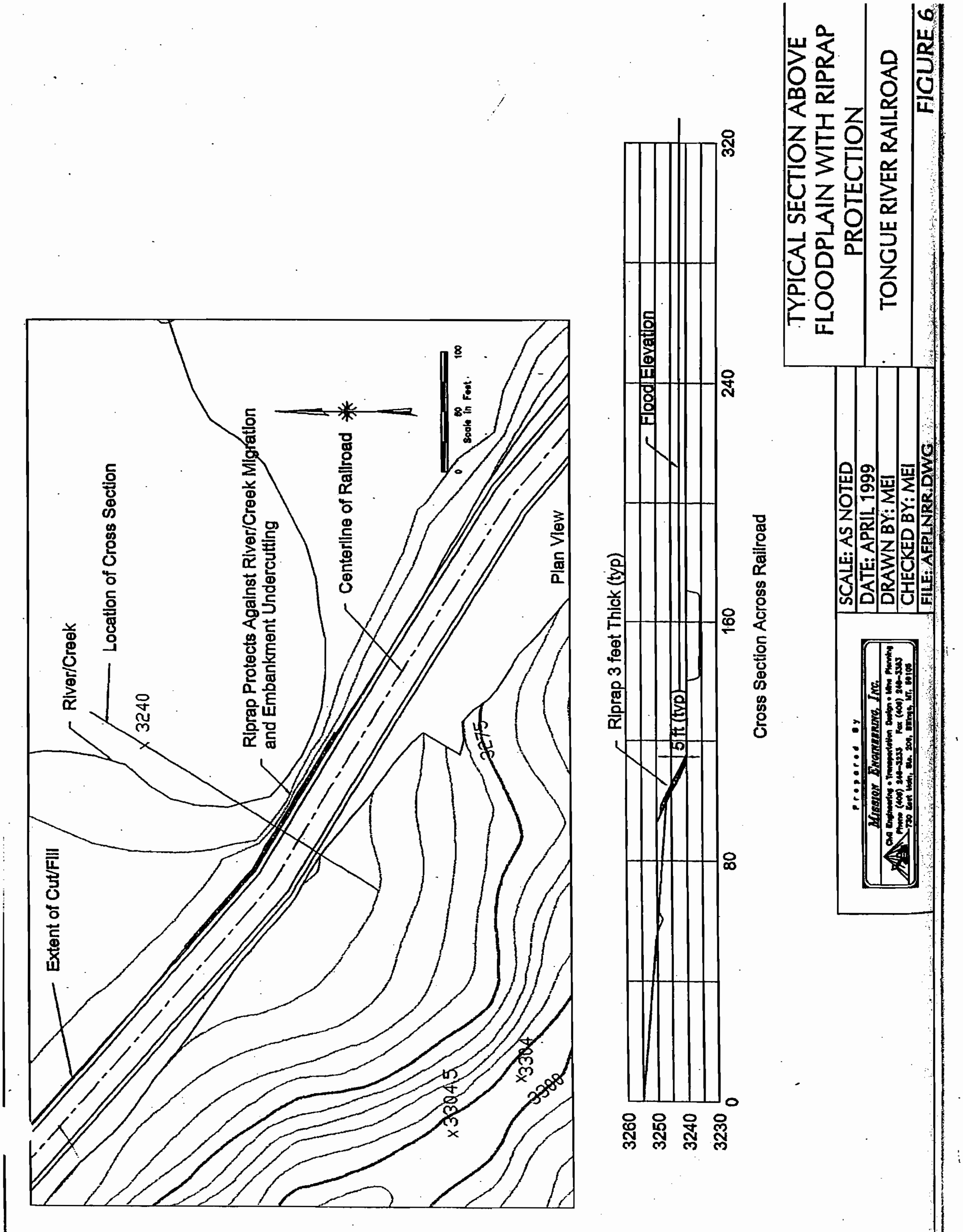
FILE: FPENCRO.DWG

TYPICAL SECTION SMALL FLOODPLAIN ENCROACHMENT
TONGUE RIVER RAILROAD
FIGURE 5


Extent of Cut/Fill
River/Creek
Location of Cross Section
3240
Riprap Protects Against River/Creek Migration and Embankment Undercutting
Centerline of Railroad
Scale In Feet
0
50
100
Plan View
3275
x3304.5
x3304
3300
Riprap 3 feet Thick (typ)
5 ft (typ)
Flood Elevation
3260
3250
3240
3230
0
80
160
240
320
Cross Section Across Railroad
TYPICAL SECTION ABOVE FLOODPLAIN WITH RIPRAP PROTECTION
TONGUE RIVER RAILROAD
FIGURE 6
SCALE: AS NOTED
DATE: APRIL 1999
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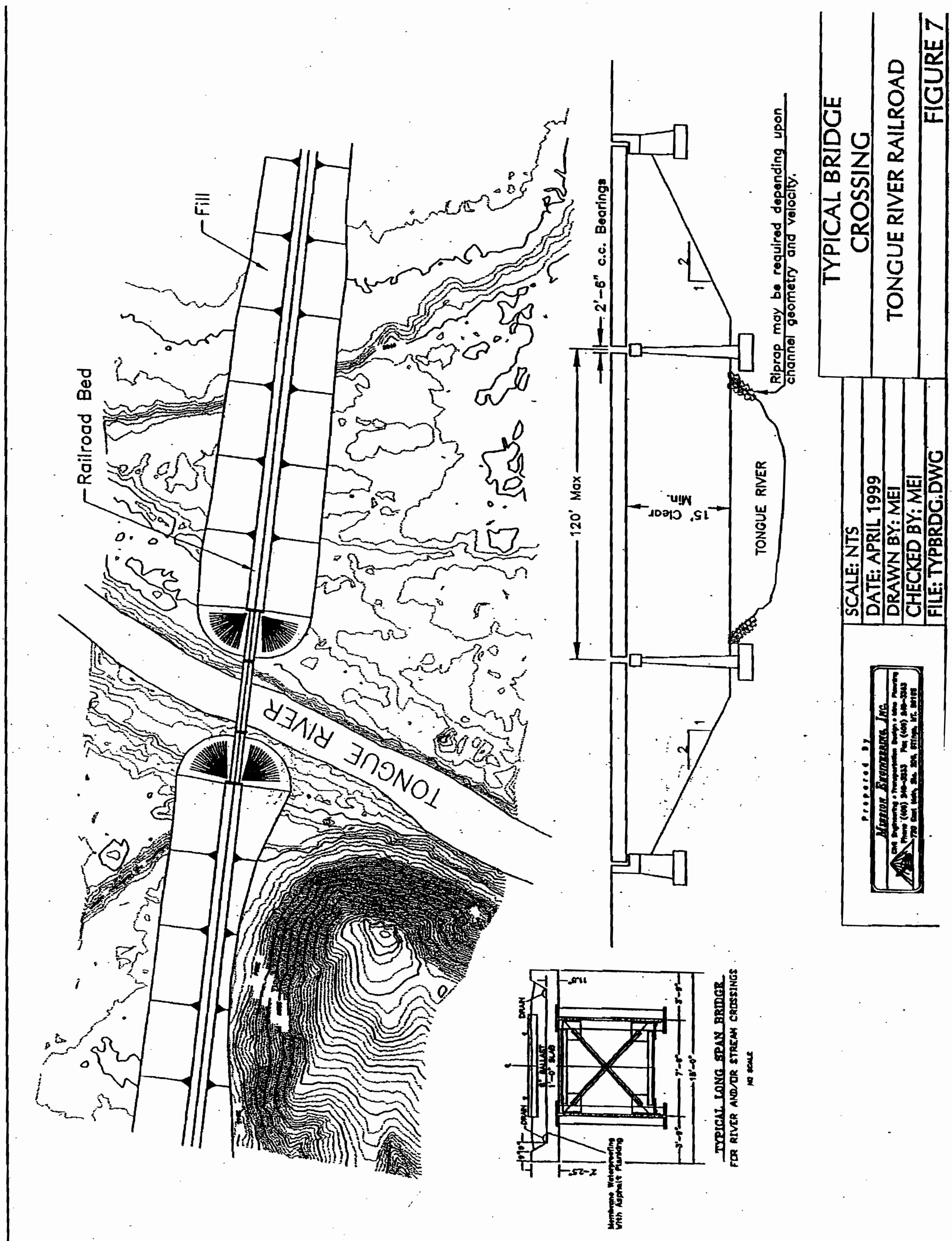
FILE: AFPLNRR.DWG
Prepared By
Mission Engineering, Inc.


Fill
Railroad Bed
TONGUE RIVER
2'-6" c.c. Bearings
120' Max
15' Clear Min.
TONGUE RIVER
Riprap may be required depending upon channel geometry and velocity.
TYPICAL LONG SPAN BRIDGE
FOR RIVER AND/OR STREAM CROSSINGS
TYPICAL BRIDGE CROSSING
TONGUE RIVER RAILROAD
FIGURE 7
SCALE: NTS
DATE: APRIL 1999
DRAWN BY: MEI
CHECKED BY: MEI
FILE: TYPBRDG.DWG
Prepared by
Mission Engineering, Inc.

- provide properly engineered bank stabilization on fill slopes susceptible to erosion from high flows. Figures 6 and 7 show conceptual bank stabilization using riprap. TRRC would consult with the Environmental Protection Agency (EPA) to implement EPA's river bank stabilization methods at bridge crossings and riprap areas to prevent soil erosion and sedimentation loading to streams and the Tongue River. Some of these methods would include placing logs, root wads, and vegetative plantings with rock riprap along the bridge sites and stream encroachment areas. To prevent unnecessary degradation of water quality due to erosion, revegetation efforts would begin as soon as possible after construction is completed in a given area. EPA's design specifications for river bank stabilization are presented in Appendix E to TRRC's Environmental Report for the Western Alignment (Radian International LLC 1998).

- where the railroad grade infringes upon the floodplain, install drainage structures to assure that the grade does not restrict or reroute the 25-year flood.

- prepare a Stormwater Pollution Prevention Plan and Erosion Control Plan in accordance with MPDES Stormwater Permit requirements and Montana Department of Transportation guidelines. Best Management Practices (BMPs) which are currently planned for erosion control during construction include:

  - spreading stockpiled topsoil, seeding, fertilizing, and mulching of approximately 20 percent of the slopes in cut and fill areas. The remainder of the slopes are expected to contain a large amount of rock and clinker material which will not support vegetation and which should provide a degree of armoring to the slope surface to reduce erodibility
  - silt fences
  - slope drains
  - run-on diversion control
  - waterway protection at the Tongue River and other perennial stream crossings (includes various BMPs)
  - pipe inlet/outlet protection
  - ditch sediment traps
  - runoff interception ditches
  - benching systems to route runoff transversely across the face of higher cuts and fills. Drainage routed to rock riprap-lined flumes
  - sediment traps
  - rock check dams

- conduct aquatic resource sampling (stream habitat survey, benthic macroinvertebrate and fish spawning surveys) where the rail line would cross the Tongue River or where extensive riprap would occur and develop appropriate mitigation measures that could include:

- preparation of a construction schedule which, if possible and practical, provides for instream work at those times that are 1) least critical to the specific fishery or aquatic resource occurring at a site, and 2) least conducive to sediment transport. These periods could differ by stream and species affected
- development of special procedures for the handling of displaced materials and petroleum products in order to prevent introduction of such materials into the aquatic system. These procedures would be dictated by site specific geographic and construction criteria
- filtering water, resulting from dewatering for footing construction, through settling pond systems
- assuring that riprap is washed and essentially silt free
- double-shifting of work crews at river crossing sites to minimize the duration of construction activities in or near stream banks

- implement reclamation and revegetation of the ROW at the earliest possible time after clearing has been completed. Revegetation would be implemented only in those ROW areas with adequate substrate and grade. In most cases, revegetation could not begin until construction is complete. However, wherever possible, construction and attendant revegetation would be expedited. The following are general practices that would be employed in the reclamation/ revegetation process:

  - conduct thorough preconstruction planning
  - commence reclamation as soon as practicable after construction ends, with the goal of rapidly reestablishing ground cover on disturbed soils that could support vegetation by mulching and seeding as they are completed
  - avoid reclamation when soil moisture is high or the ground is frozen
  - analyze site soil requirements and seasonal precipitation patterns to identify planting dates for optimal revegetation success
  - use rapidly establishing plant species for thorough and rapid ground surface protection
  - retain a reclamation specialist to determine specific procedures for reclamation on steep slopes or locations near waterways
  - prepare seed mixes, fertilizer rates and other soil amendment application based on soil chemical and physical properties, with emphasis on native species where possible
  - segregate topsoil from subsoil and stockpile soil for later application on the ROW

- use appropriate seeding techniques, such as drill seeding on level terrain and broadcast or hydroseeding on slopes, to ensure seed distribution
- apply mulch, such as straw, as a temporary erosion control measure and to minimize soil temperature fluctuations and soil moisture loss. Mulch would be applied more heavily on slopes than on level terrain and nitrogen levels would be adjusted if necessary to reflect the increased demand during mulch decomposition
- conduct monitoring on reclamation and implement remediation as necessary

2.3 COMPENSATION

Although avoidance and minimization have been employed to the extent practicable to mitigate impacts to Waters of the U.S., unavoidable impacts would result from the project. These unavoidable impacts would be mitigated by a combination of measures implemented during and following construction.

The primary mitigation for non-wetland incised drainages would be placement of culverts through the fill to ensure surface water flows are maintained.

