Engineering Evaluation/Cost Analysis
Wallace Yard and Spur Lines

USEPA Region 10

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Engineering Evaluation/Cost Analysis
Wallace Yard and Spur Lines
Response Action Under the Comprehensive Environmental Response Compensation and Liability Act

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TABLE OF CONTENTS

1.0 INTRODUCTION 1-1

2.0 SITE CHARACTERIZATION 2-1

2.1 SITE LOCATION 2-1
2.2 TYPE OF FACILITY AND OPERATIONAL STATUS 2-1
2.2.1 Site History and Description 2-1
2.3 GEOGRAPHY AND TOPOGRAPHY 2-2
2.3.1 Geography 2-2
2.3.2 Topography 2-3
2.4 GEOLOGY AND SOIL 2-3
2.4.1 Regional Geologic Setting 2-3
2.4.2 Soils 2-3
2.5 HYDROGEOLOGY 2-4
2.5.1 Surface Water Hydrology 2-4
2.5.2 Surface Water and Groundwater Interactions 2-5
2.6 SURROUNDING LAND USE AND POPULATION 2-5
2.7 METEOROLOGY 2-7
2.8 ECOSYSTEMS 2-7
2.9 PREVIOUS REMOVAL AND RESPONSE ACTIONS 2-7
2.9.1 Wallace Yard 2-7
2.9.2 Ninemile Creek 2-8
2.9.3 Canyon Creek 2-8
2.10 SOURCE, NATURE, AND EXTENT OF CONTAMINATION 2-8
2.10.1 Source of Contamination 2-8
2.10.2 Selection of Constituents of Potential Concern 2-10
2.10.3 Site Characterization 2-10
2.10.4 Soil Sampling Procedures 2-12
2.10.5 Soil Sampling Results 2-12
2.10.6 Groundwater Sampling Procedures 2-14
2.10.7 Groundwater Investigation and Sampling Results 2-15
2.10.8 Surface Water Sampling Procedures 2-16
2.10.9 Surface Water Sampling Results 2-17
2.10.10 Surface Water Flows and Loading Analysis 2-17
2.10.11 Groundwater/Surface Water Interaction 2-19

3.0 STREAMLINED RISK EVALUATION 3-1

3.1 HUMAN HEALTH RISK 3-1
3.2 DATA EVALUATION AND IDENTIFICATION OF COPCs 3-1

TABLE OF CONTENTS (Continued)

3.3 EXPOSURE ASSESSMENT 3-2
3.4 QUANTIFICATION OF EXPOSURE FOR ARSENIC, CADMIUM, AND ZINC 3-4
3.5 RECEPTOR-SPECIFIC EXPOSURE QUANTIFICATION 3-5
3.6 TOXICITY ASSESSMENT 3-6
3.6.1 Non-Lead Toxicity Assessment 3-6
3.6.2 Lead Toxicity Assessment 3-7
3.7 RISK CHARACTERIZATION 3-7
3.7.1 Methods for Calculating Theoretical Excess Lifetime Cancer Risks 3-8
3.7.2 Non-carcinogenic Risk Characterization Methods 3-8
3.7.3 Risk Characterization of Lead 3-8
3.8 RISK CHARACTERIZATION RESULTS 3-9
3.9 ECOLOGICAL RISK 3-10
3.9.1 Wallace Yard 3-10
3.9.2 Spur Lines 3-11
3.10 CONCLUSIONS OF STREAMLINED ECOLOGICAL RISK EVALUATION 3-13

4.0 IDENTIFICATION OF RESPONSE ACTION OBJECTIVES 4-1
4.1 STATUTORY LIMITS 4-1
4.2 SCOPE, GOALS, AND OBJECTIVES 4-1
4.2.1 Scope of the Response Action 4-1
4.2.2 Goals and Objectives of the Response Actions 4-1
4.2.3 Compliance with ARARs and Other Criteria 4-2

5.0 IDENTIFICATION AND ANALYSIS OF RESPONSE ACTIONS 5-1
5.1 IDENTIFICATION OF POSSIBLE RESPONSE ACTIONS 5-1
5.2 ANALYSIS OF REMOVAL ACTION ALTERNATIVES 5-2
5.3 ACHIEVEMENT OF THE SITE RAOs 5-3

6.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE 6-1
6.1 WALLACE YARD 6-1
6.1.1 Residential Areas 6-2
6.1.2 Existing Common Area (Wallace Visitor Center and Parking Area) 6-3
6.1.3 Future Common Use Areas 6-3
6.1.4 Interstate 90 6-4
6.1.5 Hercules Mill Site 6-5
6.2 SPUR LINES 6-6
6.3 RESPONSE ACTION COST 6-9

TABLE OF CONTENTS (Continued)

6.4 RESPONSE ACTIVITIES SCHEDULE 6-9
6.5 CONTROLS ON LAND USE AND MEASURES TO ENSURE INTEGRITY OF RESPONSE ACTION 6-11

7.0 REFERENCES 7-1

LIST OF TABLES

2-1 Former NPRy Spur Line Reconnaissance Summary – Ninemile Creek
2-2 Former WIRR Spur Line Reconnaissance Summary – Burke Canyon
2-3 Ninemile – Land Use Adjacent to ROW
2-4 Burke Canyon – Land Use Adjacent to ROW
2-5 Test Pit Locations Not Sampled Wallace Yard
2-6 Test Pit Locations Not Sampled Former NPRy Line Ninemile Creek
2-7 Test Pit Locations Not Sampled Canyon Creek
2-8 Analytical Results for Metals Sampling Wallace Yard
2-9 Wallace Yard Metals Samples Summary Statistics
2-10 Analytical Results for Metals Sampling Former NPRy Line Ninemile Creek
2-11 Analytical Results for Metals Sampling Former NPRy Line Canyon Creek
2-12 Analytical Results for Metals Sampling Former WIRR Line Canyon Creek
2-13 Former NPRy Line Ninemile Metals Samples Summary Statistics
2-14 Former NPRy Line Canyon Creek Metals Samples Summary Statistics
2-15 Former WIRR Line Canyon Creek Metals Samples Summary Statistics
2-16 Analytical Results of Wallace Yard Organic Samples
2-17 Summary of Analytical Results in Wallace Yard Groundwater
2-18 Summary of Analytical Results in Surface Water Near the Wallace Yard
2-19 Flow Measurements
2-20 Dissolved Cadmium Loading
2-21 Dissolved Zinc Loading
2-22 Summary of Net Gains and Losses for Flow and Metals Loading
2-23 Comparison of Groundwater and Surface Water Loading Estimates – Wallace Yard
3-1 Risk Characterization Summary
3-2 Railbed Embankment Erosion Estimate Calculations – Ninemile
3-3 Railbed Embankment Erosion Estimate Calculations – Canyon Creek (Burke Canyon)

TABLE OF CONTENTS (Continued)

LIST OF FIGURES

1-1 Wallace Yard Map

1-2 Canyon and Ninemile Creek Spur Line Location and Photo Index

2-1 Wallace Yard Map Quarter Acre Sample Grid Northwest Section of Yard

2-2 Wallace Yard Map Quarter Acre Sample Grid Southeast Section of Yard

2-3 Canyon and Ninemile Creek Spur Line Sample Locations

2-4 Surface Water/Groundwater Sampling Locations

2-5 Northwest Section of Yard Arsenic

2-6 Southeast Section of Yard Arsenic

2-7 Northwest Section of Yard Cadmium

2-8 Southeast Section of Yard Cadmium

2-9 Northwest Section of Yard Lead

2-10 Southeast Section of Yard Lead

2-11 Northwest Section of Yard Zinc

2-12 Southeast Section of Yard Zinc

2-13 Canyon and Ninemile Creek Spur Line Sample Analytes – Arsenic

2-14 Canyon and Ninemile Creek Spur Line Sample Analytes – Cadmium

2-15 Canyon and Ninemile Creek Spur Line Sample Analytes – Lead

2-16 Canyon and Ninemile Creek Spur Line Sample Analytes – Zinc

2-17 Southeast Section of Yard Diesel and Heavy Oil Range Hydrocarbons

2-18 Potentiometric Surface Contour Map – October 28, 2004

3-1 Sub-Areas

3-2 Typical Embankment Section

6-1 Wallace Yard Response Action – Eastern Portion

6-2 Wallace Yard Response Action – Western Portion

6-3 Response Action Former Hercules Mill Site

6-4 Visitors Center Parking Lot Response Action

6-5 Canyon and Ninemile Creek Spur Lines Recommended Response Actions

TABLE OF CONTENTS (Continued)

APPENDICES

A Photo Record of Spur Line Reconnaissance Ninemile Creek

B Photo Record of Spur Line Reconnaissance Burke Canyon

C Risk Calculations

D Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

E Comparative Analysis of Alternatives from Basin FS

F Boring Logs and Well Completion Details Wallace Yard

G Groundwater Flux Calculations

ACRONYMS

ADD	average daily dose
AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	ambient water quality criteria
BLM	Bureau of Land Management
BNSF	Burlington Northern Santa Fe
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
cfs	cubic feet per second
COPC	Constituents of Potential Concern
CSFs	cancer slope factors
DG	Daily Gulch
DO	dissolved oxygen
EE/CA	Engineering Evaluation and Cost Analysis
EPA	Environmental Protection Agency
EPCs	Exposure Point Concentrations
FS	Feasibility Study
ft/day	feet per day
HHRA	Human Health Risk Assessment
HI	hazard index
HQ	hazard quotient
I-90	Interstate 90
IDEQ	Idaho Department of Environmental Quality
IEUBK	Integrated Exposure Uptake Biokinetic
IRIS	Integrated Risk Information System
LADD	lifetime average daily dose
LDRs	Land Disposal Restrictions
mg/kg	milligrams per kilogram
mL	milliliters
MM	Mile Marker
NCP	National Contingency Plan
NPRy	Northern Pacific Railway
NRRB	National Remedy Review Board
PC	Placer Creek
PCBs	polychlorinated biphenyls
PHD	Panhandle Health Department
ppm	parts per million

ACRONYMS (Continued)

PRGs	Preliminary Remediation Goals
PTMs	Principal Threat Materials
RAGS	Risk Assessment Guidance for Superfund
RAOs	Response Action Objectives
RBCA	risk-based correction action
RCRA	Resource Conservation and Recovery Act
RfCs	reference concentrations
RfD	Reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
ROD	Record of Decision
ROW	right-of-way
SAP	Sampling and Analysis Plan
SFCDR	South Fork of the Coeur d'Alene River
SOW	Scope of Work
SVEDC	Silver Valley Economic Development Council
SVNRT	Silver Valley Natural Resource Trustees
SVOCs	semi-volatile organic compounds
TBC	To Be Considered
TDS	total dissolved solids
TMB	1,2,4-trimethylbenzene
TPH	total petroleum hydrocarbons
TSS	total suspended solids
U.S.C.	United States Code
UC	Unknown Canyon
UPRR	Union Pacific Railroad Company
USFS	United States Forest Service
VOCs	volatile organic compounds
WIRR	Washington & Idaho Railroad Company
WRCC	Western Regional Climate Center
WY	Wallace Yard

1.0 INTRODUCTION

This Engineering Evaluation and Cost Analysis (EE/CA) addresses contamination identified by the U.S. Environmental Protection Agency (EPA) within railroad or former railroad properties located within Shoshone County, Idaho. The properties include the former Ninemile Creek and Canyon Creek branch lines or spurs that ran along Ninemile Creek and Canyon Creek ("the Spur Lines"), as well as portions of an area located near Wallace, Idaho, referred to as the "Wallace Yard." Wallace Yard was used for railcar storage, switching, and other railroad operations and the Spur Lines were used to provide transportation services to the mines, mills, and communities in the two canyons. The purpose of the EE/CA is to summarize the nature and extent of Mine Waste and other contaminants associated with Wallace Yard and the Spur Lines, and to evaluate alternatives to be able to select an appropriate response action to address such contamination. For purposes of this EE/CA, the term "Mine Waste" includes jig and flotation tailings, waste rock, concentrates, and ores, all of which are the results of mining activities.