TRRC is evaluating alternative methods to mitigate for wetlands filled by construction and is currently considering two alternatives: 1) TRRC wetland creation near the proposed alignment and 2) wetland mitigation by government agencies or conservation organizations ("third parties"). Wetland mitigation by parties other than TRRC could include wetland creation, restoration of former wetlands or enhancement of existing wetlands. TRRC involvement in wetlands mitigation by others could involve providing technical expertise, financial support and/or obtaining suitable property for wetland mitigation. Mitigation alternatives will be explored during the 404 permitting process.

TRRC has not yet contacted agencies or conservation organizations to assess the feasibility of wetland mitigation by a third party, therefore it is not discussed further in Section 3.0. Section 3.0 addresses the alternative of wetland creation by TRRC.

3.0 COMPENSATORY MITIGATION IMPLEMENTATION PLAN

This section describes TRRC's approach to mitigate unavoidable impacts to Waters of the U.S. Section 3.1 addresses non-wetland drainageways and Section 3.2 addresses wetlands and the open water component of ponds. As discussed above (Section 2.3), wetland creation by TRRC is one alternative being considered. If wetland mitigation by a third party becomes a feasible alternative, wetland creation discussed in Section 3.2 may not be implemented.

3.1 NON-WETLAND WATERS

3.1.1 Goals

The goals of mitigation for non-wetland drainages are to:

- maintain stream flow
- avoid changes in downstream channel morphology
- minimize increased sediment loading from railroad construction or erosion of fill slopes

Methods to achieve these goals are presented in Section 3.1.4.

3.1.2 Types of Habitats to Be Created

Non-wetland drainages are currently classified in one of the following types:

Type	Code
Riverine - intermittent - stream bed - temporary flow	R4SBA
Riverine - intermittent - stream bed - seasonal flow	R4SBC
Riverine - lower perennial - open water	R2OW

Mitigation will retain the flow status, however, where culverts are used the stream bed characteristic will change from a natural soil, rock or vegetated channel to a culvert for the width of the embankment.

3.1.3 Functions of Habitats to Be Created

The modification of ephemerally or seasonally flowing channels from a natural condition to a culvert would not affect the primary function of the drainage which is transport of surface flow. The hydrological regime at drainage crossings would not be substantially altered by construction.

Since the primary function of non-wetland drainages would be maintained, TRRC does not propose to create off-site non-wetland drainages.

3.1.4 Construction

Construction methods would be designed to achieve the goals listed above. Construction methods appropriate to each goal are:

Goal	Construction Method
Maintain stream flow	Install culverts properly designed for each drainage to accommodate temporary and seasonal flow preventing over-topping of the fill. Culvert intakes would be protected as necessary. Bridge perennial streams.
Avoid changes in downstream channel morphology	Design and install dissipators or channel stabilization devices below culvert outlets where flow may alter the downstream channel.
Minimize increased sediment loading from railroad construction or erosion of fill slopes	Implement Best Management Practices (BMPs) during construction to control sedimentation. Fill slopes across drainages would be vegetatively stabilized or, where necessary, armored with rock to reduce erosion and sedimentation. Erosion control practices would be in accordance with TRRC's Stormwater Permit.

3.1.5 Schedule

Since most affected drainages flow ephemerally or seasonally, these crossings are likely to occur in dry streambeds. If flow is present, TRRC would install culverts (flumes) such that equipment would not be working in a flowing stream. Temporary bridges (such as railroad flat cars or timber mats) also would be installed where necessary across flowing streams to minimize equipment fording.

Culvert installation would occur early in the construction schedule so that equipment may travel along the ROW.

Temporary erosion control products would be in place prior to construction or would be available on-site for installation prior to anticipated precipitation or flow events.

Final erosion control, including revegetation or slope stabilization products, would be conducted during the first appropriate season following construction with the goal of completing final erosion control prior to the next runoff season.

Maintenance would occur throughout the operational life of the railroad.

3.1.6 Abandonment

TRRC will adhere to regulatory requirements applicable to the rail line at the time of any abandonment.

3.2 WETLANDS

3.2.1 Goals

The goals of wetland creation are to:

- create self-sustaining wetlands and open water habitat
- locate created wetlands in the Tongue River Valley as close to disturbed wetlands as possible
- establish wetlands with types and functions as similar to those disturbed as possible
- minimize impacts to existing wetlands at mitigation sites

3.2.2 Types of Habitats to Be Created

Mitigation would be designed to create palustrine wetlands and open water habitat with elements of the following types:

Type	Code
Palustrine - open water	POW
Palustrine - emergent	PEM
Palustrine - scrub/shrub	PSS
Palustrine - forested (deciduous)	PFO

3.2.3 Functions of Habitats to Be Created

The primary functions of proposed created wetlands include:

- general wildlife habitat: moderate to substantial use by aquatic/semi-aquatic and non-aquatic species
- flood attenuation and storage
- sediment retention and removal
- food chain support

3.2.4 Wetland Creation Sites

Location

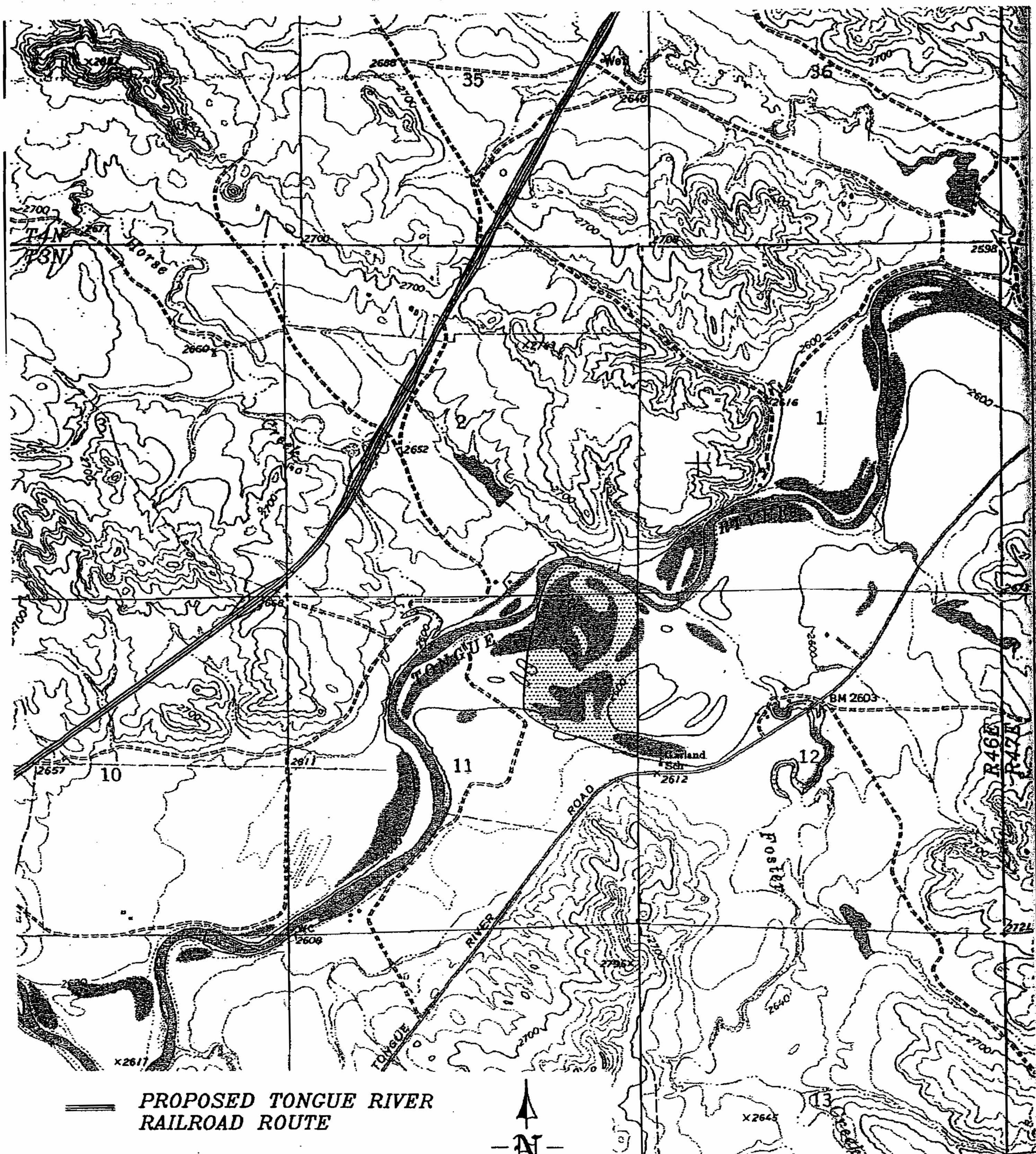
Figures 8 through 11 show the locations of alternative sites tentatively identified for wetland creation. Sites are located on the northern, central and southern portions of the ROW near the proposed railroad. The potential sites occur on Sixmile, O'Dell and Monument creeks, at an oxbow of the Tongue River near Garland School and on terraces of the Tongue River near the mouth of O'Dell Creek. Subsequent site screening may add new sites or delete identified sites. The ultimate size of created wetlands would depend on final delineation of impacted wetlands.

Stockwater ponds may be constructed as part of mitigating impacts to livestock operations. Where feasible, these stockwater ponds would be designed to create wetlands.

Ownership

Identified wetland creation sites are on private ownership as follows:

Alternative Site	Landowner
Tongue River oxbow near Garland School	L. and D. Hirsh
Sixmile Creek	K. and G. Shaw
O'Dell Creek/Tongue River terraces	Jack Knobloch/Jay Nance
Monument Creek	MonTaylor Corp.



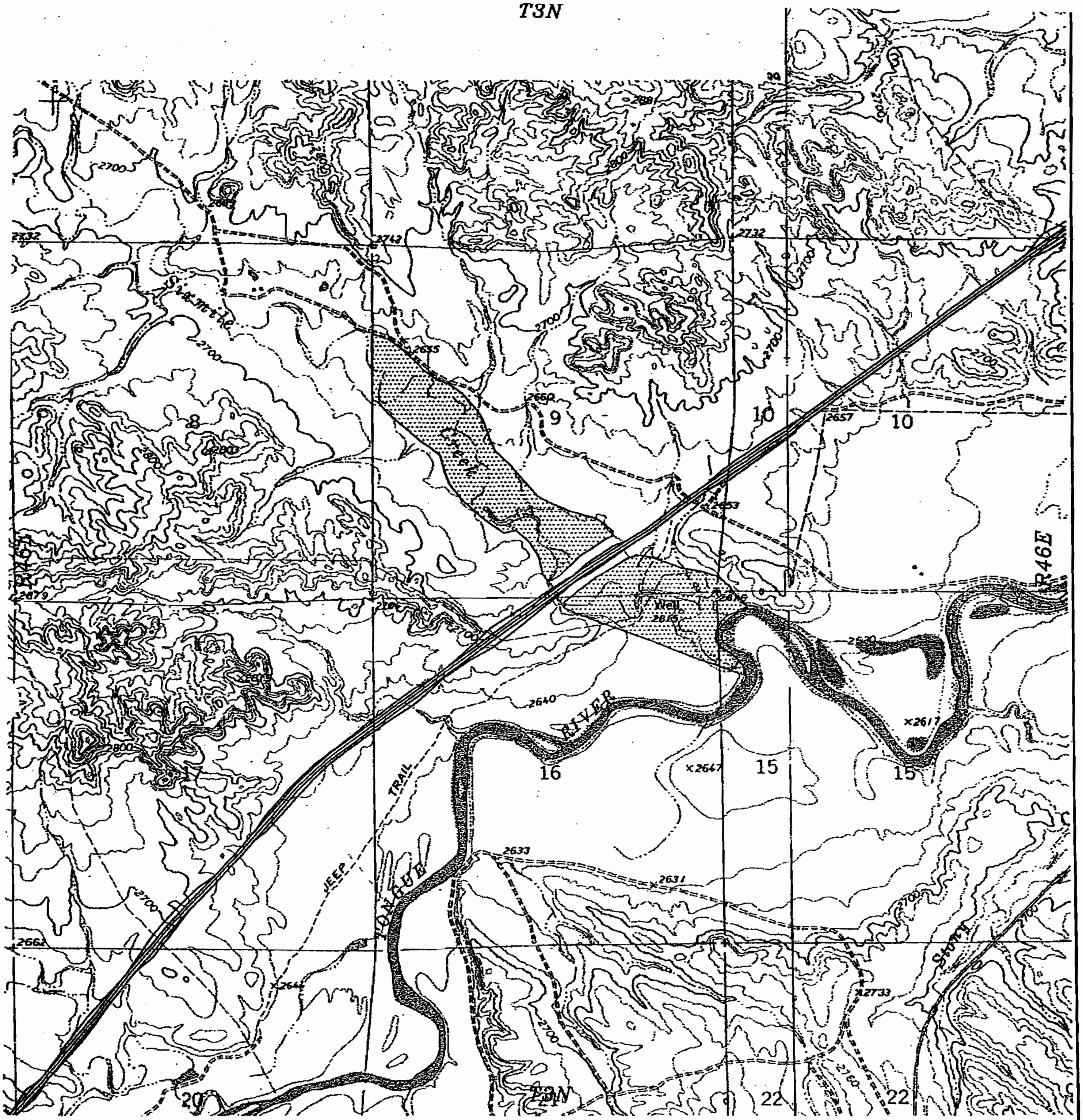
PROPOSED TONGUE RIVER RAILROAD ROUTE

ALTERNATIVE WETLAND CREATION/ENHANCEMENT SITE

N

WESTECH
Environmental Services, Inc.
P.O. Box 6045
Helena, Montana 59604

SCALE: 1:24,000	ALTERNATIVE WETLAND CREATION/ENHANCEMENT SITE - TONGUE RIVER OXBOW NEAR GARLAND SCHOOL
DATE: APRIL 1999	
DRAWN BY: DC	
CHECKED BY:	TONGUE RIVER RAILROAD
FILE: TRRR99A12.DWG	FIGURE 8