This EE/CA was prepared pursuant to Administrative Order on Consent (AOC) No. 10-2002-0138 (August 22, 2002) between the EPA and the Idaho Department of Environmental Quality (IDEQ), Union Pacific Railroad Company (UPRR), and Burlington Northern Santa Fe (BNSF) Railway Company. UPRR, BNSF, and their consultant, MFG, Inc, are collectively referred to as Respondents in this EE/CA. The Statement of Work (SOW) attached to the AOC specifies the EE/CA requirements.

The SOW requires that this EE/CA summarize available data from previous investigations, or other Respondent and EPA activities at the Site, as well as collecting and analyzing new data to support removal action alternatives. In accordance with the SOW, the Respondents developed a Sampling and Analysis Plan (MFG, 2002) to describe field and laboratory activities to be conducted to collect additional data in support of the EE/CA. Therefore, the site characterization information, and identification and analyses of removal action alternatives presented in this EE/CA are based on both the findings of previous investigations and reports conducted within the Coeur d'Alene Basin performed by others and the site specific investigations performed by the Respondents.

The primary human health and environmental concerns within Wallace Yard and the Spur Lines are related to the presence of Mine Waste contaminated media. The primary contaminants associated with the Mine Waste are arsenic, cadmium, lead, and zinc. In addition, railroad maintenance and operations at the Wallace Yard may have resulted in the release of certain regulated organic compounds, such as components of diesel fuel. Tailings, a component of Mine Waste, are present throughout the floodplain of the South Fork of the Coeur d'Alene River (SFCDR), mainly due to the long history of direct discharge of tailings from mining activities within the SFCDR drainage. These fluvially deposited tailings are likely present within some portions of the Site. Tailings and waste rock may have been used in some locations as ballast material and/or fill during the original construction of the Spur Lines and track structure within the Wallace Yard. The former operations of the Hercules Mill, located within Wallace Yard, may have also resulted in the release of Mine Waste.

A portion of the Wallace Yard area includes a 26-foot-wide corridor centered on the former main line alignment of the Wallace Branch (the Trail Corridor). The Trail Corridor, as well as portions of Wallace Yard west of approximate Mile Marker (MM) 78.9 and east of MM 79.8, was remediated as part of a response action performed by UPRR pursuant to a Consent Decree (Case No. CV 91-0342-N-EJL) between UPRR and the United States of America, State of Idaho, and the Coeur d'Alene Tribe. These areas are not addressed by this EE/CA. Therefore, for the purpose of this EE/CA, the Wallace Yard portion of the Site does not include the Trail Corridor and any other previously remediated areas. The non-remediated portions of the Wallace Yard area and the Spur Lines are referred to collectively within this EE/CA as the Site. The locations of Wallace Yard and the Spur Lines are shown on Figures 1-1 and 1-2, respectively.

The response actions described in this EE/CA will be conducted pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986. This EE/CA has been prepared in accordance with and in a manner consistent with the National Contingency Plan (NCP) and the U.S. Environmental Protection Agency's (EPA) *Guidance on Conducting Non-Time-Critical Removal Actions Under CERCLA* (EPA, 1993) (the EE/CA Guidance).

There have been several documents issued by EPA that address Mine Waste cleanup within the Coeur d'Alene Basin at large and the right-of-way (ROW) of the Wallace-Mullan Branch. The Spur Line and Wallace Yard areas are included within the scope of these documents. The previous findings, conclusions, and recommendations included within these documents were considered and relevant portions incorporated into this EE/CA as appropriate. These documents consist of the following:

- *Engineering Evaluation/Cost Analysis Response Action Under the Comprehensive Environmental Response Compensation and Liability Act Union Pacific Railroad Wallace-Mullan Branch.* (EPA, 1999) (the Wallace-Mullan Branch EE/CA);

- *Coeur d'Alene Basin RI/FS, Remedial Investigation Report, Final.* (EPA, 2001) (the Basin RI);

- *Final Baseline Human Health Risk Assessment for the Coeur d'Alene Basin Extending from Harrison to Mullan on the Coeur d'Alene River and Tributaries, Remedial Investigation/Feasibility Study.* (IDWH 2001) (the Basin HHRA);

- *Coeur d'Alene Basin RI/FS, Feasibility Study Report, Final.* (EPA, 2001a) (the Basin FS); and

- *Coeur d'Alene Basin Record of Decision.* (EPA, 2002) (the Basin ROD).

2.0 SITE CHARACTERIZATION

This section of the EE/CA provides general information regarding the Site, including the location, type of previous operations, and a synopsis of the history of the Site. Also described are the geography and topography of the area, along with descriptions of the adjacent land use, population of the cities and towns along the ROW, meteorology, and sensitive ecosystems. A description of previous response actions that have occurred within the Site area is included. Additional information presented relates to the source, nature, and extent of contamination associated with the Site, including analytical data from sampling efforts to characterize conditions within the Site. Finally, the results of a streamlined risk assessment specific to the Site is summarized to provide an overall characterization of the potential impacts to human health associated with Mine Waste and other contaminated material found within the Site, and to provide a basis for evaluating whether response actions recommended in this EE/CA protect human health and the environment.

2.1 SITE LOCATION

The Site is located in Shoshone County in the northern panhandle of Idaho. Wallace Yard includes those areas within the railroad ROW, outside of the Trail Corridor between MM 78.9 and MM 79.8 of the former Wallace Branch of the UPRR. The Wallace Yard area covers approximately 43 acres in size, excluding the Trail Corridor, previously remediated areas, Interstate 90 (I-90), and the SFCDR. The Spur Lines in Canyon Creek and Ninemile Creek measure approximately 6.7 miles and 4.5 miles, respectively. The Spur Line ROWs have typical widths of 75 to 100 feet with limited sections at 150 feet.

2.2 TYPE OF FACILITY AND OPERATIONAL STATUS

This section provides a brief overview of the history of the rail line construction and operation, as it relates to the development of recommended response actions for the Site.

2.2.1 Site History and Description

The site history presented within this section is a summary of information reported previously in several documents, including the AOC, SOW, and *Railroads through the Coeur d'Alenes* (Wood, 1983). In the late 1880s, railroad companies began using Wallace Yard for railcar storage, switching, and other operations. Around 1890, rail transport began on "spur" lines from Wallace Yard along Canyon Creek to mines near Burke, Idaho, to serve the mining industry and communities in the Silver Valley. Around 1900, rail service also began on a spur line to mines and towns along nearby Ninemile Creek. Remnants of many of the mines and mills from that period are still present along both Ninemile Creek and Canyon Creek.

In 1910, the Hercules Mining Company leased part of the area known as Wallace Yard for the construction and operation of a mill. The lease was a 50-year lease; however; it is unclear when the mill permanently ceased operations. The foundations of the former Hercules Mill are still present.

Over several decades, the railroad facilities at the Site were abandoned and/or removed. In addition, several remediation and road construction projects resulted in the removal and/or capping of metals-bearing soils within the Spur Line ROWs and Wallace Yard. For example, construction of I-90 in the late 1980s covered a significant portion of the Wallace Yard area. Soils within the area of the Wallace Visitor Center were "capped" as part of the construction of that area in the mid 1990s.

In 1934, the 2.27 miles of track between Sunset and Bunn in Ninemile Creek were removed (Wood, 1983). The last portion of track between Bunn and Wallace was removed in 1968 (Wood, 1983). In 1994, the Silver Valley Natural Resource Trustees (SVNRT) conducted removals of historic mine wastes in several sections of the floodplain in both Ninemile Creek and the East Fork of Ninemile Creek. However, the removals did not include the railbed that essentially paralleled the creeks (SVNRT, 2000a). Table 2-1 presents a summary of the railbed/embankment dimensions and volumes for this former Spur Line. Photos of various sections of the Spur Line ROWs are included in Appendix A. Figure 1-2 references the locations of the photos.

Between 1923 and 1939, the track owned by Northern Pacific Railway (NPRy) located along the north side of Canyon Creek was removed from Wallace to Burke. Approximately 4.4 miles, or 68 percent of the total ROW length, has been converted to State Highway 4. Another approximate 0.6 mile serves as a gravel access road from the highway to adjacent residences. The remainder of this former alignment is located along the slopes north of the present highway and is essentially inaccessible by vehicles and not readily accessible by pedestrians.

The former Washington and Idaho Railroad Company (WIRR) located along the south side of Canyon Creek, also known as the Burke Line, was constructed in 1890 to serve the communities in the canyon and the mines owned and operated by various entities, including Hecla Mining Company and ASARCO Incorporated. The former WIRR Line ran from Wallace to Burke. From 1996 to 1998, stream channel remediation activities performed by the SVNRT included the removal of sections of the former WIRR Line railbed and embankment (SVNRT, 2000b). Figure 1-2 illustrates the extent of these SVNRT removals along the Burke Line in Canyon Creek. Approximately one mile or 15 percent of the WIRR Line also coincides with State Highway 4. Table 2-2 summarizes the railbed/embankment dimensions and volumes for this former WIRR Line. Photos of various sections are included in Appendix B. Figure 1-2 references the locations of the photos.

In 2000, UPRR implemented a response action for the Wallace-Mullan Branch (the "Wallace-Mullan Branch Response Action"), which passes through the Wallace Yard. This response action included track salvage and tie removal, as well as the construction of a protective barrier in the form of a recreational trail (a.k.a. the Rails-to-Trails Project). The trail is a 10-foot-wide path of asphalt with 8-foot shoulders covered with a gravel barrier on either side. Access from the Trail Corridor to the areas of Wallace Yard is restricted by fencing at the edge of the shoulders on both sides. The gravel barrier extends from the edge of the asphalt to cover accessible areas between the asphalt and the fence. The remediated area includes the Trail Corridor and the Wallace Branch ROW west of MM 78.9 and east of MM 79.8.

2.3 GEOGRAPHY AND TOPOGRAPHY

2.3.1 Geography

Wallace Yard is located on the west side of Wallace, Idaho. The SFCDR runs through portions of Wallace Yard, as does I-90. Wallace Yard and the Spur Lines are located in the Upper Basin, which generally includes the SFCDR and its tributaries east of Cataldo, Idaho. The former NPRy Spur Line located along Ninemile Creek runs from just south of the Success Mill along the East Fork of Ninemile Creek to Ninemile Creek north of Bunn, Idaho, and then to Wallace Yard. The Canyon Creek Spur Lines run along opposite sides of Canyon Creek from Burke, Idaho, to Wallace Yard. Both Nine Mile Creek and Canyon Creek are tributaries to the SFCDR, which is within the Lake Coeur d'Alene watershed. The Spur Lines lie in close proximity to numerous inactive and abandoned mining facilities and public lands managed by the State of Idaho, U.S. Bureau of Land Management (BLM), and the U.S. Forest Service (USFS).

2.3.2 Topography

Wallace Yard lies within the typically narrow and relative flat SFCDR valley. The Wallace Yard area is bordered by a steep hillside or the banks of the SFCDR on the north and by I-90 and the banks of the SFCDR on the south. The elevation of Wallace Yard varies from 2,640 to 2,720 feet (USGS, 1988). The flood stage of the SFCDR at Wallace is at an elevation of 2,716 feet near the east end of Wallace Yard (FEMA, 1986).

The Canyon Creek Spur Lines lie in the narrow Canyon Creek river valley. The characteristics of this canyon include a high stream gradient in the upper reaches opening up into a U-shaped canyon near Woodland Park. The Spur Lines rise from an elevation of approximately 2,760 feet at Wallace to 3,800 feet at Burke.

The Ninemile Spur Line also lies in the narrow Ninemile Creek river valley with steep gradient characteristics. Elevations range from 2,735 feet at Wallace to 3,160 feet north of Bunn, and to 3,440 feet south of the Success Mill site along the East Fork of Ninemile Creek.

Because of the close proximity of the Spur Lines to the creeks and Wallace Yard to the SFCDR, there is a potential for flooding of various portions of the Site.