PROPOSED TONGUE RIVER RAILROAD ROUTE

ALTERNATIVE WETLAND CREATION SITE

ALTERNATIVE WETLAND CREATION SITE - SIXMILE CREEK

TONGUE RIVER RAILROAD

FIGURE 9

WESTECH Environmental Services, Inc.
P.O. Box 6045
Helena, Montana 59604

SCALE: 1:24,000
DATE: APRIL 1999
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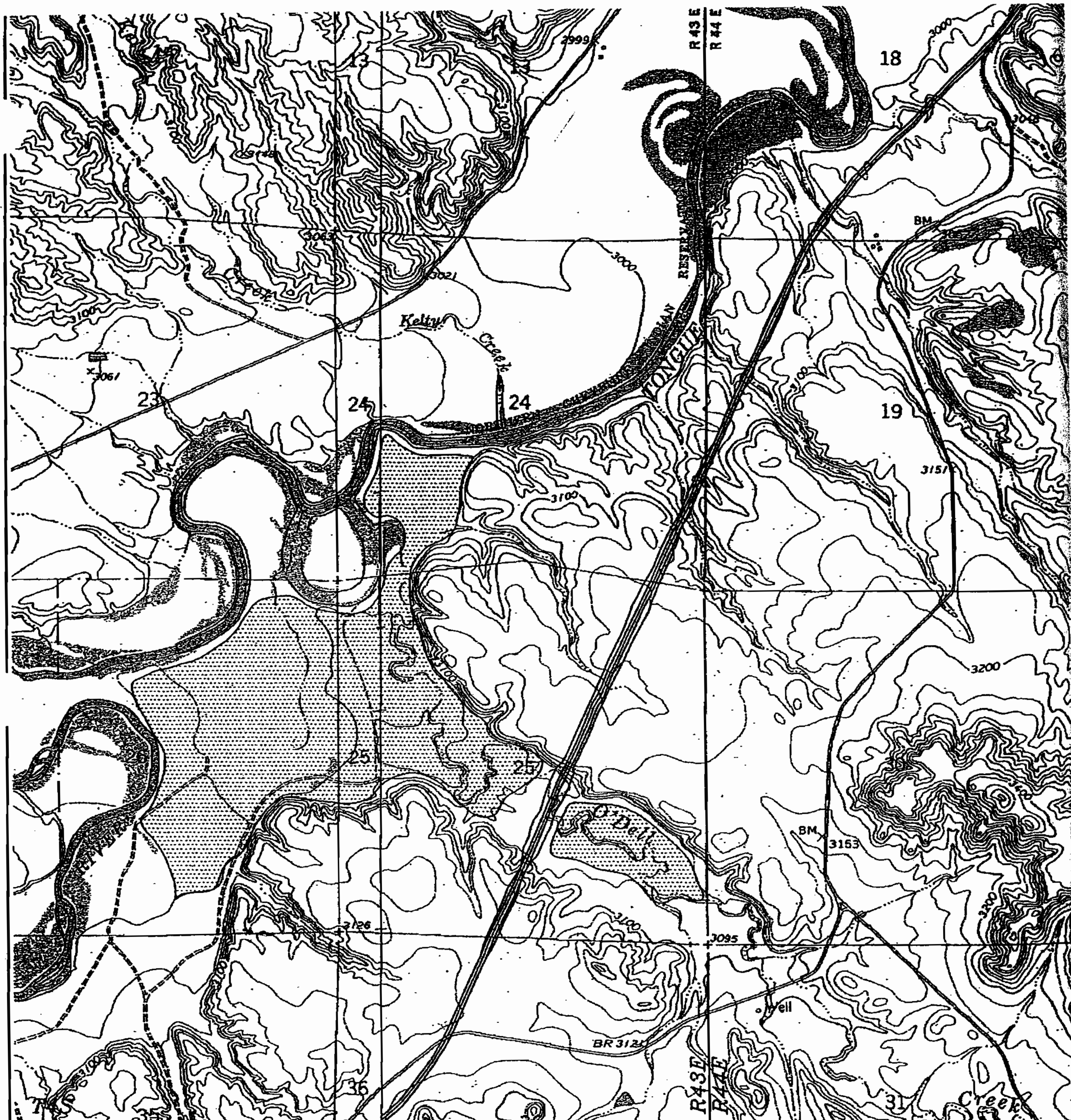
CHECKED BY:
FILE: TRRR99A13.DWG



PROPOSED TONGUE RIVER RAILROAD ROUTE

ALTERNATIVE WETLAND CREATION SITE

N

WESTECH
Environmental Services, Inc.
P.O. Box 6045
Helena, Montana 59604

SCALE: 1:24,000
DATE: APRIL 1999
DRAWN BY: DC
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FILE: TRRR99A05.DWG

ALTERNATIVE WETLAND CREATION SITE - O'DELL CREEK AND TONGUE RIVER TERRACE

TONGUE RIVER RAILROAD

FIGURE 10

PROPOSED TONGUE RIVER RAILROAD ROUTE

ALTERNATIVE WETLAND CREATION SITE

N

ALTERNATIVE WETLAND CREATION SITE - MONUMENT CREEK

TONGUE RIVER RAILROAD

FIGURE 11

WESTECH
Environmental Services, Inc.
P.O. Box 6045
Helena, Montana 59604

SCALE: 1:24,000
DATE: APRIL 1999
DRAWN BY: DC
CHECKED BY:
FILE: TRRR99A06.DWG

Landowner negotiations have not been initiated and, pending results of these negotiations, some sites may be unavailable. Additional sites would be identified if necessary to achieve mitigation goals.

Site Characteristics

A review of the Initial Waters Report, aerial photos, and county soil surveys (NRCS 1977, 1996 and 1999) provided the following general description of each site:

Site	Characteristics
Tongue River oxbow near Garland School (Figure 8)	Waters of the U.S.: This site is outside the standard 400-foot wide ROW corridor and was not evaluated as part of the Initial Analysis Report. It was, however, observed during a site visit on March 17, 1999. The lowest portions of the oxbow are palustrine - open water (POW) with an adjacent palustrine - emergent (PEM) type. Non-wetland riparian forest and riparian grassland border the existing wetland. Soils: Mapping Unit 451A, Glendive fine sandy loam, 0 to 2 percent slopes, occasionally flooded, is present at the site. This well drained, deep soil formed in stratified calcareous alluvium of the Tongue River. Vegetation: The PEM wetland is dominated by bulrushes and common cattail. Mature cottonwood with an understory of western snowberry is present in the riparian forest while prairie sand reedgrass and inland saltgrass dominate the riparian grassland. Hydrologic regime: Water is present in the lowest portion of the oxbow throughout most of the growing season. Saturated soils adjacent to the standing water likewise occur throughout most of the growing season. The riparian forest and grassland are likely subirrigated at depths greater than 18 inches below the surface. Land use: The mitigation site and surrounding area are used for livestock grazing. The Hirsh property is under Conservation Easement (CE) to the Montana Department of Fish, Wildlife and Parks (MDFWP). The CE limits the land use to "livestock grazing and directly related agricultural land management activities". The CE provides for public recreational hunting.

Site	Characteristics
Sixmile Creek (Figure 9)	<u>Waters of the U.S:</u> Sixmile Creek (WUS site NE-85) has been tentatively classified as a riverine - intermittent - streambed - seasonal flow channel (R4SBC) with the palustrine - emergent type (PEM1C) present along the channel and in low areas in the floodplain. See Table 2. <u>Soils:</u> The Yamacall and Havre series (mapping unit 30C) are present in the valley bottom. These very deep, loamy soils are formed from alluvium. Slopes are 0 to 8 percent and occasionally flooded. <u>Vegetation:</u> Dominant species in the existing wetland along the creek include Baltic rush, spikesedge, bulrush and sedge species. The non-wetland portion of the site is dominated by silver sagebrush, western wheatgrass, alkali sacaton, inland saltgrass and various forbs. <u>Hydrologic regime:</u> The Sixmile Creek valley receives seasonal surface flows from snow melt and precipitation events and may receive groundwater inflow from a coal seam that outcrops in cut banks along the valley. <u>Land use:</u> The mitigation site and surrounding area are used for livestock grazing. The Shaw property is under CE to MDFWP. The CE limits the land use to "livestock grazing and directly related agricultural land management activities". The CE also provides for public recreational hunting.
O'Dell Creek (Figure 10)	<u>Waters of the U.S.:</u> O'Dell Creek (WUS site #NE-199) is classified as a riverine - intermittent - streambed - seasonal flow channel (R4SBC) with a fringe of the palustrine - emergent type (PEM1C). See Table 2. <u>Soils:</u> Mapping Unit 36 - Borollic Camborthids - Ustic Torrifluvents Complex, 0 - 8 percent slopes are present at the site. These very deep (>60 inches) sandy loam to clay soils formed from alluvium on alluvial fans, stream terraces and floodplains. <u>Vegetation:</u> Silver sagebrush/western wheatgrass and greasewood/western wheatgrass communities occur on terraces with scattered plains cottonwood along O'Dell Creek. <u>Hydrologic regime:</u> O'Dell Creek flows seasonally in response to snow melt and precipitation events. Because of the large drainage basin which includes higher elevations to the east, runoff may extend well into the growing season in some years. <u>Land use:</u> The wetland mitigation area and surrounding areas are used for livestock grazing.

Site	Characteristics
Tongue River terrace at O'Dell Creek (Figure 10)	Waters of the U.S.: This site is outside the standard 400-foot wide ROW corridor and was not evaluated as part of the Initial Waters Report. It was, however, inventoried during baseline studies for the proposed Montco Mine. Most of the terraces at the site are upland, however the Tongue River oxbow at the mouth of O'Dell Creek is comprised of palustrine - open water and palustrine - emergent types dominated by common cattail. Soils: Three soils mapping units are present: 97 - Harlem silty clay loam, 0 - 2 percent slopes, occasionally flooded 99 - Havre loam, 0 - 2 percent slopes 198 - Yamac loam, 2 - 8 percent slopes Vegetation: Most of the site is covered by the greasewood/western wheatgrass and western wheatgrass/blue grama community types. Other types also present include common cattail marsh, silver sagebrush/western wheatgrass, riparian forest and agricultural land. Hydrologic regime: The lowest terrace (Harlem soil) is occasionally flooded while higher terraces are rarely flooded. The depth to water is greater than six feet over most of the site except in and adjacent to the common cattail marsh in the Tongue River oxbow. Land use: The majority of the site is used for livestock grazing. Flood irrigated hay meadows are present on lower terraces.
Monument Creek (Figure 11)	Waters of the U.S.: Monument Creek (WUS site #NE-289) is identified as a non-wetland incised drainage classified as riverine - intermittent - streambed - seasonal flow (R4SBC). See Table 2. Soils: Soils along the creek are mapping unit CG - Chugter complex, 2 - 15 percent slopes while adjacent hillsides are Wp - Wibaux loam. Vegetation: Dominant vegetation includes silver sagebrush, western wheatgrass and needle-and-thread grass. Big sagebrush, grassland and ponderosa pine types dominate the hillsides above Monument Creek. Hydrologic regime: Monument Creek flows seasonally in response to snow melt and precipitation events. The lower valley west of the Tongue River Reservoir will be flooded by the reservoir as a result of the current reconstruction of the Tongue River dam. Land use: The site and adjacent areas are used for livestock grazing. Proximity to Tongue River Reservoir likely increases wildlife use of the area.

3.2.5 Conceptual Construction Plan

Site Inventory

Pre-construction surveys and inventories would be conducted on proposed mitigation sites to assess site suitability for wetland mitigation and to develop specific construction plans. These inventories would include:

- topographic survey
- Waters of the U.S. identification and delineation
- stream characteristics survey (channel location, depth, width and bank configuration)
- floodplain delineation
- hydrologic characterization (drainage basin size, hydroperiod, flow rates)
- soils inventory and assessment of suitability for ponding and support of wetland vegetation
- vegetation survey and assessment of sensitive plants
- wildlife reconnaissance to assess T/E animals, prairie dog colonies and general wildlife use
- cultural resource inventory
- water rights evaluation
- potential conflicts with land uses such as mineral extraction

Grading/Contouring

Sites would be graded and contoured to provide a mix of palustrine types including open water, emergent, scrub/shrub and forested.

Grading would be designed to avoid steep banks unsuitable for establishment of wetland vegetation. Gentle slopes and terraces would be installed as appropriate to reflect hydroperiod and fluctuating water levels. Islands would be constructed within larger open water areas.

Grading could involve excavation or embankment construction, or creation of ditches or spreader dikes depending upon site conditions. Structures would be designed in accordance with sound engineering practices. Agencies or organizations experienced in constructing similar facilities (such as the Natural Resources Conservation Service, Bureau of Land Management, MDFWP, Montana Department of Natural Resources and Conservation, Montana Department of Transportation, Ducks Unlimited, and The Nature Conservancy) may be consulted as appropriate to determine design criteria found to be successful in the region.

Wetland Hydrology Establishment

Wetland hydrology would be established by detaining surface waters or excavating to ground water. Detention of surface waters would be appropriate for those sites occurring along intermittent drainages. Detention would be accomplished by constructing flow barriers (dams, dikes or embankments) or by excavation. Depending on stream flow characteristics, detention would be inline (in the stream) or offline (on a stream terrace with water diverted to the terrace).

Ground water interception would be suitable where ground water occurred within a reasonable excavation depth. The alternative mitigation sites at the Tongue River oxbow near Garland School, Tongue River terrace near the mouth of O'Dell Creek and Sixmile Creek may meet this criterion. Existing wetlands at these sites could be expanded by excavation using a shared water supply.

Soil Handling

It is unlikely that hydric soils are available in appreciable quantity at the alternative mitigation sites along intermittent streams. Although hydric soils are present on portions of the Tongue River sites, these wetlands would not be disturbed by construction of additional wetlands. Since hydric soils would be unavailable for mitigation, existing on-site soils would be salvaged and used for mitigation.

The pre-construction inventory would assess the suitability of these soils to support wetland vegetation. Organic matter, nutrients or other soil amendments may be necessary to provide a suitable plant growth material.

On-site subsoils would be evaluated to determine suitability as construction material and to assess suitability to detain water. If texture, coarse fragment content or other physical parameters resulted in permeability rates not suitable for detaining water, suitable soils would be imported, on-site soils would be amended with clay, or a clay liner would be installed to achieve desired water retention characteristics.

Revegetation

Revegetation would be accomplished by natural succession and by supplemental seeding and planting depending on site conditions and proximity to suitable adjacent wetlands that provide a seed source. Species that may be included in mixtures, if available, for the three palustrine types include:

Type	Species	
Emergent	Prairie cordgrass	Nuttall's alkaligrass
	Nebraska sedge	American bulrush
	Clustered field sedge	Alkali bulrush
	Woolly sedge	Softstem bulrush
	Common spikesedge	Slender wheatgrass
	Needle spikesedge	Western wheatgrass
	Basin wildrye	Alkali sacaton
	Foxtail barley	Sand dropseed
	Baltic rush	Inland saltgrass
	Torrey's rush	Common cattail
	Alkali bluegrass	
Scrub/Shrub	Selected herbaceous species from emergent list	
	Bebb willow	Skunkbush sumac
	Sandbar willow	Bristly currant
	Yellow willow	Wood's rose
	Red-osier dogwood	Black greasewood
	Round-leaved hawthorn	Silver buffaloberry
	Silverberry	Silver sagebrush
	Common chokecherry	American plum
Forested	Selected herbaceous and shrub species from emergent and scrub/shrub list	
	Boxelder	Peachleaf willow
	Plains cottonwood	Green ash

Herbaceous species and shrubs amenable to seeding would be drill or broadcast seeded depending on site conditions, seed characteristics and size of the area. Most shrubs and trees would be planted using containerized or bare root stock of a size suitable to ensure maximum survivability. Where appropriate, planted stock would be inoculated with applicable mycorrhizae.

If available, transplants, sprigs or sod plugs would be used to enhance rapid revegetation and diversity.

Plant communities would be patterned at each site to provide biodiversity.

Site Protection

Since mitigation sites would likely be used by livestock and grazing which could compromise revegetation success, the sites would be fenced or otherwise protected to preclude livestock use until plants were well established (two to five years). If necessary to accommodate livestock operations, downstream tanks or impoundments would be installed or created outside the fenced area.

Wildlife depredation of shrubs and trees would be controlled by repellants or protective devices.

3.2.6 Schedule

The proposed habitat mitigation schedule would be:

Prior to railroad construction:	Landowner/agency negotiations:	March - July[1]
	Site inventories:	July - September
	Water rights appropriations:	May - October
	Final mitigation plan:	October - December
During railroad construction:	Permitting:	January - May
	Wetland mitigation	May - November
Post-construction period:	Monitoring/maintenance:	Five years following wetland mitigation unless success criteria are achieved prior to five years.

[1]Months are listed as an example reflecting a typical schedule; an actual schedule would be developed as mitigation planning is finalized.

3.2.7 As-built Conditions

Within six (6) weeks of completion of mitigation, an as-built report would be submitted to COE describing the mitigation completed. The report would include topographic maps showing as-built contours, location of revegetation types, fences and any other structures.

4.0 MONITORING

Monitoring would be conducted to evaluate wetland creation success and to determine if remediation may be necessary. Specific objectives include:

- quantification of hydrologic, soils and vegetation parameters
- assessment of created wetland size
- delineation of reestablished wetland types
- evaluation of wetland functions
- identification of potential problems

4.1 PARAMETERS AND METHODS

Wetland hydrology, hydric soils, and hydrophytic vegetation will be assessed at created wetlands using methods and criteria established by COE (Environmental Laboratory 1987). Specific field sampling techniques and intensity will be determined in consultation with COE prior to field investigations.

4.1.1 Hydrology

The following field indicators will be monitored as primary evidence of wetland hydrology:

- inundation (area and depth of standing water)
- saturation (area and depth to saturated conditions if area is not saturated to the surface)
- high water marks and low water as observed

4.1.2 Soils

Soils will be evaluated by digging 12 to 18 inch deep pits in each wetland type. Parameters to be recorded include soil drainage, soil saturation, evidence of past inundation, presence of sulfidic materials, mottles or gleying, matrix color, mineral or organic soil, and aquic or peraquic soil regimes.

4.1.3 Vegetation

Vegetation will be inventoried in each wetland type by recording canopy cover of all species encountered. Each plant species will be classified based on its relative fidelity to wetlands using the "National List of Plant Species That Occur in Wetlands: 1988" (Reed 1988 and 1997). Plant species recorded for each sample site will be classified for wetland indicator status and for dominance as determined by percent canopy cover. Each vascular plant species encountered will be classified into one of the five following groups.

1) *Obligate Wetland Plants (OBL):* These plants almost always (estimated probability >99 percent) grow in wetlands under natural conditions.

2) *Facultative Wetland Plants (FACW):* These plants usually grow in wetlands (estimated probability 67 to 99 percent), but occasionally grow in non-wetlands.

3) *Facultative Plants (FAC):* These plants are equally likely to grow in wetlands or non-wetlands.

4) *Facultative Upland Plants (FACU):* These plants usually grow in non-wetlands (estimated probability 67 to 99 percent), but are occasionally found in wetlands.

5) *Obligate Upland Plants (UPL):* These plants almost always occur in non-wetlands (estimated probability >99 percent), based on their relative fidelity to wetlands.

4.1.4 Functions

Functions for each wetland type will be assessed using methods and forms described by Berglund (1996). This methodology is currently used by the Montana Department of Transportation and has been found to be appropriate for use on linear projects.

4.2 SCHEDULE

Monitoring would begin the first growing season following creation and would continue for five years unless success criteria are met prior to five years. Monitoring may be discontinued for any parameter (hydrology, soils, vegetation or functions) after the success criteria for the parameter has been met.

4.3 REPORTING

Annual reports presenting the results of monitoring would be submitted to COE during the first quarter of the year following monitoring. The reports would include:

- names and affiliation of persons collecting and analyzing data and preparing the report
- description of methods
- results by parameter (hydrology, soils, vegetation)
- assessment of functions
- maps or figures identifying monitoring areas, transects or plots and wetland types
- photographs (color) of each site taken from one or more established photo point(s)
- a discussion of potential problems and recommendations for remediation if applicable

4.4 MAINTENANCE DURING MONITORING PERIOD

Monitoring would be designed for early detection of conditions that may jeopardize achieving success criteria. These conditions could include:

- widely fluctuating water levels that do not support wetland vegetation
- loss of wetland hydrology by excessive leakage through the soil substrate
- flood damage
- rapid siltation and filling of open water habitat
- erosion/sedimentation
- development of adverse soil properties (e.g. increased salinity by capillary rise) that could affect species composition of various palustrine types established, primarily scrub/shrub and forested types
- poor seeding or planting success
- vegetation damage from livestock or wildlife grazing/browsing
- invasion by weedy vegetation (noxious or non-noxious)
- non-attainment of desired functions

Most potential problems would be avoided by proper pre-construction design. If problems developed during the monitoring period, however, TRRC would develop maintenance or remediation measures specific to the condition. These measures could include:

- modification of factors affecting the water balance (e.g. increased inflow, reduced outflow)
- installation of erosion control products
- sediment removal
- addition of soil amendments (organic material, fertilizer, pH modifiers) or removal and replacement of poor soils
- supplemental seeding or planting
- grazing/browsing protection
- weed control measures

Any structures associated with construction of the mitigation sites would be inspected to assess proper functioning and stability. Repairs would be made as necessary.

5.0 SUCCESS CRITERIA

In order to be considered successful, created wetlands must meet all criteria listed below.

5.1 COE CRITERIA

Created wetlands would be successful when they meet wetland hydrology, hydric soil and hydrophytic vegetation criteria of the 1987 COE manual (Environmental Laboratory 1987).

Target hydrologic regimes would be established appropriate to the mitigation site. Mitigation sites along intermittent drainages would be expected to have fluctuating water levels reflecting runoff amount and duration in addition to other variables. The mitigation sites on the Tongue River would likely have less fluctuation depending upon water contributed by ground water in addition to surface water input. Hydrologic balances would be prepared for each mitigation site developed to assess probable hydrologic regime.

Hydric soils would be assumed for those portions of the site meeting wetland hydrology criteria. Since physical and chemical characteristics of hydric soils are unlikely to develop within the monitoring period, inundation or saturation is an appropriate measure of hydric soil at the mitigation sites.

For hydrophytic vegetation, more than 50 percent of dominant plant species must be wetland species (facultative or wetter). Vegetation criteria specific to the three common palustrine types are:

Type	Vegetation Criteria
Emergent	Herbaceous species must dominate the site. Composition must be comprised of grasses, sedges, rushes and forbs typical of herbaceous wetlands in the Tongue River Valley. Total cover must be adequate to prevent erosion.
Scrub/Shrub	Shrubs must be established at a density to eventually develop a canopy cover appropriate for wildlife cover and browse.
Forested	Tree density must be adequate to eventually develop an open canopied stand suitable for wildlife habitat.

5.2 FUNCTIONS

Created wetlands must provide comparable functions to disturbed wetlands. Functions of undisturbed wetlands are discussed in Section 1.4 and functions of habitats to be created are discussed in Section 3.2.3.

5.3 ACREAGE AND MITIGATION RATIOS

The total acreage of Waters of the U.S. (WUS) created must equal total acreage disturbed plus additional acreage calculated from mitigation ratios. Actual acreage impacted will be determined as a result of the pre-construction Waters of the U.S. inventory. The size, number and location of wetlands to be created will reflect the acreage and types of wetlands impacted.

TRRC proposes the following minimum mitigation ratios for WUS types identified in the Initial Waters Report:

Type (code)	Proposed Mitigation Ratio	Rationale/Comments
Riverine		
Intermittent - temporary flow (R4SBA)	1:1	Mitigation will be accomplished on-site by installing culverts maintaining temporary flow. Acreage impacted in this type would not be added to wetland creation sites.
Intermittent - seasonal flow (R4SBC)	1:1	Mitigation will be accomplished on-site by installing culverts maintaining seasonal flow. Acreage impacted in this type would not be added to wetland creation sites.
Lower perennial - open water (R2OW)	1:1	Bridging will minimize acreage disturbed in this type.
Lower perennial - beach/bar (R2BB)	1:1	May be avoided by bridging.
Palustrine		
Open water (POW)	1:1	Mitigation sites would likely establish more POW than disturbed by railroad construction.
Emergent (PEM)	1:1	Herbaceous vegetation develops rapidly on properly designed mitigation sites
Scrub/Shrub (PSS)	1.5:1	Shrub development may take several years to achieve comparable functions.
Forested (PFO)	2:1	Tree development may take many years to achieve comparable functions.
Flat (PFL)	1:1	Herbaceous vegetation develops rapidly on properly designed mitigation sites

5.4 SCHEDULE/REPORTING

To minimize the amount of time wetland functions are lost, TRRC would implement wetland mitigation concurrently with railroad construction.

When TRRC considers that success criteria have been achieved, the COE would be notified via the annual monitoring report. The report would document attainment of success criteria and would include a current jurisdictional delineation of the wetland mitigation site(s) accompanied by legible copies of all field data sheets.

Following receipt of the report, the COE may require a site visit to confirm completion of mitigation and verify the jurisdictional delineation.

5.5 PERMANENT PROTECTION MEASURES

To ensure long-term protection of wetland mitigation sites, TRRC would select sites currently under Conservation Easements or would pursue establishing Conservation Easements on mitigation sites. If a Conservation Easement is not feasible, TRRC would pursue a written agreement with the landowner providing for long-term protection and management of the site. A written long-term management plan would be prepared for each mitigation site designating the party responsible for management and citing restrictions binding on current and future owners.

6.0 REMEDIATION/CONTINGENCY PLAN

If results of annual monitoring indicate that success criteria may not be met for all or any portion of the mitigation project, TRRC would prepare an analysis of probable causes and, if determined necessary by the COE, propose remedial action. Remediation could include additional work at the existing mitigation site or developing mitigation at an alternative location.