2.4 GEOLOGY AND SOIL

2.4.1 Regional Geologic Setting

The Site is located within the western slopes of the Bitterroot Range which is in the western part of the physiographic province of the Northern Rocky Mountains. This area is characterized geologically by extensive exposures of the Precambrian Belt Supergroup, a thick sequence of metasedimentary rocks which also host the ore deposits of the Coeur d'Alene Mining District. Aside from a few small and scattered intrusive bodies of Mesozoic age, the next youngest rocks in the area are associated with the middle Columbia River Basalt Group. Pleistocene glacial deposits overlie these Miocene basalts.

The Precambrian Belt Supergroup consists of a thick sequence of fine-grained, mostly clastic metasedimentary rocks. The sequence has been subdivided into six formations, all of which have lithologic gradations found at the contacts. The lithologies consist mostly of argillite, siltite, and quartzite, with some interbedded carbonates. Belt rocks have undergone only low-grade, regional metamorphism, and the original sedimentary features are generally well preserved.

2.4.2 Soils

Soils of the Upper South Fork Watershed can be grouped into two broad categories: hillside soils and valley soils. Hillside soils typically consist of silty loam with variable amounts of gravels and clay, generally less than 2 feet thick (EPA, 2001). Valley soils within and along the flanks of the South Fork may consist of alluvial or glacial deposits. The alluvium is characterized as unconsolidated sand, gravel, and clay valley fill material, while the glacial deposits may occur in the form of terrace gravels. Terrace gravels may be characterized as well-developed sandy soil overlying gravels consisting of cobbles and boulders above the active floodplain of the river.

2.5 HYDROGEOLOGY

The Basin Remedial Investigation (RI) presents a conceptual hydrogeologic model for the upper portion of the Coeur d'Alene Basin. The following sections incorporate hydrogeological and hydrological information from the Basin RI that is pertinent to the Wallace Yard.

The SFCDR and its tributaries drain a total area of approximately 323 square miles (USHUD, 1979). The upper SFCDR valley, including the Wallace Yard area, is generally narrow, with flats less than one mile in width. The SFCDR below Wallace is relatively shallow and swift flowing, with a gradient of approximately 30 feet per mile (0.6 percent grade). Stream flows for the SFCDR and tributaries are usually highest during spring runoff. However, some of the worst flooding in the Coeur d'Alene Basin has occurred during January and February when rains fall on a large snow pack.

The SFCDR watershed, from Wallace to Kellogg, is an aggraded, montane alluvial valley that is fed by numerous tributaries and the South Fork of the Coeur d'Alene River. The aerial extent of this part of the watershed is approximately 57 square miles.

Detailed hydrostratigraphic descriptions are not available for portions of the watershed above Kellogg. However, others have made generalizations of the area from Wallace to Kellogg based on drillers' logs, exposures of alluvium in the valley, and geophysical surveys (EPA, 2001). The Basin RI, summarized below, presents these generalized hydrostratigraphic descriptions.

The unconfined aquifer system consists of unconsolidated sediments overlying rocks of the Belt Supergroup in an elongated U-shaped trough that is approximately 800 feet wide in Wallace and the depth to bedrock is approximately 30 feet. The Belt Supergroup rocks are reported to have very low permeability; however, faulting, fracturing, and mining activities result in localized zones of higher permeability. Upper sediments appear to overlie the lower sediments in direct hydraulic communication forming a single, unconfined aquifer. Sediments are coarser with less silt. Alluvium consists of sand and gravel with considerable (10 to 20 percent) rounded to sub-rounded cobbles and boulders.

Aquifer properties have been estimated by others to be as follows: horizontal hydraulic conductivity of 500 to 10,790 feet per day (ft/day); vertical hydraulic conductivity of 0.0025 ft/day; transmissivity of 10,002 to 216,852 feet squared per day (ft^2/day); storativity of 0.0015 to 0.09; and an effective porosity of 23.6 to 29.0 percent (EPA, 2001). While these aquifer properties are cited for the Basin in general, alternate hydraulic conductivity properties are presented in Section 2.10.7, based on the boring logs from monitoring wells installed in the Wallace Yard as part of the site investigation. Groundwater flow direction in the valley fill deposits along the SFCDR typically is from east to west, with minor north and south components near the mouths of tributary watersheds.

2.5.1 Surface Water Hydrology

Residents of Wallace obtain their water through a municipal water supply system from surface water sources located upstream of Wallace and outside of the Site. Canyon Creek, Nine Mile Creek, Placer Creek and the upper SFCDR join near the city of Wallace. USGS gauging stations are present in Placer Creek near Wallace (Station Number 12413140) and in the SFCDR at Silverton (Station Number 12413150). The nearest precipitation gauging station is the Western Regional Climate Center (WRCC) at Woodland Park in Canyon Creek. This precipitation gage is the nearest gage to the Silverton and Placer Creek gauging stations.

The maximum mean daily discharge measured at the Silverton station was approximately 4,000 cubic feet per second (cfs) and occurred on January 16, 1974. The instantaneous peak discharge on this date was 4,300 cfs. Typically, for this period of record, maximum mean daily discharge varied from approximately 1,000 cfs to 2,000 cfs, with the average annual discharge being approximately 250 cfs. Base flow is estimated to be between 50 and 60 cfs. The majority of discharge occurs in spring and summer months, when snowmelt supplies water to the channel system. Smaller discharges typically occur during the fall and winter months.

The maximum mean daily discharge recorded at the Placer Creek gage was approximately 900 cfs and occurred on January 15, 1974, with an instantaneous peak discharge of 1,140 cfs. The USGS has estimated that a peak discharge of 2,200 cfs occurred on February 2, 1996, during a period when the gage was not in operation. Typically for this period of record, peak mean annual discharge varies from approximately 150 cfs to 500 cfs. The average annual discharge from Placer Creek is approximately 35 cfs and base flow is estimated at 3 cfs to 5 cfs. The bank full discharge, a 1.5-year return event, is estimated to be approximately 300 cfs for Placer Creek and 1,500 cfs for the SFCDR.

2.5.2 Surface Water and Groundwater Interactions

Previous studies (MFG 1992; Williams 1989) have reported that the SFCDR is composed of both gaining reaches (where groundwater flows into the stream when the aquifer groundwater elevation is higher than the stream elevation) and losing reaches (where surface water flows into the unconfined aquifer when the stream elevation is greater than the aquifer elevation). The prevailing conceptual model holds that the distribution of gaining and losing reaches along the SFCDR is governed by the cross-sectional area of the valley fill deposits. Specifically, where the valley fill is narrow and/or thin (constricted valley) net gain to the river from the aquifer is observed; and where the valley fill is wide and/or thick, net loss from the river to the aquifer is observed. It is reasonable to expect that the aerial limits and the net flow rates of gaining and losing reaches along the SFCDR will vary from season to season and year to year as a result of variations in recharge-discharge conditions. A more detailed discussion of surface water and groundwater interactions specific to the Site is presented in Section 2.10.11.

2.6 SURROUNDING LAND USE AND POPULATION

Existing land uses within the vicinity of the Site range from undeveloped forest to urban communities. The eastern portion of Wallace Yard is within the city limits of Wallace. This area primarily consists of portions of I-90, an active industrial manufacturing facility operated by Spunstrand, remaining foundations from the Hercules Mine milling operations, the Wallace Visitor Center, a vacant area, parking lots, and two residences. Approximately 1,000 people reside in Wallace and most of these residents live within approximately two miles of the Wallace Yard area.

Canyon Creek and Ninemile Creek drainages converge with the main valley of the SFCDR at Wallace. Property ownership in the valley floor area of these canyons is mixed. Existing land uses along the Spur Lines range from undeveloped to small, rural residential communities. Tables 2-3 and 2-4 present summaries of this land use along Canyon Creek and Ninemile Creek. Access to each of the drainage areas is by a county or state highway. The highways generally follow the active stream channels. However, along Ninemile Creek, the highway veers away from the main stream channel as it increases in elevation along the east side of the drainage and approaches Dobson Pass. State Highway 4 along Canyon Creek covers approximately 68 percent of the former NPRy line and approximately 15 percent of the former WIRR line. The County road covers approximately four percent of the former NPRy line in the Ninemile canyon and another 12 percent serves as a gravel access road.

In November 2004, representatives of EPA, IDEQ, and Respondents performed reconnaissance of the Spur Lines along both Ninemile Creek and Canyon Creek to identify land use patterns. Another follow-up field reconnaissance was conducted by EPA, IDEQ, and Respondents in May 2007. The results of the reconnaissance are summarized as follows:

- Canyon Creek (former NPRy and WIRR Lines):
    - Portions of the railbed and embankment within the former NPRy ROW (the northern line) and the former WIRR ROW are no longer present along Canyon Creek.
    - The paved State Highway 4 covers most of the former NPRy railbed and a portion of the former WIRR railbed. However, portions of the unpaved road shoulder exist within the railroad ROW.
    - A relative short length (approximately 0.6 mile) of the former NPRy ROW and 1.2 miles of the former WIRR ROW serves as an unpaved road to the residential areas. (At the time of the field review, it appeared that the gravel road along the NPRy ROW was also part of the WIRR ROW; however, subsequent reconnaissance found that the highway covers the WIRR ROW that actually crosses over to the south side of the creek.)
    - There are portions of the ROWs (primarily the former WIRR line) where remnants of the railbed or railroad embankment are still present within residential use areas.
    - There were no current formal recreational use areas identified within Canyon Creek. However, portions of the rail spur are accessible to local residents and to recreational users (e.g., ATV access).
- Nine Mile Creek (former NPRy Line):
    - There are portions of the former NPRy ROW where remnants of the railbed or railroad embankment are still present within either a common use area (e.g., the RV Park near Wallace) or residential use areas.
    - There are portions of the former NPRy ROW where remnants of the embankment are still present. Some of these areas are overgrown with vegetation and are not readily accessible. However, other portions are readily accessible and are being used as access routes to residences and for recreational purposes.
    - There is approximately 1.25 miles of the NPRy ROW where the railroad embankment is present and appears to be in use for some ATV access.
    - Except for the very end (the Success Mine load-out area), the portion of the former NPRy ROW beyond the switch back is generally overgrown and inaccessible.
    - Approximately four percent of the former NPRy railbed is covered by the paved County road. However, portions of unpaved road shoulder exist in the railroad ROW.
    - Across the road from the Dayrock Mine Complex, the former rail alignment is functioning as a roadside pullout. There is no distinguishable railbed or embankment within the Dayrock Mine Complex.

- A portion of the former NPRy ROW alignment splits off from Nine Mile Road and is coincident with a gravel road. There is no discernable railroad embankment or railbed within this portion of the ROW. Approximately 3,000 feet of this road provides access to two residences. Beyond the residences, the gravel road is used for logging access. Sampling data displays contaminants of concern below the action level along this stretch. Given the limited use, the logging road portion of the road beyond the residences is not considered a public street ROW.

- There were no current formal recreational use areas identified within the former NPRy ROW. However, portions of the rail spur are accessible to local residents and to recreational users (e.g., ATV access).

Because of the historic mining activity that occurred in the area, several abandoned mill sites and waste rock dumps are present in both drainages (Basin RI). Canyon Creek contains several abandoned mine sites throughout its length; whereas, Ninemile Creek only contains a few in the upper portion of the drainage as well as in its tributary of the East Fork Ninemile Creek. In addition, a series of tailings ponds near Woodland Park (identified in Figure 1-2 between Mile Posts 1.25 and 1.5) along Canyon Creek still receive mine water from the Star-Hecla Mine located upstream in Burke.

2.7 METEOROLOGY

The Pacific Maritime flow of moist air influences the climate of the area. This results in high levels of precipitation with over 70 percent occurring from October to April. Precipitation in the area is correlated with elevation, with the highest elevations receiving higher precipitation amounts, mainly in the form of snow. Measured precipitation in the Coeur d'Alene Basin ranges between 30 and 40 inches per year. Ambient temperature also varies throughout the project area depending upon elevation. In general, temperatures range from a low of –20 degrees F to a high of 100 degrees F (USDC, 1963). The mean annual temperature at Coeur d'Alene is 48 degrees F (CLCC, 1996).