7.0 REFERENCES

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8.0 TABLES

Table 1. Waters of the U.S. types, number of sites and estimated acreage, TRRC Preferred Alignment

Type (code)	Number of Sites[1]	Average Size (acres)	Estimated Acreage[2]
Riverine			
Incised drainages - temporary flow (R4SBA)	183	0.02	3.7
Incised drainages - seasonal flow (R4SBC)	93	0.03	2.8
Lower perennial - open water (R2OW)	12	1.32	15.8
Lower perennial - beach/bar (R2BB)	1	0.20	0.2
Palustrine			
Open Water (POW)	7	0.60	4.2
Emergent (PEM)	24	0.22	5.4
Scrub/Shrub (PSS)	4	0.41	1.6
Forested (PFO)	9	0.48	4.3
Flat (PFL)	2	<0.01	<0.1
TOTALS	335		38.1

[1]The total number of sites by type exceeds the total number of WUS identified in the Initial Waters Report since 2 or 3 types are present at some sites.

[2]Acreage based on a standard 400-foot wide corridor.

Table 2. Waters of the U.S. within the analysis corridor of the Tongue River Railroad Preferred Alignment

Site					Classification				
Site #	Site Name	Legal Description	Cnty[1]	Owner-ship[2]	Cowardin[3]	WUS Class[4]	Function[5]	Acreage[6]	Comments
NE-1	Miles City Fish Hatchery	NE1/4 SE1/4 SEC 5 T7N R47E	C	S	POWHh	P, Manmade	Ft, WL	2.020	Half of pond crossed by corridor
NE-2	Unnamed channel	NW1/4 SW1/4 SEC 4 T7N R47E	C	S	PEM1Hx	ES, Drainage channel		0.294	Channel from fish hatchery to wetland on east side of centerline (C/L), crossed by C/L
NE-3	Wetland fringe of Spotted Eagle Lake	NW1/4 SW1/4 SEC 4 T7N R47E	C	C	POWHh/ PEM1C	P/R, Manipulated	Fp, WL, FLD	1.837	Wetland fringe is paralleled by C/L, receives discharge from NE-2
NE-4	Pond of Miles City Fish Hatchery	NW1/4 SW1/4 SEC 4 T7N R47E	C	S	POWHh	P, Manmade		0.808	120 feet west of C/L
NE-5	Unnamed channel	SE1/4 NW1/4 SEC 9 T7N R47E	C	L	R4SBA	ES, NWUS		0.007	Crossed by C/L, very steep slope
NE-6	Unnamed channel	NE1/4 SW1/4 SEC 9 T7N R47E	C	L	R4SBA	ES, NWUS		0.007	Crossed by C/L
NE-7	Unnamed channel	SW1/4 SE1/4 SEC 9 T7N R47E	C	L	R4SBC	ES, NWUS		0.028	Crossed by C/L
NE-8	Unnamed channel	NW1/4 SW1/4 SEC 15 T7N R47E	C	L	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-9	Unnamed channel	NE1/4 NW1/4 SEC 22 T7N R47E	C	L	R4SBA	ES, NWUS		0.020	Crossed by C/L
NE-10	Unnamed channel	NW1/4 NE1/4 SEC 22 T7N R47E	C	L	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-11	Stock pond	SW1/4 NE1/4 SEC 22 T7N R47E	C	L	PEM1Ch	P, In terraced field		0.367	Crossed by C/L
NE-12	Unnamed channel	SW1/4 SW1/4 SEC 23 T7N R47E	C	L	R4SBC	ES, NWUS		0.046	Crossed and paralleled by C/L
NE-13	Unnamed channel	SW1/4 NE1/4 SEC 26 T7N R47E	C	L	R4SBC	ES, NWUS		0.009	Crossed by C/L
NE-14	Unnamed channel	SW1/4 SW1/4 SEC 25 T7N R47E	C	L	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-15	Unnamed tributary to NE-14	SW1/4 SW1/4 SEC 25 T7N R47E	C	L	R4SBA	ES, NWUS		0.009	Crossed by C/L
NE-16	Unnamed tributary to NE-17	NW1/4 NW1/4 SEC 36 T7N R47E	C	L	R4SBA	ES, NWUS		0.007	Crossed by C/L
NE-17	Paddy Fay Creek	NW1/4 NW1/4 SEC 36 T7N R47E	C	L	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-18	Unnamed channel	NW1/4 NW1/4 SEC 36 T7N R47E	C	L	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-19	Stock pond	SE1/4 NW1/4 SEC 36 T7N R47E	C	L	PEM1A	P/WM	WL	0.918	Crossed by C/L on eastern edge
NE-20	Unnamed channel	SW1/4 SE1/4 SEC 36 T7N R47E	C	L	R4SBA	ES, NWUS		0.021	Crossed by C/L
NE-21	Unnamed channel	NE1/4 SE1/4 SEC 1 T6N R47E	C	L	R4SBC	ES, NWUS		0.026	Crossed by C/L
NE-22	Unnamed channel	NE1/4 NE1/4 SEC 12 T6N R47E	C	L	R4SBA	ES, NWUS		0.022	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Owner-ship[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-23	Unnamed channel	NE1/4 NE1/4 SEC 12 T6N R47E	C	L	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-24	Unnamed channel	SE1/4 NE1/4 SEC 12 T6N R47E	C	L	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-25	Unnamed channel	NE1/4 SE1/4 SEC 12 T6N R47E	C	L	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-26	Unnamed channel	NW1/4 NW1/4 SEC 18 T6N R48E	C	L	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-27	Unnamed channel	SW1/4 NW1/4 SEC 18 T6N R48E	C	L	R4SBC	ES, NWUS		0.026	Crossed by C/L
NE-28	Unnamed tributary to NE-27	SW1/4 NW1/4 SEC 18 T6N R48E	C	L	R4SBA	ES, NWUS		0.010	80 feet east of and parallel to C/L
NE-29	Tongue River	SE1/4 SW1/4 SEC 18 and NE1/4 NW1/4 SEC 19 T6N R48E	C	L	R2OWG	RWF	FLD, WL, Fp, DS?	2.893	180 feet east of C/L
NE-30	Unnamed channel	SW1/4 SE1/4 SEC 19 T6N R48E	C	P	R4SBC	ES, NWUS		0.008	140 feet east of C/L
NE-31	Unnamed channel	SW1/4 SE1/4 SEC 19 T6N R48E	C	P	R4SBC	ES, NWUS		0.034	Crossed by C/L
NE-32	Unnamed channel	SE1/4 NE1/4 SEC 30 T6N R48E	C	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-33	Unnamed channel	NE1/4 SE1/4 SEC 30 T6N R48E	C	P	R4SBA	ES, NWUS		0.006	60 feet east of C/L
NE-34	Unnamed channel	NE1/4 NE1/4 SEC 31 T6N R48E	C	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-35	Unnamed channel	NE1/4 NE1/4 SEC 31 T6N R48E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-36	Unnamed channel	NW1/4 SE1/4 SEC 31 T6N R48E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-37	Unnamed channel	SW1/4 NW1/4 and SE1/4 NW1/4 SEC 6 T5N R48E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-38	Unnamed channel	NW1/4 SW1/4 SEC 6 T5N R48E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-39	Wolf Creek	SW1/4 NW1/4 SEC 7 T5N R48E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.031	100 feet east of C/L
NE-40	Stock water reservoir, Wolf Creek	SW1/4 NW1/4 SEC 7 T5N R48E	C	P	R4SBC/ PFO1C	P, Manmade ES, NWUS		3.306	C/L bisects stock water reservoir
NE-41	Unnamed channel	NE1/4 SE1/4 SEC 12 T5N R47E	C	P	R4SBA	ES, NWUS		0.028	200 feet west of and parallel to C/L
NE-42	Unnamed channel	SW1/4 SE1/4 and SE1/4 SE1/4 SEC 12 T5N R47E	C	P	R4SBA	ES, NWUS		0.050	Crossed by C/L
NE-43	Unnamed tributary to NE-44	NE1/4 NW1/4 SEC 13 T5N R47E	C	P	R4SBA	ES, NWUS		0.010	West of C/L
NE-44	Unnamed channel	NE1/4 NW1/4 and NW1/4 NE1/4 SEC 13 T5N R47E	C	P	R4SBC	ES, NWUS		0.028	Crossed by C/L

Table 2. (Continued)