2.8 ECOSYSTEMS

The Coeur d'Alene Basin is a large watershed that contains a number of interconnected and interactive ecosystem components. These ecosystem components are rivers and streams; the riparian zone; wetlands; uplands; lateral lakes; and Lake Coeur d'Alene. The Spur Lines and Wallace Yard are located adjacent to or within the rivers and streams, riparian zone, and uplands of the Coeur d'Alene Basin ecosystem. The Basin RI and the *Coeur d'Alene Basin RI/FS, Basinwide Ecological Risk Assessment*. (EPA, 2001b) (the Basin ERA) presents extensive discussions of the Coeur d'Alene Basin ecosystem.

2.9 PREVIOUS REMOVAL AND RESPONSE ACTIONS

There have been several previous response actions within the Coeur d'Alene Basin, including the Wallace Yard and Spur Line areas. These response actions are summarized below.

2.9.1 Wallace Yard

The portions of Wallace Yard west of MM 78.9 and east of MM 79.8 and the Trail Corridor were remediated between 2000 and 2002 by UPRR as part of the previously referenced Wallace-Mullan Branch response action. This remediation included the removal and salvage of rail and ties, excavation and disposal of siding ballast, demolition of loading docks, placement of barriers, and installation of

hogwire and barbless wire fencing. A portion of the barriers serves as part of the recreational trail that has been constructed throughout the Wallace-Mullan Branch as part of the Rails-to-Trails Project. The fencing was installed to control access from the recreational trail to the non-remediated portion of Wallace Yard.

2.9.2 Ninemile Creek

The SVNRT planned and completed several removal projects in order to reduce non-point source loading of trace metals to the SFCDR from historic depositions of mine tailings in Ninemile Creek and the East Fork of Ninemile Creek near Wallace, Idaho. Contaminated sediments from the creek floodplain were excavated along five miles of the creek and placed in a repository near the confluence of the East Fork and Ninemile Creek during the period of 1994 to 1997. Work elements included removal of approximately 95,000 cubic yards of materials and stream and floodplain stabilization.

2.9.3 Canyon Creek

The SVRNT also completed metals source control projects in Canyon Creek. Tailings and mine wastes from the floodplain of Canyon Creek were excavated and removed during the period from 1995 to 1999. Approximately 610,000 cubic yards of contaminated materials were removed from the floodplain along five and one-half miles of Canyon Creek. Removals also included excavation of portions of the former railroad embankment along Woodland Park and the Star-Hecla tailings ponds. Materials were deposited in a repository near Woodland Park. The resulting uncovered creek bed and disturbed floodplain were subsequently stabilized.

2.10 SOURCE, NATURE, AND EXTENT OF CONTAMINATION

2.10.1 Source of Contamination

Mine Waste related contamination found at various locations along the Spur Line ROWs and in Wallace Yard is generally associated with the presence of waste rock and tailings. Based on sampling performed by EPA in 2001, concentrates were also thought to possibly be present in portions of the Hercules Mill area of Wallace Yard.

Waste rock is the rock excavated in pursuit of ore and often contains elevated metals concentrations in comparison to background. Tailings are the discarded fraction from the milling of ores containing residual metals, although concentrations will vary depending on the mineralogy of the ore and the processing technology utilized. In the early years of mining in the Silver Valley, milling involved a relatively crude mechanical process called “jigging.” Because this process was not very efficient in separating ore from non-ore bearing rock, the jig tailings often contained residual ore resulting in elevated metals concentrations. Jig tailings ranged in size from sands to gravels. As the technology for milling improved through flotation milling, the tailings became finer (sand to silt size) and over time generally had lower residual metals concentrations. Concentrates are the main product of the milling operation, and lead concentrations in such materials can range up to 750,000 parts per million (ppm).

The Basin RI Report (EPA, 2001) presents statistical summaries of various mine waste sources in the Basin. The table below presents the minimum, maximum, and average metal concentrations basin-wide as discussed in the Basin RI for several waste types.

Basin-Wide Statistical Summary of Metals Concentrations in Mine Waste

	Arsenic (mg/kg)			Cadmium (mg/kg)			Lead (mg/kg)			Zinc (mg/kg)		
Location	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**	**Min**	**Max**	**Avg**
Floodplain Waste Rock	10	2,400	485	0.78	26	7.78	18	8,100	1,360	7	6,500	1,220
Upland Waste Rock	1.1	3,610	253	0.03	298	20.1	1.8	63,700	7,410	1.4	166,000	5,810
Floodplain Tailings	5.8	960	134	2.4	122	24.9	26.4	20,200	4,250	93.3	16,900	3,880
Upland Tailings	1.1	148	36	0.07	298	26.4	6.5	63,700	8,420	41.1	166,000	8,460
Upland Concentrates & Process Wastes	100	160	140	160	250	213	7,100	40,000	18,500	43,000	65,000	53,700

The components of Mine Waste found at the Site likely derive from the following activities:

- Tailings and waste rock were directly discharged to the watershed from mining operations since the onset of mining related activities in the Upper Basin (approximately 1884). EPA reports that this activity has resulted in discharges of more than 16 million, 3 million, and 25 million tons of tailings to the stream segments of Canyon Creek, Ninemile Creek, and the Upper South Fork, respectively (Table 2.4-1 of the Basin Feasibility Study [FS]). As with other floodplain properties in the Upper Basin, those portions of the Site within the floodplain have been impacted by fluvial deposition of tailings. The large volume of tailings present in off-site areas continues to act as a source of contamination to portions of the Site during flood events.

- In the late 1800s and early 1900s, tailings and waste rock were commonly used throughout the Upper Basin as construction materials. These mine waste materials, along with other fill materials, may have been used in the early construction of portions of the Wallace Yard and the Spur Line railbeds or fill portions of embankments. Under current conditions where roadways, vegetation, and/or riprap are present in many locations, it is extremely difficult to identify such areas.

- The lease to the Hercules Mining Company (1910) for a portion of Wallace Yard allowed for the depositing, storing, and impounding of tailings; to what extent those activities occurred is unknown. There are no identified former tailings ponds within the site.

- Concentrates potentially could be present within portions of the Site from spillage during derailments, from "weep holes" in the bottoms of open rail cars, or from loading and unloading activities. However, the Site characterization sampling (Section 2.10.5) did not find metals concentrations that would be indicative of concentrates, although the ranges of metals concentrations observed are not dissimilar to the basin-wide data for upland concentrates and process wastes presented in the table above.

- Sampling data collected in 2001 by EPA reportedly identified concentrations of lead of approximately 225,000 mg/kg within the Hercules Mill portion of Wallace Yard that are indicative of concentrates. An additional 15 samples (HM-1 through HM-15) were collected from the Hercules Mill area in November 2004 at locations identified during a November 2004 site reconnaissance visit. The results of these samples are presented in Table 2-8 and the maximum observed lead concentration was 51,000 mg/kg.

2.10.2 Selection of Constituents of Potential Concern

The Basin RI identified the following Constituents of Potential Concern (COPCs) for Mine Waste related contamination within the Coeur d'Alene Basin:

- Antimony, arsenic, cadmium, iron, lead, manganese, and zinc for the solid media soil, sediment, and house dust;
- Arsenic, cadmium, lead, manganese, and mercury for surface water; and
- Antimony, arsenic, cadmium, lead, and zinc for groundwater.

The Basin Human Health Risk Assessment (HHRA) evaluated these COPCs and determined that the primary risk drivers for the Upper Basin were arsenic, cadmium, lead, and zinc. Given that the source of metals contamination at the Site (i.e., Mine Waste) is the same as that evaluated within the Basin RI and the Basin HHRA, these four metals were selected as COPCs for this EE/CA. The selection of arsenic, cadmium, lead, and zinc as COPCs is also consistent with the Wallace-Mullan Branch EE/CA.

Railroad maintenance and operations at the Wallace Yard could have resulted in the presence of certain regulated organic compounds. Therefore, COPCs for the site include total petroleum hydrocarbons, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs).

2.10.3 Site Characterization

In May 2003 as a requirement of the AOC, Respondents initiated a program to sample soil, groundwater, and/or surface water at Wallace Yard and soils within the Spur Lines. This sampling was performed in accordance with the Sampling and Analysis Plan (SAP) that was approved by IDEQ and EPA. Sample locations within the Wallace Yard were generally located on a grid pattern at a frequency of approximately four test pits per acre. In specific potential source areas (e.g., areas near the mill foundation, former locations of the engine houses, the bulk fuel storage facilities, and the machine shop, etc.), additional sample locations were added to provide a more focused characterization of the source areas. As indicated in the SAP, the following areas were not sampled:

- Areas beneath the foot print of I-90;
- Areas covered by asphalted surfaces (e.g., roads, parking lots, driveways);
- Areas within the foot print of existing buildings;
- The portion of Wallace Yard west of MM 78.9 and the Trail Corridor where a barrier was constructed as part of the Wallace-Mullan Branch Response Action;
- Sections of the ROW along the north side of the SFCDR due to overly steep embankments;
- Sections of the ROW along the south side of the SFCDR due to overly steep embankments along the Old Yellowstone Highway and the area in the immediate floodway of the SFCDR; and
- Portions of the Spur Lines where access was denied or where the area was inaccessible (i.e., heavily vegetated or wooded areas).

Sample locations based on the SAP and the above criteria are shown in Figures 2-1 and 2-2. During implementation of the sampling, several target sample locations within Wallace Yard were found to be inaccessible. These locations and the conditions that limited the accessibility at each given location are summarized in Table 2-5.

Supplemental soil sampling within the Hercules Mill and Visitor Center areas was conducted in November 2004. The supplemental soil samples were collected in the same manner as those collected in May 2003. Figures 2-1 and 2-2 show the supplemental sample locations.

Soils sampling along the Spur Lines in both the Ninemile Creek and Canyon Creek portions of the Site primarily focused on characterizing the nature and extent of metals concentrations within the railbed and upper portions of the embankments. The former NPRy Lines ran along Ninemile Creek, as well as along the north side of Canyon Creek. The former WIRR Line (e.g., the Burke Line) ran along the south side of Canyon Creek. The former railbed alignments are the most likely locations for Mine Waste associated with prior railroad activities. Other potential locations are at sidings or sharp curves where there was a greater potential for derailment. Approximately 5.7 miles (69 percent of the total 6.5-mile length) of the former NPRy railbed alignment along Canyon Creek underlies the asphalt of State Highway 4. A large portion of the former WIRR railbed along Canyon Creek has been removed as part of earlier government-sponsored removal actions. Thus, the Spur Line sampling program focused on those locations in which the railbed alignment is still visible and is not capped by asphalt or structures.

Because the Spur Lines are linear in nature, sample locations were located at a frequency of approximately one test pit for every 1,000 feet of visible, exposed railbed. Additional samples were collected near areas in which there was a greater potential for derailments or accidental spills. These areas typically coincided with relatively sharp bends along the rail line, on sidings, and the former locations of the depots near Burke. Several sample locations along the Spur Lines were either not accessible (due to steep slopes or heavy wooded vegetation) or access was not granted by the property owner. Lists of the specific sample locations along the Spur Lines that were not sampled either because the property owner did not provide consent to access or where the area was determined to be inaccessible are presented in Tables 2-6 and 2-7. Figure 2-3 shows the sampling locations along the Spur Lines. Section 2.10.5 presents a summary of the Wallace Yard and Spur Line sampling results.

In addition to soil sampling, both groundwater and surface waters were investigated in Wallace Yard by means of monitoring wells and surface water sampling stations. Groundwater characterization was accomplished by installing a total of five monitoring wells. These wells were located in the area of the former bulk fuel storage, engine house and turntable, and machine shop operations. The locations of these former facilities were determined by reviewing the 1945 Station Map of Wallace (UPRR, 1945). In addition, an upgradient piezometer was installed in the eastern portion of the Wallace Yard to provide groundwater level data in conjunction with groundwater levels measured in the five monitoring wells. Figure 2-4 shows the completed well locations. The monitoring wells and piezometers were installed using the procedures specified in the SAP. A qualified geologist oversaw the drilling and installation of the monitoring wells.

After installation of monitoring wells, screened zones were developed by pumping and/or bailing. Water-bearing zones were considered developed when discharge water was visually non-turbid and free of sediment. Water levels and field measurements of water temperature, pH, and specific conductance were made periodically during development.