Site #	Site Name	Legal Description	Cnty[1]	Ownership[2]	Classification: Cowardin[3]	Classification: WUS Class[4]	Function[5]	Acreage[6]	Comments
NE-45	Circle L Creek	SE1/4 SE1/4 SEC 14 T5N R47E	C	P	R4SBC	ES, NWUS		0.021	Crossed by C/L
NE-46	Unnamed channel	SE1/4 NW1/4 SEC 23 T5N R47E	C	P	R4SBA	ES, NWUS		0.011	Crossed and paralleled by C/L
NE-47	Unnamed channel	SE1/4 NW1/4 SEC 23 T5N R47E	C	P	R4SBA	ES, NWUS		0.010	Crossed by C/L
NE-48	Unnamed channel	SE1/4 SE1/4 SEC 22 T5N R47E	C	P	R4SBA	ES, NWUS		0.055	Crossed (at low angle) and paralleled by C/L
NE-49	Unnamed channel	NE1/4 NE1/4 and SE1/4 NE1/4 SEC 27 T5N R47E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.035	Crossed and paralleled by C/L
NE-50	Thorpe Creek	SW1/4 NE1/4 and SE1/4 NE1/4 SEC 27 T5N R47E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.026	Crossed by C/L
NE-51	Unnamed channel	NW1/4 SE1/4 and SW1/4 SE1/4 SEC 27 T5N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-52	Unnamed channel	SW1/4 SE1/4 SEC 27 T5N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-53	Unnamed channel	NW1/4 NE1/4 SEC 34 T5N R47E	C	P	R4SBA	ES, NWUS		0.009	Crossed by C/L
NE-54	Unnamed channel	NW1/4 NE1/4 SEC 34 T5N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-55	Unnamed channel	SW1/4 NE1/4 SEC 34 T5N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-56	Unnamed channel	NW1/4 SE1/4 SEC 34 T5N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-57	Kennedy Creek	NW1/4 NW1/4 and SW1/4 NW1/4 SEC 1 T4N R47E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-58	Plunkett Creek	NE1/4 NE1/4 SEC 10 T4N R47E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-59	Unnamed channel	SW1/4 NW1/4 SEC 10 T4N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-60	Unnamed channel	SW1/4 NW1/4 SEC 10 T4N R47E	C	P	R4SBC	ES, NWUS		0.003	140 feet southeast of C/L
NE-61	Unnamed channel	NE1/4 SE1/4 SEC 9 T4N R47E	C	P	R4SBA	ES, NWUS		0.007	Terminates 40 feet north of C/L
NE-62	Unnamed channel	NW1/4 SE1/4 and NE1/4 SE1/4 SEC 9 T4N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-63	Unnamed channel	SW1/4 SE1/4 SEC 9 T4N R47E	C	P	R4SBA	ES, NWUS		0.007	Terminates 40 feet north of C/L
NE-64	Unnamed channel	NW1/4 NE1/4 SEC 16 T4N R47E	C	P	R4SBA	ES, NWUS		0.028	Crossed by C/L
NE-65	Geddes Creek	NE1/4 NW1/4 and SE1/4 NW1/4 SEC 16 T4N R47E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-66	Unnamed channel	NW1/4 SE1/4 and SW1/4 SE1/4 SEC 17 T4N R47E	C	P	R4SBA	ES, NWUS		0.021	Crossed by C/L
		SW1/4 SE1/4 SEC 17 T4N R47E	C	P	R4SBC	ES, NWUS		0.057	Crossed and paralleled by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Owner-ship[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-68	Unnamed channel	NW1/4 NW1/4 SEC 20 T4N R47E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-69	Unnamed channel	SW1/4 NE1/4 SEC 19 T4N R47E	C	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-70	Miles Creek	SW1/4 SW1/4 and NW1/4 SW1/4 SEC 19 T4N R47E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.055	Crossed and paralleled by C/L
NE-71	Unnamed channel	SE1/4 SE1/4 SEC 24 and NE1/4 NE1/4 SEC 25 T4N R46E	C	P	R4SBC	ES, NWUS		0.024	Crossed by C/L
NE-73	Unnamed channel	NE1/4 SW1/4 SEC 25 T4N R46E	C	P	R4SBA	ES, NWUS		0.014	Crossed by C/L
NE-74	Unnamed channel	SE1/4 SW1/4 and NW1/4 SW1/4 SEC 25 T4N R46E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-75	Forest Creek	SE1/4 NE1/4 SEC 35 T4N R46E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.041	Crossed and paralleled by C/L
NE-76	Tributary to Forest Creek	NE1/4 SE1/4 SEC 35 T4N R46E	C	P	R4SBA	ES, NWUS		0.033	Crossed by C/L
NE-77	Unnamed channel	SE1/4 NW1/4 SEC 2 T3N R46E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-78	Horse Creek	NW1/4 SW1/4 SEC 2 T3N R46E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.018	Crossed by C/L
NE-79	Unnamed tributary to NE-80	NE1/4 NE1/4 SEC 10 T3N R46E	C	F	R4SBA	ES, NWUS		0.015	Crossed by C/L
NE-80	Unnamed channel	NW1/4 NE1/4 SEC 10 T3N R46E	C	F	R4SBA	ES, NWUS		0.016	Crossed by C/L
NE-81	Unnamed channel	SE1/4 NW1/4 SEC 10 T3N R46E	C	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-82	Unnamed channel	SE1/4 NW1/4 SEC 10 T3N R46E	C	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-83	Unnamed channel	NW1/4 SW1/4 SEC 10 T3N R46E	C	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-84	Side channel of Six Mile Creek	SW1/4 SE1/4 SEC 9 T3N R46E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.037	25 feet west of and paralleled by C/L.
NE-85	Six Mile Creek	SW1/4 SE1/4 SEC 9 and NW1/4 NE1/4 SEC 16 T3N R46E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.018	Crossed by C/L
NE-86	Unnamed channel	SW1/4 NW1/4 SEC 16 T3N R46E	C	P	R4SBA	ES, NWUS		0.026	Crossed by C/L
NE-87	Unnamed channel	SE1/4 NE1/4 SEC 17 T3N R46E	C	P	R4SBA	ES, NWUS		0.020	140 feet west of C/L
NE-88	Unnamed channel	NW1/4 SE1/4 SEC 17 T3N R46E	C	P	R4SBA	ES, NWUS		0.005	100 feet west of C/L
NE-89	Unnamed channel	NW1/4 SE1/4 SEC17 T3N R46E	C	P	R4SBA	ES, NWUS		0.005	100 feet west of C/L
NE-90	Unnamed channel	NW1/4 SE1/4 SEC 17 T3N R46E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-91	Miller Creek	NW1/4 NW1/4 SEC 20 T3N R46E	C	P	R4SBC	ES, NWUS		0.033	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Owner-ship[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-92	Unnamed pond	SW1/4 NW1/4 SEC 20 T3N R46E	C	P	PEM1C	P	WL	0.147	40 feet east of C/L
NE-93	Unnamed channel	NE1/4 SE1/4 SEC 19 T3N R46E	C	P	R4SBA	ES, NWUS		0.011	Crossed by C/L
NE-94	Unnamed channel	NW1/4 SE1/4 and NE1/4 SE1/4 SEC 19 T3N R46E	C	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-95	Unnamed channel	SW1/4 SE1/4 SEC 19 T3N R46E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-96	Unnamed channel	NE1/4 NW1/4 SEC 30 T3N R46E	C	P	R4SBA	ES, NWUS		0.024	Crossed by C/L
NE-97	Unnamed channel	NE1/4 NW1/4 SEC 30 T3N R46E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-98	Unnamed channel	SW1/4 NW1/4 SEC 30 T3N R46E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-99	Unnamed channel	NE1/4 SE1/4 SEC 25 T3N R45E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-100	Pump Creek	SW1/4 SE1/4 SEC 25 T3N R45E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-101	Cow Creek	SE1/4 NE1/4 SEC 35 T3N R45E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.051	Crossed by C/L
NE-102	Unnamed channel	SW1/4 SE1/4 SEC 35 T3N R45E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-103	Ranch Creek	SW1/4 NW1/4 SEC 2 T2N R45E	C	P	R4SBC/ PFO1C	ES, NWUS, SWF		0.078	Crossed and paralleled by C/L
NE-104	Coal Creek	NE1/4 NW1/4 and NW1/4 NW1/4 SEC 9 T2N R45E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.018	Crossed by C/L
NE-105	Unnamed channel	SE1/4 NE1/4 SEC 8 T2N R45E	C	P	R4SBA	ES, NWUS		0.033	Crossed by C/L
NE-106	Unnamed channel	NE1/4 SW1/4 SEC 8 T2N R45E	C	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-107	Tributary to NE-106	NE1/4 SW1/4 SEC 8 T2N R45E	C	F	R4SBA	ES, NWUS		0.007	Conflues with NE-106 40 feet west of C/L
NE-108	Unnamed channel	SE1/4 SW1/4 SEC 8 T2N R45E	C	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-109	Unnamed channel	NE1/4 NW1/4 and NW1/4 NW1/4 SEC 17 T2N R45E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-110	Unnamed channel	SW1/4 NW1/4 SEC 17 T2N R45E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-111	Unnamed channel	SW1/4 NW1/4 SEC 17 and SE1/4 NE1/4 SEC 18 T2N R45E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-112	Unnamed channel	NE1/4 SE1/4 SEC 18 T2N R45E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-113	Unnamed channel	NE1/4 SE1/4 SEC 18 T2N R45E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-114	Unnamed channel	SE1/4 SE1/4 SEC 18 T2N R45E	C	P	R4SBA	ES, NWUS		0.005	190 feet east of C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Ownership[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-115	Cottonwood Creek	SW1/4 SE1/4 SEC18 T2N R45E	C	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.018	Crossed by C/L
NE-116	Unnamed channel	SW1/4 NE1/4 SEC 19 T2N R45E	C	P	R4SBA	ES, NWUS		0.005	100 feet east of C/L
NE-117	Tributary to NE-118	SE1/4 NW1/4 SEC 19 T2N R45E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-118	Unnamed channel	NE1/4 SW1/4 and SE1/4 NW1/4 SEC 19 T2N R45E	C	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-119	Unnamed channel	NE1/4 SW1/4 SEC 19 T2N R45E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-120	Unnamed channel	SW1/4 SW1/4 SEC 19 and NW1/4 NW1/4 SEC 30 T2N R45E	C	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-120A	Dry Creek	NW1/4 SE1/4 SEC 25 T2N R44E	R	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.068	Crossed by C/L
NE-120B	Unnamed channel	SW1/4 SE1/4 SEC 25 T2N R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-120C	Unnamed channel	NE1/4 NW1/4 SEC 36 T2N R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-120D	Unnamed channel	NW1/4 NW1/4 and SW1/4 NW1/4 SEC 36 T2N R44E	R	S	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-120E	Unnamed channel	SW1/4 NW1/4 SEC 36 T2N R44E	R	S	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-120F	Unnamed channel	NE1/4 SE1/4 SEC 35 T2N R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-121	Unnamed channel	SW1/4 SE1/4 SEC 35 T2N R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-122	Trail Creek	SW1/4 NW1/4 SEC 2 T1N R44E	R	P	R4SBC	ES, NWUS		0.028	Crossed by C/L
NE-123	Alfalfa Creek	NW1/4 SW1/4 SEC 2 T1N R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-124	Unnamed channel	SE1/4 SE1/4 SEC 3 T1N R44E	R	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-125	Unnamed tributary to Hart Creek	NW1/4 NE1/4 SEC 10 T1N R44E	R	P	R4SBA	ES, NWUS		0.026	Crossed by C/L
NE-126	Hart Creek	SW1/4 SE1/4 SEC 10 T1N R44E	R	P	R4SBC	ES, NWUS		0.022	Crossed by C/L
NE-127	Unnamed channel	NE1/4 SW1/4 SEC 22 T1N R44E	R	P	R4SBC	ES, NWUS		0.013	40 feet east of C/L
NE-128	Joe Leg Creek	NE1/4 SE1/4 SEC 28 and NW1/4 SW1/4 SEC 27 T1N R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-129	Unnamed channel and pond	SE1/4 NW1/4 SEC 33 T1N R44E	R	P	R4SBA/ POWAh	P, Manmade ES, NWUS		0.826	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Ownership[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-130	Unnamed channel	NE1/4 SE1/4 SEC 32 and NW1/4 SW1/4 SEC 33 T1N R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-131	Unnamed channel	SE1/4 NE1/4 SEC 3 T1S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-132	Unnamed channel	SE1/4 NE1/4 SEC 3 T1S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-133	Hammond Draw	NW1/4 SE1/4 SEC 3 T1S R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-134	Unnamed channel	SW1/4 SW1/4 SEC 10 T1S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-135	Unnamed channel	SE1/4 SE1/4 SEC 9 and NW1/4 NW1/4 SEC 15 T1S R44E	R	P	R4SBA	ES, NWUS		0.011	Crossed by C/L
NE-136	Unnamed channel	NE1/4 NE1/4 SEC 16 T1S R44E	R	S	R4SBA	ES, NWUS		0.015	Crossed by C/L
NE-137	Unnamed channel	NE1/4 NE1/4 SEC 16 T1S R44E	R	S	R4SBA	ES, NWUS		0.017	Crossed by C/L
NE-140	Roe and Cooper Creek	SW1/4 NE1/4 SEC 16 T1S R44E	R	S	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-141	Unnamed channel	NE1/4 SW1/4 SEC 16 T1S R44E	R	S	R4SBA	ES, NWUS		0.017	Crossed by C/L
NE-142	Unnamed channel	NE1/4 SW1/4 SEC 16 T1S R44E	R	S	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-143	Unnamed channel	SE1/4 SW1/4 SEC 16 T1S R44E	R	S	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-144	Unnamed channel	SE1/4 SW1/4 SEC 16 and NE1/4 NW1/4 SEC 21 T1S R44E	R	S/P	R4SBA	ES, NWUS		0.015	Crossed by C/L
NE-145	Unnamed channel	NE1/4 NW1/4 SEC 21 T1S R44E	R	P	R4SBA	ES, NWUS		0.008	Crossed by C/L
NE-146	Unnamed channel	NE1/4 NW1/4 SEC 21 T1S R44E	R	P	R4SBA	ES, NWUS		0.005	Terminates 20 feet east of C/L
NE-147	Unnamed channel	NE1/4 NW1/4 SEC 21 T1S R44E	R	P	R4SBA	ES, NWUS		0.013	Crossed by C/L
NE-148	Unnamed channel	SE1/4 SE1/4 SEC 21 T1S R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-149	Unnamed channel	NE1/4 NE1/4 SEC 28 T1S R44E	R	P	R4SBA	ES, NWUS		0.015	Crossed by C/L
NE-150	Unnamed channel	SW1/4 NW1/4 SEC 27 T1S R44E	R	P	R4SBA	ES, NWUS		0.013	Crossed by C/L
NE-151	Tongue River	NE1/4 SW1/4 and NW1/4 SW1/4 SEC 27 T1S R44E	R	P	R2OWG/ PFO1A	RWF	WL, Fp, FLD	2.204	crossed by C/L
NE-152	Unnamed channel	SW1/4 SE1/4 SEC 34 T1S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-153	Unnamed channel	NW1/4 NE1/4 SEC 3 T2S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-154	Unnamed channel	NW1/4 SE1/4 SEC 3 T2S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-155	Unnamed channel	SW1/4 NE1/4 SEC 10 T2S R44E	R	P	R4SBA	ES, NWUS		0.008	Crossed by C/L
NE-156	Unnamed channel	NW1/4 SE1/4 SEC 10 T2S R44E	R	P	R4SBA	ES, NWUS		0.009	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Ownership[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-157	Tongue River	NW1/4 SE1/4 SEC 10 T2S R44E	R	P	R2OWG	RWF	WL, Fp, FLD	5.785	80 feet west of C/L
NE-158	Unnamed channel	SW1/4 SE1/4 SEC 10 T2S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-159	Unnamed channel	NW1/4 NE1/4 SEC 15 T2S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-160	Unnamed channel	NE1/4 NW1/4 and NW1/4 NE1/4 SEC 15 T2S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-161	Tongue River	SE1/4 NW1/4 and NE1/4 SW1/4 SEC 15 T2S R44E	R	P	R2OWG	RWF	WL, Fp, FLD	0.882	120 feet west of C/L
NE-162	Unnamed channel	SW1/4 NE1/4 SEC 22 T2S R44E	R	P	R4SBA	ES, NWUS		0.007	40 feet east of C/L
NE-163	Tongue River	NE1/4 NE1/4 SEC 27 T2S R44E	R	P	R2OWG	RWF	WL, Fp, FLD	1.414	140 feet west of C/L
NE-164	Double E Coulee	SE1/4 NE1/4 and NE1/4 SE1/4 SEC 27 T2S R44E	R	P	R4SBC/ PFO1A	ES, NWUS, SWF		0.052	Crossed by C/L
NE-165	Tongue River	NE1/4 SE1/4 SEC 27 T2S R44E	R	P	R2OWG	RWF	WL, Fp, FLD	1.194	100 feet west of C/L
NE-166	Tongue River	NW1/4 SW1/4 and SW1/4 NW1/4 SEC 35 T2S R44E	R	P	R2OWG/ PFO1A	RWF	WL, Fp, FLD	2.314	60 feet west of C/L
NE-167	Cook Creek	NW1/4 SW1/4 SEC 35 T2S R44E	R	P	R4SBC/ PFO1A	ES, NWUS, SWF		0.018	Crossed by C/L
NE-168	Unnamed channel	NW1/4 SE1/4 and SW1/4 NE1/4 SEC 2 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-169	Unnamed channel	SW1/4 SE1/4 SEC 2 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-170	Otter Creek	NE1/4 NE1/4 SEC 11 T3S R44E	R	P	R2OWH/ PEM1Y	SWF	WL, Fs, FLD	1.019	190 feet west of C/L centerline
NE-171	Otter Creek meander	SE1/4 NE1/4 SEC 11 T3S R44E	R	P	PSS1Y	UM	WL, FLD, Fs	0.882	140 feet west of C/L
NE-172	Otter Creek meander	NE1/4 SW1/4 SEC 12 T3S R44E	R	P	POWF/ PFO1U	UM	WL, FLD, Ft?, DS	0.413	Meander cut off by road - 80 feet west of C/L
NE-173	Unnamed channel	NE1/4 SW1/4 SEC 12 T3S R44E	R	P	R4SBA	ES, NWUS		0.044	Crossed by C/L (3 times) and paralleled by C/L
NE-174	Otter Creek	SE1/4 SW1/4 SEC 12 T3S R44E	R	P	R2OWF/ PSS1Y	SWF	WL, FLD, Fp, DS	0.275	Crossed by C/L
NE-175	Otter Creek	SE1/4 SW1/4 SEC 12 and NE1/4 NW1/4 SEC 13 T3S R44E	R	P	R2OWF/ PSS1Y	SWF	WL, FLD, Fp, DS	0.161	150 feet east of C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Owner-ship[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-176	Unnamed channel	NW1/4 SW1/4 SEC 23 T3S R44E	R	P	R4SBC/ PSS1Y	ES, NWUS, SWF		0.018	Crossed by C/L
NE-178	Unnamed channel	SW1/4 SE1/4 SEC 22 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-179	Spring Creek	NW1/4 NE1/4 SEC 27 T3S R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-180	Bridge Creek	NW1/4 SW1/4 SEC 27 T3S R44E	R	P	R4SBC	ES, NWUS		0.039	Crossed by C/L
NE-181	Unnamed channel	SE1/4 SE1/4 SEC 28 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-182	Unnamed channel	SE1/4 SE1/4 SEC 28 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-183	Unnamed channel	SE1/4 SE1/4 SEC 28 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-184	Unnamed channel	SW1/4 NE1/4 SEC 33 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-185	Unnamed channel	NE1/4 SW1/4 SEC 33 T3S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-186	Bowman Creek	NW1/4 NW1/4 SEC 4 T4S R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-187	Unnamed channel	SW1/4 NW1/4 SEC 4 T4S R44E	R	P	R4SBC	ES, NWUS		0.023	Crossed by C/L
NE-188	Unnamed channel	SE1/4 SE1/4 SEC 5 T4S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L, spring 550 ft. from edge of ROW
NE-189	Unnamed channel	SW1/4 SE1/4 SEC 5 T4S R44E	R	P	R4SBA	ES, NWUS		0.044	Crossed and paralleled by C/L
NE-190	King Creek	SW1/4 NE1/4 SEC 8 T4S R44E	R	P	R4SBC	ES, NWUS		0.046	Crossed and paralleled by C/L
NE-191	Cedar Creek	NE1/4 NE1/4 SEC 18 T4S R44E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-192	Unnamed channel	SE1/4 NE1/4 SEC 18 T4S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-193	Dry Creek	NW1/4 SE1/4 SEC 18 T4S R44E	R	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.035	Crossed by C/L
NE-194	Unnamed channel	NW1/4 SE1/4 SEC 18 T4S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-195	Unnamed channel	SE1/4 SW1/4 SEC 18 T4S R44E	R	P	R4SBC	ES, NWUS		0.023	Crossed by C/L
NE-196	Unnamed channel	SW1/4 NW1/4 SEC 19 T4S R44E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-197	Unnamed channel	SE1/4 SE1/4 SEC 24 T4S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-198	Unnamed channel	SW1/4 NE1/4 and NW1/4 NE1/4 SEC 25 T4S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-199	O'Dell Creek	NW1/4 SE1/4 SEC 25 T4S R43E	R	P	R4SBC/ PEM1C	ES, NWUS, SWF		0.064	Crossed and paralleled by C/L
NE-200	Unnamed channel	NW1/4 SW1/4 SEC 36 T4S R43E	R	S	R4SBA	ES, NWUS		0.024	Crossed by C/L
NE-201	Unnamed channel	NE1/4 SE1/4 SEC 35 T4S R43E	R	P	R4SBA	ES, NWUS		0.024	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Owner-ship[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-202	Unnamed channel	NE1/4 SE1/4 SEC 35 T4S R43E	R	P	R4SBA	ES, NWUS		0.015	Crossed by C/L
NE-203	Unnamed channel	NE1/4 SE1/4 SEC 35 T4S R43E	R	P	R4SBA	ES, NWUS		0.009	C/L bisects lower end of channel
NE-204	Unnamed channel	SW1/4 SE1/4 SEC 35 T4S R43E	R	P	R4SBC	ES, NWUS		0.026	Crossed by C/L
NE-205	Unnamed channel	SW1/4 SE1/4 SEC 35 T4S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-206	Gate Creek	NE1/4 NW1/4 SEC 2 T5S R43E	R	F	R4SBC	ES, NWUS		0.046	Crossed by C/L
NE-207	Unnamed channel	NW1/4 SE1/4 SEC 3 T5S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-208	Unnamed channel	NW1/4 SE1/4 and SW1/4 SE1/4 SEC 3 T5S R43E	R	P	R4SBC	ES, NWUS		0.028	Crossed and paralleled by C/L
NE-209	Unnamed channel	NW1/4 NW1/4 SEC 10 T5S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-210	Unnamed channel	NW1/4 SW1/4 SEC 10 T5S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-211	Unnamed channel and pond	NW1/4 SW1/4 SEC 10 T5S R43E	R	P	R4SBA/ PFL3Ch/ POWFh	ES, NWUS, P, SWF		0.018	Crossed by C/L
NE-212	Poker Teechee Creek	SE1/4 SE1/4 SEC 9 and NE1/4 NE1/4 SEC 16 T5S R43E	R	P/S	R4SBC	ES, NWUS		0.028	Crossed by C/L
NE-213	Unnamed channel	SW1/4 NE1/4 SEC 16 T5S R43E	R	S	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-214	Unnamed channel	NW1/4 SW1/4 SEC 16 T5S R43E	R	S	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-215	Poker Jim Creek	NE1/4 SE1/4 and SE1/4 SE1/4 SEC 17 T5S R43E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-216	Unnamed channel	SW1/4 SE1/4 SEC 17 T5S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-217	Unnamed channel	NE1/4 NW1/4 SEC 20 T5S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-218	Unnamed channel	NW1/4 NW1/4 and SW1/4 NW1/4 SEC 20 T5S R43E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-219	Unnamed channel	SW1/4 NW1/4 SEC 20 T5S R43E	R	P	R4SBA	ES, NWUS		0.022	Crossed by C/L
NE-220	Unnamed channel and pond	NW1/4 SE1/4 SEC 19 T5S R43E	R	P	R4SBC/ PFL3Ch	ES, NWUS, P		0.023	Crossed by C/L
NE-221	Unnamed channel	SE1/4 SW1/4 and SW1/4 SE1/4 SEC 19 T5S R43E	R	P	R4SBA/ PEM5A	ES, NWUS, SWF		0.018	Crossed by C/L
NE-223	Unnamed channel	SW1/4 NW1/4 SEC 30 T5S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-224	Unnamed channel	NE1/4 SE1/4 SEC 25 T5S R42E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-225	Black Eagle Creek	SE1/4 SE1/4 SEC 25 T5S R42E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L