Surface water sample locations included select stations along the SFCDR as it passes through the Wallace Yard. These stations typically coincided with bridge abutments associated with small foot bridges and former railroad and highway crossings over the river. In addition to the 2003 sampling event, supplemental rounds of surface water sampling were performed in October 2004 and March 2005. These later sampling events included three tributary creeks (Placer Creek, Daly Gulch, and Unknown Canyon) upstream of their respective confluences with the portion of the SFCDR that flows through Wallace Yard.

The results of the water quality characterization were used to establish gaining and losing reaches, as well as potential hydraulic interactions with groundwater. This characterization was also intended to provide information for the possible delineation of potential contaminant source areas on the basis of metals loading (discussed in Section 2.10.10). The 2003 and 2004 surface water sampling events coincided with the groundwater sampling. Figure 2-4 shows the locations of the surface water sampling sites.

2.10.4 Soil Sampling Procedures

Sampling of soil within the Wallace Yard and Spur Line areas was accomplished by excavating test pits using a rubber-tired backhoe to a depth of 2 feet as specified in the SAP. In the grass-covered area around the Visitor Center, soil sampling was conducted using hand tools, thereby minimizing the disturbance of the landscaped grounds. The supplemental samples from the Hercules Mill were also collected using hand tools. A total of 316 soil samples were collected for analysis of the metal COPCs (i.e., arsenic, cadmium, lead, and zinc) in the Wallace Yard area.

To minimize the dilution of metals concentrations over a relatively large sample interval, two samples from each test pit were collected and analyzed for metals analysis. The upper sample was obtained from throughout the 0- to 6-inch depth interval and is identified in the tables and figures at the end of this report with an "A" suffix in the sample identification. This depth interval is consistent with EPA's definition of "surface soil" for purposes of risk assessment. The lower sample was collected from throughout the 6- to 24-inch interval and is identified in the tables and figures with a "B" suffix.

Soils were also investigated for the organic COPCs (i.e., TPH, VOCs, SVOCs, and PCBs) that may have been released onto the ground surface in and around the former locations of the engine houses, the bulk fuel storage facilities, and the machine shop. Because these analytes would likely have been released on the surface, if at all, analyses for TPH, VOCs, SVOCs, and PCBs were initially limited to the 0- to 6-inch sample from the test pits located within these potential source areas. If these analytes were detected in the 0- to 6-inch sample, then the 6- to 24-inch sample was subsequently analyzed. All samples were visually screened for the presence of hydrocarbons.

Soil samples for the metal COPCs analysis along the Spur Lines were obtained by means of test pits using a rubber-tired backhoe. Actual locations of test pits were determined in the field and depended on accessibility, underground utilities, and/or the proximity of existing structures. Since the railbeds were typically constructed as an embankment, samples were collected from three depth intervals for metals analysis. These intervals include 0- to 1- foot, 1- to 2-foot, and 2- to 3-foot depths. A total of 57 soil samples were collected along the former NPRy line in Ninemile Creek; a total of 27 soil samples were collected along the former NPRy line in Canyon Creek; and a total of 39 soil samples were collected along the former WIRR line in Canyon Creek.

2.10.5 Soil Sampling Results

2.10.5.1 Metals

Table 2-8 and Figures 2-5 through 2-12 present the results of the metals analysis of all samples from Wallace Yard. In general, the mean metal concentrations (except arsenic) found in the upper 6 inches are less than the mean metal concentrations in the 6- to 24-inch interval. Table 2-9 presents a summary of the metal concentrations for various sub-areas of Wallace Yard, as well as the soil screening levels established within the Basin RI. Also presented at the bottom of Table 2-9 are the summary statistics for surface and subsurface soil sampling results from the Upper Basin (MidGradSeg01 including Wallace), as reported in the Basin RI (EPA, 2001). Metal concentrations found in the Wallace Yard soil samples are generally within the same range as the Basin RI reports throughout the Upper Basin. Concentrations of all metals exceed the screening levels at certain locations; therefore, these metals will be evaluated further in the streamlined risk assessment (Section 3).

Tables 2-10, 2-11, and 2-12 and Figures 2-13 through 2-16 present and summarize the results of the metals analysis of samples taken from the Spur Line areas. Mean metal concentrations along the Spur Lines are typically highest in the upper 1-foot interval (A suffix) when compared to the 1- to 2-foot (B suffix) intervals and the 2- to 3-foot intervals (C suffix). However, exceptions do occur. For example, the mean cadmium and lead concentrations in the 1- to 2-foot interval along the former NPRy line in Canyon Creek and the former WIRR Line in Canyon Creek are higher than the other two intervals. Although lead concentrations typically decrease with depth along the Spur Lines, the sampling at depth, particularly in Canyon Creek, often revealed increased zinc concentrations.

Some of the higher concentrations of lead found within the Spur Line samples occurred at locations where there were potential sources not related to railroad activities. These concentrations are noted in Tables 2-10, 2-11, and 2-12. Tables 2-13, 2-14, and 2-15 present a summary of the Spur Line data, as well as data reported within the Basin RI for the same areas (UpperSFCDRSeg01). The data from the Spur Lines obtained as part of this EE/CA fall within the ranges of this data from surface and subsurface sampling reported in the Basin RI. Concentrations of all metals at certain locations exceed the screening levels; therefore, these metals will be evaluated further in the streamlined risk assessment (Section 3).

2.10.5.2 Organics

Within Wallace Yard, samples from 12 locations were analyzed to determine if there were any residual TPH, VOC, SVOC, or PCB constituents that may have been released onto the ground surface in and around the former locations of the engine houses, the bulk fuel storage facilities, and the machine shop. Table 2-16 and Figure 2-17 present the analytical results. These results indicate that diesel range hydrocarbons and lube oil (i.e., heavy oil range hydrocarbons) were detected in select locations. Below is a summary of the results:

- Concentrations in samples collected from the former bulk fuel facility area ranged from 31.4 to 1,110 milligrams per kilogram (mg/kg) of lube oil. Concentrations of lube oil decreased with depth, typically by an order of magnitude. Diesel range hydrocarbons were not detected in the former bulk fuel facility samples.

- Concentrations in samples collected from the former machine shop area were 86.6 and 318 mg/kg of lube oil in the upper and lower intervals, respectively. Diesel range hydrocarbons were not detected in samples from the former machine shop area.

- Samples collected from the former north engine house and turntable areas ranged in concentration from 55.9 to 435 mg/kg of lube oil and from no detection to 27.4 mg/kg of diesel range hydrocarbons. Concentrations of lube oil were higher in the 0- to 6-inch interval versus the 6- to 24-inch interval (probably due to weathering), whereas diesel range hydrocarbons typically decreased with depth.

- Samples collected from the former south engine house and turntable area ranged in concentration from 46.1 to 1,780 mg/kg of lube oil and from no detection to 241 mg/kg of diesel range hydrocarbons. Concentrations of lube oil decreased with depth, whereas diesel range hydrocarbons increased with depth in one sample location.

- Samples collected from the Visitor Center area (i.e., former location of a 1,000-barrel oil tank) had concentrations of 3,920 and 257 mg/kg of lube oil in the upper and lower intervals, respectively. Diesel range hydrocarbons were not detected in the former bulk fuel facility samples.

Given the presence of detectable concentrations of lube oil and diesel range hydrocarbons, samples were analyzed for individual VOC, SVOC, and PCB constituents. SVOC and PCB constituents were not detected in any of the samples. With the exception of 1,2,4-trimethylbenzene (a.k.a. TMB), VOC constituents were also not detected in any of the samples.

The TMB detection was limited to the upper 6 inches in three sample locations in the north engine house and turntable area. Concentrations of TMB ranged from 0.102 to 0.119 mg/kg. EPA Region 9 Preliminary Remediation Goals (PRGs) prescribe action levels for TMB concentrations of 52 mg/kg for residential soils and 170 mg/kg for industrial soils. Concentrations of TMBs detected in soils in the Wallace Yard area are orders of magnitude less than the EPA Region 9 PRGs. In accordance with the State of Idaho's risk-based correction action (RBCA) program and the procedures outlined in the SAP, the lack of detectable VOCs, SVOCs, PAHs, and PCBs warrants no further action regarding soil removals with respect to organic constituents. The State's RBCA program specifically addresses VOC, SVOC, and PAH concentrations for petroleum products rather than TPH results, such as the lube oil concentrations observed at the Wallace Yard Site.

2.10.6 Groundwater Sampling Procedures

Groundwater levels were measured from the top of the PVC riser casing using an electronic water-level indicator to the nearest 0.01 foot. Measurements were taken concurrent with water-quality sampling activities and were recorded on the appropriate sample record forms.

Monitoring wells were purged prior to sample collection using a portable submersible pump or Teflon bailer to ensure that representative groundwater samples were collected from the water-bearing units. Temperature, specific conductance, and pH were monitored in the discharged waters during the purging operation; qualitative estimates of color and turbidity of the discharged waters were also noted. The volume of water purged depended on the original volume of groundwater in each monitoring well, the rate at which the water level recovered after pumping, the rate at which temperature, pH, and specific conductance in the discharged water stabilized, and the rate at which turbidity was observed to decrease. No less than three casing volumes were purged from each monitoring well prior to sample collection. Water-quality samples were collected only after measured field parameters in the discharged water stabilized.

After the final field parameter measurements were taken (i.e., pH, specific conductance, and temperature), groundwater samples were collected from the wells using a bailer. The samples were transferred from the bailer to containers supplied by the analytical laboratory. Samples were preserved, as necessary, in the field at the time of collection using reagent-grade chemicals. Aliquots requiring filtration (e.g., "dissolved" metals) were pumped into the sample bottles through a 0.45-micron, high-capacity, and in-line filter connected to a peristaltic pump with tubing. Aliquots not requiring filtration (e.g., TPH, VOCs, and SVOCs) were transferred directly into their respective sample containers using tubing. Tubing and filters were used for only one sample and then subsequently disposed. Laboratory parameters for groundwater sampling included the COPC metals (arsenic, cadmium, lead, and zinc), total petroleum hydrocarbons (TPH), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs). The metals analyses were performed for the dissolved fraction consistent with conventional groundwater analytical procedures and the SAP. The dissolved fraction is generally the more mobile form of constituents with groundwater. Table 2-17 presents a list of analytical parameters and analytical methods.

Immediately after collection, groundwater sample containers were labeled and placed in ice-cooled, insulated chests for storage pending delivery to the laboratory. Chain-of-custody records were completed for the samples and placed in each insulated chest. All pumps, bailers, accessories, and monitoring equipment were thoroughly decontaminated prior to sampling each well as described in Section 6.0 of the SAP.

The groundwater sampling occurred in January 2003 during low flow in the SFCDR following completion of the drilling and monitoring well installation. A subsequent sampling event was performed in October 2004. Groundwater sampling coincided with surface water sampling so that potential hydraulic interactions, if any, could be established.

2.10.7 Groundwater Investigation and Sampling Results

Previous evaluations of valley-fill deposits in the SFCDR watershed have indicated that groundwater flow is generally from east to west, with minor north and south components near the mouths of tributary watersheds (MFG, 1992). Groundwater level measurements at the Site indicated that groundwater flow is generally to the northwest along the axis of the valley in which Wallace Yard is situated (Figure 2-18). This flow direction is generally consistent with that found elsewhere; however, there have been no previous investigations within the Site area to provide a direct comparison.

Based on groundwater surface elevations measured at the Wallace Yard during the October 2004 groundwater sampling event and depicted in Figure 2-18, the hydraulic gradient across the site is anticipated to be within the range of 0.0052 ft/ft (between Wells MW-1 and MW-4) to 0.0086 ft/ft (perpendicular to the flow path across the entire site).

As indicated on the boring logs for the five monitoring wells installed within the Wallace Yard, included as Appendix F, the saturated alluvium varied from silty sandy gravel with cobbles to sandy gravel with cobbles. Typical hydraulic conductivities for material with gradations classified as silty sand to sandy gravel, as defined by Freeze and Cherry (1979, p. 29), range from 1×10^{-3} centimeters per second (cm/s) (2.84 ft/day) to 1×10^{-1} cm/s (284 ft/day).

The groundwater sampling results are presented in Table 2-17. The November 2003 groundwater sampling reported no detectable concentrations for TPH, PCB, SVOC, and VOC constituents except chloroform. Chloroform was detected in MW-3 (located near the former bulk fuel facility area) at a concentration of 6.13 micrograms per liter (ug/L).

Both dissolved arsenic and lead were below their respective reporting limits. Dissolved cadmium and zinc concentrations ranged from below detection to 101.0 ug/L and from 466 to 25,300 ug/L, respectively. Table 2-17 also presents the screening levels from the Basin FS for the metals. A comparison of the 2003 and 2004 data with the screening levels indicates the following:

- Arsenic is below the screening level; therefore, will not be considered further in the EE/CA evaluation.

- Although lead was below the reporting limit (1.82 ug/L) in the 2003 data, the reporting limit is only slightly above the screening level of 1.09 ug/L. Lead had a concentration of 8.0 ug/L in the 2004 data.

- Cadmium and zinc concentrations were both above screening levels with the highest concentrations found in MW-3.

Groundwater is not known to be used presently within the Wallace Yard for drinking water or other purposes. Therefore, for purposes of this EE/CA to support a CERCLA removal action, no further consideration of groundwater relative to the use of groundwater is warranted at this time. The metals concentrations in the groundwater will be considered relative to surface water interactions in Section 2.10.11.

2.10.8 Surface Water Sampling Procedures

Surface water discharge measurements were performed in accordance with the procedures described in the National Handbook of Recommended Methods for Water Data Acquisition (USGS, 1977), to the extent possible. The discharge at sampling locations was measured using the area-velocity method of stream flow gauging (USGS, 1977). By this method, stream flow is divided into a series of subsections where the average depth, average velocity, and width for the subsection are measured. Flow for the entire stream cross-section is computed using the formula:

$$Q = \Sigma_{(i = 1\text{-}n)}(A_i\ V_i)$$

where: Q = Stream flow in cubic feet per second;

A_i = Area of stream subsection in square feet; and

V_i = Velocity in feet per second.

Subsection areas were computed using the trapezoidal area method (USGS, 1977). The SFCDR was spanned with a measuring tape and divided into a series of subsections. A top-setting wading rod was used to measure stream depths and to set the velocity sensor to the appropriate measurement depths. Velocity measurements were made using a Marsh-McBirney velocity meter. In cases where the stream depth was greater than or equal to 2.5 feet, velocity measurements taken at 0.2 and 0.8 foot of stream depth were averaged to obtain the stream subsection average velocity. When stream depth was less than 2.5 feet, a single velocity measurement taken at 0.6 foot of stream depth was used to estimate the average velocity through the subsection (USGS, 1977). Measurements typically were made at sufficiently small intervals such that no more than 10 percent of the total stream flow occurred in any one subsection.

Water-quality samples were collected in a stainless-steel container (approximately 3 gallons) that had been cleaned with a dilute nitric acid solution, and then rinsed with de-ionized water. Before a sample was collected, the container was rinsed with water from the sample collection location at least twice. During the low-flow event, a composite water sample (as specified in the SAP) was collected from the water surface across the entire width of the stream. In addition to collecting a water-quality sample, weather conditions, field personnel, and the sampling time were recorded on surface water sampling forms.

Field parameters included dissolved oxygen (DO), pH, specific conductance, and temperature. These parameters were measured immediately after sample collection and recorded on sampling forms. Temperature and DO were taken by immersing the temperature/DO probe directly into the stream channel. Specific conductance and pH were measured from the sample collection container. Additional field parameters, such as color, turbidity, and other characteristics, were visually assessed and noted in the field log.

Meters were calibrated per the manufacturer's instructions. The DO meter was calibrated at the start of each sampling day using an altitude-compensated, two-point calibration method. Saturated sodium sulfite and aerated water samples were used to calibrate ambient oxygen-free and oxygen-saturated endpoints, respectively. A two-point calibration, using pH 4 and 7 buffers, was used to standardize the pH meter before each measurement. The specific conductance meter was calibrated with standardizing solutions (e.g., 447 µmhos/cm) prior to each use.

Samples collected for laboratory analysis were analyzed for total and dissolved metals (arsenic, cadmium, lead, and zinc); total dissolved solids (TDS); and total suspended solids (TSS). The use of "total" versus "dissolved" metal analysis is consistent with the work presented in the Basin RI. Mass loading estimates in the Basin RI are presented for dissolved cadmium and zinc because a high percentage of zinc and cadmium loads are in the dissolved form, and total lead (as most of the lead will be in the particulate), as opposed to dissolved form (EPA, 2001).

Water samples were collected using the collection container. A peristaltic pump was used to extract a portion of the sample from the container and to pass it through an in-line, 0.45-micron disposable filter to obtain aliquots for dissolved metals analysis. Approximately 200 milliliters (mL) of water from the collection container was passed through the filter and discarded onto the ground before the sample was pumped into the laboratory-supplied sample container to rinse the filters. Samples designated for total metals and other analytes were transferred directly to laboratory-supplied sample containers. Samples for dissolved and total metals analyses were preserved in the field with nitric acid. Immediately after collection, surface water sample containers were placed in ice-cooled, insulated chests for storage, pending delivery to the laboratory. Chain-of-custody forms were completed for the samples and placed in each insulated chest.

2.10.9 Surface Water Sampling Results

The surface water sampling results are presented in Table 2-18, along with surface water screening levels from the Basin RI. The Basin RI also includes probabilistic predictions of expected surface water concentrations at various locations along the SFCDR. Two of these locations (shown in Figure 2.4) are located upstream and downstream of the Wallace Yard area. These predicted surface water concentrations are also included in Table 2-18. Following is a summary of the results of the surface water data:

- Both total and dissolved arsenic in all sampling events was below either the reporting limit of one ug/L or the screening level; therefore, arsenic in surface water will not be considered further in this EE/CA.

- Both total and dissolved lead concentrations within the samples from the SFCDR are less than screening levels; therefore, lead in surface water will not be considered further in this EE/CA. [The highest concentration of lead in the surface water is from a tributary (UC-1).]

- Both cadmium and zinc were present in the SFCDR samples at concentrations above screening levels; however, the concentrations decreased or remained relatively unchanged across the site from the upstream sampling site (SW-1) to the downstream location (SW-4).

- Cadmium, zinc, and lead in samples from SW-4, at the downstream end of the Site, are less than, or nearly equal to the concentrations predicted in the Basin RI for a location just upstream of the Site (SF12 in Figure 2-4). This indicates that the presence of these constituents in the SFCDR adjacent to the Site is from upstream sources. Section 2.10.10 discusses loading of cadmium and zinc.

2.10.10 Surface Water Flows and Loading Analysis

In addition to the chemical analysis discussed in Section 2.10.9, flow was measured at the four surface water stations (SW-1 through SW-4) during the November 2003, October 2004, and March 2005 sampling events to allow for the calculation of metals loading. The 2003 and 2004 events were performed in response to the SAP and requests by EPA/IDEQ in 2004 for additional data. MFG also took flow

measurements in March 2005 to supplement the previous data. During the March 2005 event, the samples for chemical analysis were taken a day later than the flow measurements. Based on visual observation by the sampler, the flows on the day of sampling appeared to be similar to the previous day when the flow measurements were taken. However, the loading calculations for the March 2005 event are considered to be approximate.

Higher flows were occurring during the March 2005 measurements. These flows caused some instability in the substrate at SW-2 resulting in an uncertain flow measurement at this location. Therefore, the flow measurement at SW-2 for the March 2005 event has been disregarded for the flow and loading evaluations.

The October 2004 and March 2005 sampling included tributaries that flowed into the SFCDA within the reach of the Site. These locations included Placer Creek (PC-1), Daily Gulch (DG-1), and Unknown Canyon (UC-1). Flows and samples were collected using the same methods and procedures as were used for SW-1 through SW-4. Table 2-19 presents the flow measurements, and below is a summary of the observed flow characteristics:

- For each of the three periods monitored, flow measurements indicate a loss in the first reach (SW-1 to SW-2);
- During the low flow events (November 2003 and October 2004), there is a gain in flow within the reach between SW-2 and SW-3;
- The loss in the SW-1/SW-2 reach and the gain in the SW-2/SW-3 reach are approximately equal during the low flow events;
- During the higher flow event (March 2005) the reach between SW-1 and SW-3 experiences a net loss; and
- During all three flow-events, there is gain in flow through the final reach (SW-3 to SW-4).

Metals loading for dissolved cadmium and dissolved zinc were calculated based on the flow measurements and chemical data (Section 2.10.9). As indicated previously, lead and arsenic concentrations in the SFCDR were below screening levels; therefore, a loading analysis for these metals was not performed. Cadmium and zinc were predominately found in the dissolved fraction; therefore, a total metals loading for these constituents was not evaluated. Tables 2-20 and 2-21 present the loading calculations for dissolved cadmium and zinc by reach for each of the three monitoring events. Table 2-22 presents a summary of the net gains and losses for both flow and metals loading for each reach and if further highlighted below:

- During the higher flow event (March 2005), there is an overall decrease in dissolved cadmium and zinc loading through the Wallace Yard Site (from Station SW-1 to SW-4).
- During the November 2003 low flow event, the flow rate dropped slightly between SW-1 and SW-2 and increased slightly between SW-2 and SW-3, while the dissolved zinc and cadmium loadings decreased through both of these reaches. The stream flow increased between SW-3 and SW-4, with increases in cadmium and zinc concentrations observed. Both the dissolved zinc and cadmium loadings increased, resulting in a net increase in loadings through the Site (between SW-1 and SW-4).

- During the October 2004 low flow event, the observed decrease in flow between SW-1 and SW-2 was nearly equivalent to the increase observed between SW-2 and SW-3. Contrary to the 2003 data, dissolved zinc and cadmium loadings were observed to steadily increase through the Wallace Yard area, although concentrations of both metals decreased through the Site.

In summary, these surface water data do not reveal any consistent trends related to dissolved zinc and cadmium loadings through the Wallace Yard Site. Although this lack of pattern or trend may make it difficult to identify and characterize potential sources that may impact the SFCDR through the Site, the gaining portions of the SFCDR through the Site are evaluated in Section 2.10.11 to identify and characterize potential sources that may impact the SFCDR.

The Basin RI includes projections of expected flows and metals loading based on probabilistic modeling at various locations within the Upper Basin. These expected values at a point upstream of the Site (SF228) and the next downstream point (SF239) for which there are projected values are also included in Table 2-22. The locations of SF228 and SF239 relative to the Site are shown in Figure 2-4.

The expected flow and metals loading projected in the Basin RI represent long-term averages and are used as part of the remedy selection process for the Upper Basin. Although the data collected for this EE/CA are instantaneous values and a rigorous comparison with the Basin RI projections cannot be made, the Basin RI projections can be used to assess potential loading from the Site relative to sources outside of the Site. This comparison results in the following conclusions:

- The dissolved cadmium loading in surface water decreased between SW-1 and SW-4 in November 2003, but increased in October 2004; this increase represents less than 10 percent of the total expected cadmium loading estimated in the Basin RI for the reach from SF228 to SF239.

- At low flow, the dissolved zinc loading in surface water increased between SW-1 and SW-4, but the increases observed in November 2003 and October 2004 represent 5 and 15 percent, respectively, of the total expected zinc loading estimated in the Basin RI for the reach from SF228 to SF239.

- The data from the March 2005 sampling event suggest that the Wallace Yard Site does not adversely affect the water quality in the SFCDR during high flow conditions. Therefore, relative to other sources, the Wallace Yard does not appear to be a significant contributor to loading within this larger segment of the SFCDR.

Water quality in the SFCDR may be influenced by a number of sources, some potentially related to the Wallace Yard and others unrelated. Potential sources related to the Wallace Yard include groundwater discharge to the river and surface water run-off. Potential sources unrelated to the Site include inputs from tributaries; groundwater discharge, or regional groundwater recharge; dissolution of metals from sediment in the river; and surface water run-off. The following section estimates the potential contribution of groundwater at the Wallace Yard to metals loading within the SFCDR.