Table 2. (Continued)

Site #	Site Name	Legal Description	Cnty[1]	Ownership[2]	Classification: Cowardin[3]	Classification: WUS Class[4]	Function[5]	Acreage[6]	Comments
NE-226	Tributary to NE-227	NE1/4 SW1/4 SEC 36 T5S R42E	R	S	R4SBA	ES, NWUS		0.018	Crossed by C/L,
NE-227	Unnamed channel	NE1/4 SW1/4 SEC 36 T5S R42E	R	S	R4SBC	ES, NWUS		0.007	Conflues with NE-226 100 feet east of C/L
NE-228	Unnamed channel	SE1/4 SW1/4 SEC 36 T5S R42E	R	S	R4SBC	ES, NWUS		0.027	Crossed by C/L
NE-229	Unnamed channel	NE1/4 SE1/4 SEC 6 T6S R43E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-230	Unnamed channel and pond	SE1/4 NE1/4 SEC 7 T6S R43E	R	P	R4SBC/ PEM5A	ES, NWUS, P		0.018	Crossed by C/L
NE-231	Unnamed channel	NE1/4 NE1/4 SEC 18 T6S R43E	R	P	R4SBA	ES, NWUS		0.030	Crossed by C/L
NE-232	Unnamed channel	NE1/4 NE1/4 SEC 18 T6S R43E	R	P	R4SBA	ES, NWUS		0.017	Crossed by C/L
NE-233	Unnamed channel	NE1/4 NE1/4 SEC 18 T6S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-234	Unnamed channel	SE1/4 NE1/4 SEC 18 T6S R43E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-235	Hackley Creek	NW1/4 SE1/4 SEC 18 T6S R43E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-236	Hanging Woman Creek	NW1/4 SE1/4 SEC 18 T6S R43E	R	P	R2OWF/ PFO1A	SWF	WL, FLD, Ft	0.230	Crossed by C/L
NE-237	Unnamed channel and pond	NW1/4 NE1/4 and NE1/4 NW1/4 SEC 24 T6S R42E	R	P	R4SBA/ POWFh	ES, NWUS, P		0.018	Crossed by C/L
NE-238	Unnamed channel	SE1/4 SW1/4 and SW1/4 SW1/4 SEC 23 T6S R42E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-239	Unnamed channel	NW1/4 NW1/4 SEC 26 T6S R42E	R	P	R4SBA	ES, NWUS		0.024	Crossed and paralleled by C/L
NE-240	Unnamed channel	NW1/4 NW1/4 SEC 26 T6S R42E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-241	Unnamed channel	SW1/4 NE1/4 and SE1/4 NE1/4 SEC 27 T6S R42E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-242	Battle Butte Creek	NW1/4 SW1/4 SEC 27 T6S R42E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-243	Unnamed channel	SW1/4 SE1/4 SEC 28 T6S R42E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-244	Ebaugh Creek	SE1/4 SW1/4 SEC 28 T6S R42E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-245	Unnamed channel	NE1/4 NE1/4 SEC 32 T6S R42E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-246	Unnamed channel	NE1/4 NE1/4 SEC 32 T6S R42E	R	P	R4SBA	ES, NWUS		0.014	Crossed by C/L
NE-246A	Tongue River	SW1/4 NW1/4 SEC 32 T6S R42E	R	P	R2OWG/ R2BB2C/ PFO1A	RWF	Fp, FLD, DS, WL	1.882	Crossed by C/L
NE-247	Prairie Dog Creek	NW1/4 SE1/4 SEC 31 T6S R42E	R	P	R4SBC	ES, NWUS		0.028	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Ownership[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-248	Bootlegger Draw	SW1/4 SW1/4 SEC 31 T6S R42E	R	P	R4SBA	ES, NWUS		0.021	Crossed by C/L
NE-249	School House Draw	NE1/4 NE1/4 SEC 1 T7S R41E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-250	Unnamed channel	SW1/4 NE1/4 and SE1/4 NE1/4 SEC 1 T7S R41E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-251	Spring Creek	NE1/4 SW1/4 and NW1/4 SE1/4 SEC 1 T7S R41E	R	P	R4SBC	ES, NWUS		0.041	Crossed and paralleled by C/L
NE-252	Unnamed channel	Center of SW1/4 SEC 1 T7S R41E	R	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-253	Unnamed channel	NE1/4 NE1/4 SEC 11 T7S R41E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-254	Unnamed channel	NE1/4 NE1/4 SEC 11 T7S R41E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-255	Unnamed channel	NE1/4 NE1/4 SEC 11 T7S R41E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-256	Unnamed channel	SW1/4 NE1/4 SEC 11 T7S R41E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-257	Canyon Creek	SE1/4 NW1/4 and NE1/4 SW1/4 SEC 11 T7S R41E	R	P	PEM5/9C/ R4SBC	ES, NWUS, SWF		0.018	Crossed by C/L
NE-258	Unnamed channel	NE1/4 SW1/4 SEC 11 T7S R41E	R	P	R4SBC	ES, NWUS		0.028	Crossed by C/L
NE-259	Unnamed channel	NW1/4 NW1/4 SEC 14 T7S R41E	R	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-260	Unnamed channel	SW1/4 NW1/4 SEC 14 T7S R41E	R	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-261	Dutch Hollow	SE1/4 SE1/4 SEC 15 T7S R41E	R	P	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-262	Unnamed channel	SW1/4 SE1/4 SEC 15 T7S R41E	R	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-263	Unnamed channel	NE1/4 NW1/4 SEC 22 T7S R41E	R	P	R4SBA	ES, NWUS		0.032	Crossed by C/L at acute angle
NE-264	Unnamed channel	NE1/4 SE1/4 SEC 21 T7S R41E	R	F	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-265	Unnamed channel	NE1/4 SE1/4 SEC 21 T7S R41E	R	F	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-266	Unnamed channel	NE1/4 NE1/4 SEC 28 T7S R41E	R	P	R4SBA	ES, NWUS		0.026	Crossed and paralleled by C/L
NE-267	Fourmile Creek	NE1/4 NE1/4 SEC 28 T7S R41E	R	P	R4SBC	ES, NWUS		0.055	Crossed by C/L
NE-268	Unnamed channel	NE1/4 SW1/4 and NW1/4 SE1/4 SEC 28 T7S R41E	R	P	R4SBA	ES, NWUS		0.046	Crossed and paralleled by C/L
NE-269	Unnamed channel	SE1/4 SW1/4 SEC 28 T7S R41E	R	P	R4SBA	ES, NWUS		0.051	Crossed by C/L (ROW=800 feet wide at this point)
NE-270	Unnamed channel	SE1/4 SW1/4 SEC 28 T7S R41E	R	P	R4SBA	ES, NWUS		0.018	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Ownership[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-271	Unnamed channel	NW1/4 NW1/4 SEC 33 T7S R41E	R	P	R4SBA	ES, NWUS		0.031	Crossed by C/L at an angle (ROW up to 600 feet wide at this location)
NE-272	Unnamed channel	NE1/4 NE1/4 SEC 32 T7S R41E	R	P	R4SBA	ES, NWUS		0.023	Crossed by C/L
NE-273	Unnamed channel	SE1/4 NW1/4 SEC 32 T7S R41E	R	F	R4SBA	ES, NWUS		0.034	Crossed by C/L (ROW ≈700 feet wide)
NE-274	Unnamed channel	NW1/4 SW1/4 SEC 32 T7S R41E	R	P	R4SBC	ES, NWUS		0.036	Crossed by C/L (ROW ≈700 feet wide)
NE-275	Unnamed channel	SE1/4 SE1/4 SEC 31 T7S R41E	R	P	R4SBA	ES, NWUS		0.025	Crossed by C/L
NE-276	Unnamed channel	SW1/4 NE1/4 SEC 31 T7 ½ S R41E	B	P	R4SBA	ES, NWUS		0.051	Crossed and paralleled by C/L (ROW up to 650 feet wide)
NE-277	Post Creek	NW1/4 SE1/4 SEC 31 T7 ½ S R41E	B	P	R4SBC	ES, NWUS		0.057	Crossed by C/L (ROW ≈850 feet wide) and meanders
NE-278	Unnamed channel	SW1/4 NE1/4 and NW1/4 SE1/4 SEC 6 T8S R41E	B	P	R4SBA	ES, NWUS		0.021	Crossed by C/L
NE-279	Unnamed channel	NE1/4 SW1/4 SEC 6 T8S R41E	B	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-280	Unnamed channel	SW1/4 SW1/4 SEC 6 T8S R41E	B	P	R4SBA	ES, NWUS		0.022	Crossed by C/L
NE-281	Unnamed channel	NE1/4 NE1/4 SEC 12 T8S R40E	B	P	R4SBA	ES, NWUS		0.018	Crossed by C/L
NE-282	Unnamed channel	NE1/4 NE1/4 SEC 12 T8S R40E	B	P	R4SBC	ES, NWUS		0.030	Crossed by C/L (ROW ≈650 feet wide)
NE-283	Unnamed channel	SW1/4 NE1/4 SEC 12 T8S R40E	B	P	R4SBA	ES, NWUS		0.025	Crossed by C/L
NE-284	Unnamed channel	SW1/4 NE1/4 SEC 12 T8S R40E	B	P	R4SBA	ES, NWUS		0.021	Crossed by C/L
NE-285	Unnamed channel	NE1/4 SW1/4 SEC 12 T8S R40E	B	P	R4SBA	ES, NWUS		0.037	80 - 200 feet east of and parallel to C/L
NE-286	Leaf Rock Creek	SW1/4 SW1/4 SEC 12 T8S R40E	B	P/S	R4SBC	ES, NWUS		0.018	Crossed by C/L
NE-287	Unnamed channel	NE1/4 NE1/4 SEC 14 T8S R40E	B	P	R4SBA	ES, NWUS		0.028	Crossed by C/L
NE-288	Unnamed channel	SE1/4 NW1/4 SEC 14 T8S R40E	B	F	R4SBC	ES, NWUS		0.024	Crossed by C/L
NE-289	Monument Creek	NE1/4 SW1/4 SEC 14 T8S R40E	B	P	R4SBC	ES, NWUS		0.029	Crossed by C/L (ROW 600 feet wide)
NE-290	Unnamed channel	NW1/4 NW1/4 SEC 23 T8S R40E	B	P	R4SBA	ES, NWUS		0.030	Crossed by C/L at angle
NE-291	Unnamed channel	SE1/4 NE1/4 SEC 22 T8S R40E	B	P	R4SBC	ES, NWUS		0.018	Crossed by C/L