2.10.11 Groundwater/Surface Water Interaction

To better understand the interaction between the surface water and groundwater, the groundwater and surface water elevations obtained during the October 2004 event were used to develop groundwater contours for the Wallace Yard area. Figure 2-18 shows these contours.

In an attempt to quantify the potential for metals loading from groundwater at the Wallace Yard Site an analysis of the groundwater flux through the area was performed. Calculations for groundwater flux consisted of a simple flow net analysis based on the potentiometric surface for groundwater elevations measured on October 28, 2004 (Figure 2-18). These calculations are presented in a series of tables included as Appendix G. Groundwater flux, using a range of hydraulic conductivities, was estimated using Darcy's flow equation

$$Q = KiA$$

where: Q = groundwater discharge (flux) (cfd);

K = hydraulic conductivity (ft/day);

I = hydraulic gradient (ft/ft); and

A = cross-sectional area (ft^2).

The flow net analysis focused on the widest portion of the Wallace Yard, and incorporated six individual flow paths between the 2,700-foot and 2,702-foot potentiometric contours. The cross-sectional area for each flow path was calculated along the 2,701-foot contour and used a saturated thickness of 10 feet. The total saturated cross-sectional area was calculated at approximately 8,580 square feet (Table G-1).

Hydraulic gradients were calculated for each of the six flow paths, selected between the 2,702-foot and 2,700-foot potentiometric contours. As indicated on Table G-2, hydraulic gradients for the individual flow paths range from 0.0043 to 0.0133 ft/ft, with an average of 0.0069 ft/ft.

As presented in Section 2.10.7, hydraulic conductivities (K) for the saturated alluvium are estimated to range from 1×10^{-3} cm/s to 1×10^{-1} cm/s. For the purpose of estimating the potential maximum groundwater flux, only K values of 1×10^{-2} cm/s and 1×10^{-1} cm/s (Table G-3) were used. As presented in Table Y-3, the estimated groundwater flux at the Site ranges from 0.018 cubic feet per second (cfs) to 0.18 cfs.

Potential metals loading in groundwater has been calculated using the maximum dissolved cadmium and zinc concentrations detected in groundwater samples collected from monitoring wells MW-1 through MW-6 (Tables 2-17 and G-4). For dissolved cadmium concentrations that were reported as non-detect, one-half of the reporting limit was used in the calculation. Table G-5 presents the estimated dissolved cadmium and zinc load, in pounds per day, for each of the estimated groundwater flux rates described above. The potential dissolved cadmium and zinc loads range from 0.005 to 0.050 pounds per day (lb/day) and from 1.15 to 11.5 lb/day, respectively. Metal loads for arsenic and lead were not calculated due to the high number of non-detects.

The purpose of the groundwater wells installed at the Site was to assess the potential for groundwater impact, particularly related to organics, from those portions of the Wallace Yard where railroad maintenance activities had historically taken place. The following section provides an evaluation of metals loading to the SFCDR potentially attributable to groundwater, using the groundwater flux analysis presented above. The groundwater data utilized to perform these calculations are associated with the eastern portion of the Wallace Yard, as indicated by the identification of the groundwater monitoring wells in Figure 2-18. The SAP did not require the collection of groundwater data from the northwest portion of the Site, and therefore there is no data on which to evaluate potential groundwater impacts in this area.

Under low flow conditions (November 2003 and October 2004), a comparison of the estimated groundwater loading to changes in surface water loading across various reaches may be made. Using the cadmium and zinc surface water loading for each reach presented in Tables 2-20 and 2-21, respectively, and the potential range of loadings from groundwater presented above, Table 2-23 presents the percentage of observed surface water loading potentially attributable to groundwater across three river segments through the Wallace Yard Site. Under high flow conditions, represented by the data from March 2005, dissolved cadmium and zinc loadings both decrease through the Wallace Yard Site, making an estimation of the influence from groundwater a moot point.

As presented in Table 2-23, the maximum loading potentially attributable to groundwater from the eastern portion of the Wallace Yard Site is represented by a comparison of the groundwater loading estimate to the observed increase in loading for both cadmium and zinc between surface water stations SW-2 and SW-3 during October 2004. Based on this comparison, the loading attributable to groundwater may vary from 2 to 20 percent for the range of hydraulic conductivities used in the groundwater flux calculation described above. Because the observed dissolved cadmium and zinc loadings in the SFCDR, if any, do not follow a consistent trend or pattern, it is difficult to draw any definitive conclusions regarding the contribution that groundwater may have on surface water quality in the SFCDR over the range of anticipated site conditions; however, it is anticipated that there is some contribution from groundwater during gaining flow scenarios.

In addition to the comparison of estimated groundwater to surface water loading, an evaluation has been performed to assess if contaminant loading potentially attributable to Wallace Yard groundwater may impact achievement of the long-term surface water goals for the SFCDR as required in the ROD. The Bunker Hill Record of Decision (ROD) for Operable Unit 3 indicates that for the SFCDR, the fisheries benchmark is to improve conditions to support a higher fish density (Tier 2+ to 3 fishery). The long-term goals for the SFCDR include achieving dissolved metals concentrations of less than 7 to 10 times the chronic ambient water quality criteria (AWQC).

Using the maximum estimated groundwater loading of 11.5 lbs/day of zinc mixed in the river at the lowest flow rate measured at SW-3 (75 cfs), results in an estimated maximum increase in the dissolved zinc concentration of 0.03 mg/L. This calculation was made by dividing the zinc load mass of 11.5 lbs/day by the volumetric flow rate of 75 ft^3/sec, and converting the result to obtain a concentration with the mg/L of the unit, as illustrated below:

$$\frac{11.5lbs}{day} \times \frac{\sec}{75\,ft\text{^}3} \times \frac{day}{86{,}400\sec} \times \frac{453{,}600mg}{lb} \times \frac{ft\text{^}3}{28.3L} = \frac{0.03mg}{L}$$

Similarly, for dissolved cadmium the maximum increase in the concentration in the river is estimated at 0.0001 mg/L. Both of these values are below the lowest AWQC referenced in the ROD at a hardness of 50 (0.058 mg/L for zinc and 0.0017 mg/L for cadmium).

3.0 STREAMLINED RISK EVALUATION

3.1 HUMAN HEALTH RISK

This streamlined human health risk evaluation for the Site was prepared using the general guidance provided in EPA's *Conducting Non-Time-Critical Removal Actions Under CERCLA* (EPA, 1993) and the general methodologies described by the EPA in *Risk Assessment Guidance for Superfund (RAGS), Volume 1, Human Health Evaluation Manual, Part A* (EPA, 1989), and various associated guidance (e.g., EPA, 1991a, b, c; 1992a, b; 1994; 1996; 1997a, b; 2003a, b; and 2004), as appropriate.

The risk assessment process can be summarized as follows:

- COPCs are identified in potential exposure media;
- Exposure doses of COPCs are estimated for receptors having the potential to contact these chemicals through different potentially complete exposure routes;
- The estimated exposure doses are combined with the toxicity assessment information to characterize the risk of the exposure; and
- The calculated risks are compared with acceptable levels of risk to provide the basis for making risk-based management decisions for a site.

For a streamlined evaluation, these same concepts apply but often are condensed and/or earlier studies utilized to assist with risk management.

The Basin HHRA evaluated the risk to human health associated with exposure to Mine Waste in the Upper Basin, including the Wallace Yard and Spur Line areas. As discussed in Section 2.10, and as presented in Table 2-9, the concentrations of Mine Waste constituents found within the soils at the Site are generally comparable to that found in the Basin RI and evaluated in the Basin HHRA. Given this similarity, the process and results of the Basin HHRA have been used to supplement this streamlined risk assessment for the Wallace Yard and Spur Lines.

3.2 DATA EVALUATION AND IDENTIFICATION OF COPCs

Sections 2.10.5, 2.10.7, and 2.10.9 identified the COPCs to be evaluated by the streamlined risk assessment. These COPCS and applicable media are summarized below:

Media	COPCs	Evaluation Required	Comment
Soil	As, Pb, Cd, Zn	Yes	Exceeded Basin RI screening levels.
	Organics	No	Only detection (TMB) below PRG.
Applicable to Wallace Yard Only – Investigation of groundwater and surface water within Spur Line areas not required.			
Groundwater	Cd, Zn, Pb	Yes	Only one detection of Pb; Cd and Zn > screening levels.
	Organics	No	Only one detection.
Surface Water	As, Pb	No	Below screening levels.
	Cd, Zn	Yes	Exceeded Basin RI screening levels.

3.3 EXPOSURE ASSESSMENT

The exposure assessment estimates the extent of human contact with COPCs by characterizing potentially exposed populations (i.e., receptors), identifying actual or potential routes of exposure, and estimating the exposure point concentrations and intake. The exposure assessment identifies possible exposure pathways that are appropriate for each potential receptor.

Exposure pathways are dependent on current and future land use. Four elements define an exposure pathway (EPA, 1989):

- A source material and mechanism of constituent release to the environment;
- An environmental migration or transport medium (e.g., soil, air) for the released constituents;
- A point of potential human contact with the medium of interest (e.g., potential exposure media such as soil or air); and
- An exposure route (e.g., ingestion, dermal contact, or inhalation) at the contact point.

An exposure pathway is considered "complete" if all elements are present. If complete and significant, these pathways were quantitatively evaluated in the risk assessment.

Section 2.6 describes the land use and population in the vicinity of the Site. This discussion includes the results of a joint field reconnaissance by EPA and MFG to identify land use patterns specific to the Spur Lines. The Basin HHRA also includes an in-depth evaluation of the site environmental setting, demographics, and potentially exposed populations for the Upper Basin with specific references to the Wallace, Canyon Creek, and Ninemile areas. For this streamlined risk assessment, it is assumed that future exposure scenarios are similar to current scenarios since it is reasonably anticipated that land use will not change in the future. These land uses are described as follows:

- Residential use includes children and adults living in homes.
- Common use areas include public buildings; developed and undeveloped parks; playgrounds; churches; and commercial buildings.
- Readily accessible common use areas refers to generally open areas where access is not encumbered by steep slopes, heavy vegetation, and wooded areas and where soils are generally exposed allowing ingestion.
- Industrial/manufacturing use primarily represents workers in an enclosed building where the exposure to contaminated materials is incidental and associated with walking from parking lots, limited outdoor activities, dust, etc. These workers would not participate in routine intrusive activities into contaminated soils.

A portion of Area WY-2 is currently in use as an industrial/manufacturing area. UPRR (the current owner of this property) has been in discussions with the Silver Valley Economic Development Council (SVEDC) relative to their desire to use this property for additional industrial/manufacturing activities. Given these discussions, it is anticipated that this will be the future use of this portion of Wallace Yard. However, given the uncertainties associated with the timing of future development and potential inconsistencies with the Basin ROD, this area will be evaluated as a common use area. Therefore, the future use of all of the currently open areas of the Wallace Yard (WY-1, WY-2, WY-3, and WY-4) will be considered to be common use areas, which would support recreational or commercial uses, as well as potential future industrial/manufacturing uses.

The Trail of the Coeur d'Alenes passes through the Wallace Yard area. The trail represents a recreational use; however, this recreational area has been remediated under a separate response action and has access controls (fencing) to discourage access by trail users to the remainder of Wallace Yard. There are no identified formal recreational use areas within the Spur Line areas.

This streamlined risk assessment assumes the following relative to land use for areas within the Site:

- Deed restrictions will be used to restrict the Wallace Yard area to either common or industrial/manufacturing use as indicated below by sub-area (Figure 3-1):

Wallace Yard Sub-Area	Use Scenario
Visitor Center and Parking Area, I-90 Corridor	Common use
Hercules Mill	Common use with limited access
Areas WY-1, WY-2, WY-3, and WY-4	Common use
Residential	Either remain or converted to common use

- There is no known current groundwater use within the Wallace Yard area.
- Land use within the Spur Line areas will potentially consist of:
  - Adjacent Residential – The ROW is generally not used for residential use; however, it may be located immediately adjacent to, or intersect, residential areas;
  - Common Use – Readily accessible areas only; and
  - Street Right-of-ways.