Table 2. (Continued)

Site		Legal Description	Cnty[1]	Owner-ship[2]	Classification		Function[5]	Acreage[6]	Comments
Site #	Site Name				Cowardin[3]	WUS Class[4]			
NE-292	Unnamed channel	NE1/4 NW1/4 SEC 27 T8S R40E	B	P	R4SBA	ES, NWUS		0.096	20 - 40 feet east of and parallel to C/L
NE-293	Tributary to NE-292	NW1/4 NW1/4 SEC 27 T8S R40E	B	P	R4SBA	ES, NWUS		0.016	Crossed by C/L
NE-294	Unnamed channel	SW1/4 NW1/4 SEC 27 T8S R40E	B	P	R4SBC/ PEM5Ah	ES, NWUS, SWF		0.022	Crossed by C/L
NE-295	Tributary to NE-294	SW1/4 NW1/4 SEC 27 T8S R40E	B	P	R4SBA	ES, NWUS		0.018	Cross

[1]County
- C - Custer
- R - Rosebud
- B - Big Horn

[2]Ownership:
- L - Livestock and Range Research Station
- C - Municipal
- S - State
- F - Federal
- P - Private

[3]See attached figure

[4]Waters of the U.S. classes:
- NWUS - Non-wetland waters of the U.S.
- ES - Ephemeral stream
- IS - Intermittent stream
- RWF - River with wetland fringe
- SWF - Stream with wetland fringe
- UM - Abandoned or unused meander of channel.
- P - Natural or artificial pond
- R - Riparian area
- WM - Wet meadow/saline meadow

[5]Wetland function designations (adapted from Berglund 1996):
- WL - General wildlife habitat
- Ft - General Fish habitat, temporary
- Fs - General Fish habitat, seasonal
- Fp - General Fish habitat, perennial
- DS - Dynamic surface water storage
- FLD - Flood attenuation and storage

[6]Acreage is calculated based on a 400-foot-wide corridor unless otherwise noted.

Footnote 3 to Table 2

WETLANDS AND DEEPWATER HABITATS CLASSIFICATION

SYSTEM: P–PALUSTRINE

CLASS	Subclass
RB–ROCK BOTTOM	1 Bedrock; 2 Boulder
UB–UNCONSOLIDATED BOTTOM	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic
AB–AQUATIC BED	1 Submergent Algal; 2 Submergent Vascular; 3 Submergent Moss; 4 Floating–leaved; 5 Floating; 6 Unknown Submergent; 7 Unknown Surface
FL FLAT	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic; 5 Vegetated Pioneer; 6 Vegetated Non–pioneer
ML–MOSS–LICHEN	1 Moss; 2 Lichen
EM–EMERGENT	1 Persistent; 2 Nonpersistent; 3 Narrow–leaved Nonpersistent; 4 Broad–leaved Nonpersistent; 5 Narrow–leaved Persistent; 6 Broad–leaved Persistent
SS–SCRUB–SHRUB	1 Broad–Leaved Deciduous; 2 Needle–Leaved Deciduous; 3 Broad–Leaved Evergreen; 4 Needle–Leaved Evergreen; 5 Dead; 6 Deciduous; 7 Evergreen
FO–FORESTED	1 Broad–Leaved Deciduous; 2 Needle–Leaved Deciduous; 3 Broad–Leaved Evergreen; 4 Needle–Leaved Evergreen; 5 Dead; 6 Deciduous; 7 Evergreen
OW–OPEN WATER/ Unknown Bottom	

SYSTEM: R–RIVERINE

SUBSYSTEM: 1–TIDAL; 2–LOWER PERENNIAL; 3–UPPER PERENNIAL; 4–INTERMITTENT; 5–UNKNOWN PERENNIAL

CLASS	Subclass
RB–ROCK BOTTOM	1 Bedrock; 2 Boulder
UB–UNCONSOLIDATED BOTTOM	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic
*SB–STREAMBED	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic
AB–AQUATIC BED	1 Submergent Algal; 2 Submergent Vascular; 3 Submergent Moss; 4 Floating–leaved; 5 Floating; 6 Unknown Submergent; 7 Unknown Surface
RS–ROCKY SHORE	1 Bedrock; 2 Boulder
FL–FLAT	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic; 5 Vegetated Pioneer; 6 Vegetated Non–pioneer
**EM–EMERGENT	2 Nonpersistent; 3 Narrow–leaved Nonpersistent; 4 Broad–leaved Nonpersistent
BB–BEACH/BAR	1 Cobble–Gravel; 2 Sand
OW–OPEN WATER/ Unknown Bottom	

SYSTEM: L–LACUSTRINE

SUBSYSTEM: 1–LIMNETIC

CLASS	Subclass
RB–ROCK BOTTOM	1 Bedrock; 2 Boulder
UB–UNCONSOLIDATED BOTTOM	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic
AB–AQUATIC BED	1 Submergent Algal; 2 Submergent Vascular; 3 Submergent Moss; 4 Floating–leaved; 5 Floating; 6 Unknown Submergent; 7 Unknown Surface
OW–OPEN WATER/ Unknown Bottom	

SUBSYSTEM: 2–LITTORAL

CLASS	Subclass
RB–ROCK BOTTOM	1 Bedrock; 2 Boulder
UB–UNCONSOLIDATED BOTTOM	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic
AB–AQUATIC BED	1 Submergent Algal; 2 Submergent Vascular; 3 Submergent Moss; 4 Floating–leaved; 5 Floating; 6 Unknown Submergent; 7 Unknown Surface
RS–ROCKY SHORE	1 Bedrock; 2 Boulder
FL–FLAT	1 Cobble–Gravel; 2 Sand; 3 Mud; 4 Organic; 5 Vegetated Pioneer; 6 Vegetated Non–pioneer
BB–BEACH/BAR	1 Cobble–Gravel; 2 Sand
**EM–EMERGENT	2 Nonpersistent; 3 Narrow–leaved Nonpersistent; 4 Broad–leaved Nonpersistent
OW–OPEN WATER/ Unknown Bottom	

*STREAMBED is limited to TIDAL and INTERMITTENT SUBSYSTEMS, and comprises the only CLASS in the INTERMITTENT SUBSYSTEM.
**EMERGENT is limited to TIDAL and LOWER PERENNIAL SUBSYSTEMS.

MODIFIERS

In order to more adequately describe wetland and deepwater habitats one or more of the water regime, water chemistry, soil, or special modifiers may be applied at the class or lower level in the hierarchy. The farmed modifier may also be applied to the ecological system.

WATER REGIME

Non–Tidal

- A Temporarily Flooded
- B Saturated
- C Seasonally Flooded
- D Seasonally Flooded/ Well Drained
- E Seasonally Flooded/ Saturated
- F Semipermanently Flooded
- G Intermittently Exposed
- H Permanently Flooded
- J Intermittently Flooded
- K Artificially Flooded
- W Intermittently Flooded/Temporary
- Y Saturated/Semipermanent/ Seasonal
- Z Intermittently Exposed/Permanent
- U Unknown

Tidal

- K Artificially Flooded
- L Subtidal
- M Irregularly Exposed
- N Regularly Flooded
- P Irregularly Flooded
- *S Temporary–Tidal
- *R Seasonal–Tidal
- *T Semipermanent–Tidal
- *V Permanent–Tidal
- U Unknown

*These water regimes are only used in tidally influenced, freshwater systems.

WATER CHEMISTRY

Coastal Halinity

- 1 Hyperhaline
- 2 Euhaline
- 3 Mixohaline (Brackish)
- 4 Polyhaline
- 5 Mesohaline
- 6 Oligohaline
- 0 Fresh

Inland Salinity

- 7 Hypersaline
- 8 Eusaline
- 9 Mixosaline
- 0 Fresh

pH Modifiers for all Fresh Water

- a Acid
- t Circumneutral
- i Alkaline

SOIL

- g Organic
- n Mineral

SPECIAL MODIFIERS

- b Beaver
- d Partially Drained/Ditched
- f Farmed
- h Diked/Impounded
- r Artificial Substrate
- s Spoil
- x Excavated

Source: *Classification of Wetlands and Deepwater Habitats of the United States* Cowardin ET. AL. 1979 as modified for National Wetland Inventory Mapping Convention

Table 3. Comparison of Waters of the U.S. along the Tongue River Railroad Proposed Alignment and four alternatives.

(Revised November 30, 1998)

Alternative	Approx. Length (Miles)	Total Number WUS	Total Acreage WUS	Acreage by WUS Type[1]						
				ES	ES, NWUS	IS	P	RWF	SWF	UM
TRRC Proposed Alignment	116	297	38.05	0.29	5.99	0.00	10.23	18.57	1.68	1.29
Tongue River Road Alternative[2]	117	309	94.36	0.29	5.67	3.09	5.95	42.31	1.95	35.10
Moon Creek Alternative[3]	124	294	46.92	0.00	7.08	0.01	0.97	35.51	2.06	1.29
Colstrip Alternative[4]	109	308	53.94	0.00	5.10	0.00	25.90	15.67	5.44	1.83
Four Mile Creek Alternative[5]	128	325	65.51	0.29	6.21	0.07	10.23	44.69	1.68	2.33

[1]Waters of the U.S. types:

NWUS - Non-wetland waters of the U.S.
ES - Ephemeral stream
IS - Intermittent stream
RWF - River with wetland fringe
SWF - Stream with wetland fringe
UM - Abandoned or unused meander of channel
P - Natural or artificial pond
R - Riparian area
WM - Wet meadow/saline meadow

[2]Incorporates TRRC Proposed Alignment from Miles City to approx. station 520+00, and from approx. station 3200+00 to Decker.
[3]Joins TRRC Proposed Alignment at approx. station 1100+00 then incorporates TRRC Proposed Alignment to Decker.
[4]Joins TRRC Proposed Alignment at approx. station 3040+00 then incorporates TRRC Proposed Alignment to Decker.
[5]Incorporates TRRC Proposed Alignment from Miles City to approx. station 5180+00.