Based on this land use and the evaluations in the Basin HHRA, the following exposure pathways have been evaluated in the streamlined risk assessment:

Area	Media	Exposure Scenario	Comment
Wallace Yard	Surface Water	Not evaluated – Pathway not complete	Based on Basin HHRA
	Groundwater	Not evaluated – Pathway appears incomplete	No known current use of groundwater
	Soils	Common use – readily accessible areas[a]	Equivalent to the public recreational scenario in the Basin HHRA
		Residential	Two specific locations
Spur Lines	Surface Water	Not evaluated	Determined to not be a risk driver in Basin HHRA
	Groundwater	Not evaluated	Risk driver only for future groundwater consumption; not relevant to Spur Lines
	Soils	Common use – readily accessible areas[a]	Equivalent to the public recreational scenario in the Basin HHRA
		Residential	–

[a] Refers to generally open areas where access is not encumbered by steep slopes, heavy vegetation, or other restrictions, and wooded areas where soils are generally exposed allowing ingestion.

The Basin HHRA evaluated two different recreational scenarios: public recreational and neighborhood recreational. The neighborhood scenario generally applied to undeveloped properties immediately adjacent to residences where children ages 4 through 11 would play in or near creeks or on waste piles. According to the Basin HHRA, the public recreational scenario pertains to children and adults who use developed parks, playgrounds, or undeveloped recreation areas, whether they are local residents or visitors. The public recreational scenario is more applicable to the Wallace Yard area and the readily accessible areas of the Spur Lines. To the extent that some portions of the Spur Line ROWs intersect residential yard areas, these risks will be addressed as part of the residential evaluation.

3.4 QUANTIFICATION OF EXPOSURE FOR ARSENIC, CADMIUM, AND ZINC

Exposure is defined as the contact rate of an organism with an environmental medium containing a chemical or physical agent. Intake is the quantification of exposure, and by convention this is normalized for body weight of the receptor and daily exposure. The resulting intake is expressed as a dose in units of mg chemical/kg body weight per day (EPA, 1989). Exposure Point Concentrations (EPCs) were calculated by methods presented in the following subsection, and EPCs for COPCs in environmental media are incorporated to estimate potential human intake via the complete exposure pathways identified in Section 3.3 (i.e., soils). For the soil media, ingestion is the only exposure route evaluated consistent with the Basin HHRA. Inhalation of fugitive dust was identified in the Basin HHRA as a potentially complete pathway but excluded from quantification as it was determined not to be a primary contributor to exposure and risk. Neither dermal nor inhalation exposure routes were considered in the detailed risk evaluations performed in the Basin HHRA because the relative contributions do not justify additional characterization (IDHW, 2001).

For purposes of this EE/CA, intake (dose) was calculated following EPA guidance (EPA, 1989; 1997a). For non-carcinogens, an average daily dose (ADD) is calculated based on an averaging time equivalent to exposure duration. For potentially carcinogenic constituents, a lifetime average daily dose (LADD) is calculated based on an averaging time of 70 years (lifetime). The following general equation was used to estimate exposure for incidental ingestion of soil (EPA, 1989):

$$ADD_{ing} = (C \ x \ IR \ x \ EF \ x \ ED)/(BW \ x \ AT)$$

where: ADD_{ing} = average daily intake of compound (mg/kg BW-day);

C = exposure concentration in media (mg/kg);

IR = intake rate (mg/day);

EF = exposure frequency (days/year);

ED = exposure duration (years);

BW = body weight (kg); and

AT = averaging time (days).

EPA has published several documents that contain statistical data on the various factors used in assessing exposure. The documents include the *Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part B)* (EPA, 1991a), the *Human Health Evaluation Manual, Supplemental Guidance: Standard Default Exposure Factors* (EPA, 1991b), and the *Exposure Factors Handbook* (EPA, 1997a). In the absence of site-specific data, EPA-recommended default exposure assumptions were generally used in this streamlined risk assessment, as well as information contained in the Basin HHRA.

The goal of the exposure assessment is to estimate reasonable maximum exposure (RME), as well as average exposure (central tendency or CT) for populations that may be exposed to COPCs in site environmental media. In keeping with EPA guidance (EPA, 1992b), the RME is to provide a reasonable, high-end (i.e., conservative) estimate of exposure that focuses on exposure in the actual population. RME is considered a high-end exposure that is still within a possible range, and is estimated by combining upper range and average exposure assumptions (EPA, 1992b).

Mean concentrations have been used as EPCs in this streamlined risk assessment. Average concentrations (EPCs) are presented in Tables 2-9, 2-13, 2-14, and 2-15 for Wallace Yard and the Spur Lines. The Wallace Yard area was divided into several sub-areas based on existing or potential future use. These sub-areas are shown on Figure 3-1.

The receptors evaluated in this risk assessment are generally thought to be exposed to surface soils only (i.e., the upper 0- to 6-inch interval) and, as such, the average concentration from the upper soil zone sampled was used as the exposure point concentration for the risk assessment. If more than one sub-area (applicable to Wallace Yard) existed for a given use scenario (i.e., common use) then the highest average concentrations for all of the sub-areas was used as the EPC. This method of selecting the EPC adds conservatism that biases the uncertainty in the risk assessment toward higher risk.

3.5 RECEPTOR-SPECIFIC EXPOSURE QUANTIFICATION

Below is a summary of the receptors evaluated and the exposure factors used in this streamlined risk assessment. The selected receptor represents the most sensitive for the given use scenario.

Area	Exposure Scenario	Receptor	Exposure Factors
Wallace Yard	Common use – Readily accessible areas	Child 0-6	From public recreational scenario Basin HHRA
	Common use (Hercules Mill area)	Adult Recreational User	From public recreational scenario Basin HHRA
	Residential use	Child 0-6/Adult	Soil action levels for lead from the Basin ROD
Spur Lines	Common use – Readily accessible areas	Child/Adult Recreational User	From public recreational scenario Basin HHRA
	Residential use	Child 0-6	Soil action levels for lead from the Basin ROD

As indicated above, the soil residential action levels of 700 mg/kg used in the Basin HHRA for evaluation of lead risk will also be used for the evaluation of residential lead risk in this EE/CA. The Basin action level will also serve as a surrogate for the other metal COPCs within residential areas. This approach is based on the following:

- The Basin ROD indicates that arsenic and cadmium are co-located with lead, and remediation of lead above the action levels will address cadmium and arsenic. Lead was detected at a concentration greater than the Basin RI screening level in 90 percent of the 158 Wallace Yard surface soil samples; arsenic in 58 percent; and cadmium in 42 percent. In only three samples was arsenic detected at a concentration above its screening level (22 mg/kg), where lead was observed below the lead screening level (171 mg/kg); and the maximum arsenic concentration of these samples was 29.5 mg/kg. Cadmium was not detected above its screening level (9.8 mg/kg) in any samples where lead was less than 171 mg/kg.

- The Basin ROD has established a residential soil action level for arsenic of 100 mg/kg. Only one of the 63 surface soil samples within the Wallace Yard that had lead concentrations below 1,000 mg/kg had an arsenic concentration above 100 mg/kg, and this one sample was in the Hercules Mill area. Only one surface sample from the Spur Lines was observed to have an arsenic concentration above 100 mg/kg, where the lead concentration was below 1,000 mg/kg.

- The Basin HHRA determined that cadmium in soils was a risk driver only in garden soils. Garden soils are not typically located within the ROW and, in any case, remediation of any garden soils for lead will address cadmium.

3.6 TOXICITY ASSESSMENT

The toxicity assessment provides a description of the relationship between a dose of a chemical and the anticipated incidence of an adverse health effect (Preuss and Ehrlich, 1987; EPA, 1989). The purpose of toxicity assessment is to provide a quantitative estimate of the inherent toxicity of COPCs to incorporate into the risk characterization. Toxicity values are derived from a quantitative dose response association and are correlated with the quantitative exposure assessment in the risk characterization.

In this risk assessment, lead was identified as a COPC based on site knowledge and the results of the Basin HHRA. EPA human health risk assessments evaluate lead differently than other non-lead COPCs. Therefore, this toxicity assessment considers non-lead COPCs and lead separately.

3.6.1 Non-Lead Toxicity Assessment

For risk assessment purposes, toxic constituent effects are separated into two categories of toxicity: 1) carcinogenic effects, and 2) non-carcinogenic effects. This division arises from EPA's current policy position that the mechanisms of action for these endpoints differ. Generally, the EPA has required that potentially carcinogenic chemicals be treated as if minimum threshold doses do not exist, whereas non-carcinogenic effects are recognized as threshold phenomena. All toxicity values were obtained from EPA's on-line database, Integrated Risk Information System (IRIS), and the Basin HHRA.

3.6.1.1 Carcinogenic Effects

Potential carcinogenic effects resulting from human exposure to constituents are estimated quantitatively using cancer slope factors (CSFs), which represent the theoretical increased risk per milligram of constituent intake/kilogram body weight/day (mg/kg day) or unit risks, which are the theoretical increased risk per exposure concentration. CSFs or unit risks are typically derived for "known or probable" human carcinogens. CSFs or unit risks are used to estimate a theoretical upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular lifetime daily dose of a potential carcinogen. Constituents that are believed to be carcinogenic may also have non-cancer effects. Arsenic is the only COPC at the Site that falls within this category. Potential health risks for these constituents are evaluated for both cancer and other types of effects as described below.

3.6.1.2 Non-carcinogenic Effects

It is widely accepted that non-carcinogenic biological effects of chemical substances occur only after a threshold dose is achieved (Klaassen, 1986). This threshold concept of non-carcinogenic effects assumes that a range of exposures up to some defined threshold can be tolerated without appreciable risk of harm. Adverse effects may be minimized at concentrations below the threshold by pharmacokinetic processes,

such as decreased absorption, distribution to non-target organs, metabolism to less toxic chemical forms, and excretion (Klaassen, 1986). Reference dose (RfD) values and reference concentrations (RfCs) are developed by the EPA RfD Work Group on the basis of a wide array of non-carcinogenic health effects. The RfD and RfC are estimates of the daily maximum level of exposure to human populations (including sensitive subpopulations) that are likely to be without an appreciable risk of deleterious effects during a lifetime (EPA, 1989). RfDs are expressed in units of daily dose (mg/kg-day) while RfCs are expressed as an air concentration (mg/m^3). Both incorporate uncertainty factors to account for limitations in the quality or quantity of available data. Arsenic, cadmium, and zinc have non-carcinogenic toxicity values.

3.6.2 Lead Toxicity Assessment

Under current EPA policy, there is considered to be no exposure dose to lead that is without some level of risk for adverse health effects. Therefore, EPA has not derived an RfD or RfC for lead and the methodology used to estimate potential risks from lead is different than the approach for other chemicals. EPA considers lead a probable human carcinogen (weight of evidence classification B2), with sufficient evidence in animals but inadequate in humans. EPA has not estimated a cancer slope factor for lead (EPA, 2004 and ATSDR, 1999). The non-carcinogenic effects, however, are generally considered to be the greatest concern. Lead is reported to cause a range of health effects from behavioral problems and learning disabilities to stomach cramps and seizures. The approach used for determining lead toxicity within this streamlined risk assessment is discussed below.

3.6.2.1 Residential Areas

The most sensitive receptors for lead exposure are very young children, and EPA has developed an exposure model for young children, the Integrated Exposure Uptake Biokinetic (IEUBK) Model (EPA, 2003a). It is EPA policy that the IEUBK Model be used to assess lead risks for residential scenarios (EPA, 1994; 1998). Extensive lead modeling was conducted during the Basin HHRA using the IEUBK model. For residential use area risk characterization (i.e., the residential property in the Wallace Yard Site), this streamlined risk assessment will rely on the lead response action threshold (700 mg/kg) identified in the Basin HHRA.

3.6.2.2 Common Use Areas

The Basin ROD recommends the same response action thresholds for common use areas as for residential use areas on the premise that the risks are similar. The Basin ROD residential action thresholds for lead are primarily driven by children up to seven years in age. The premise within the Basin ROD for using the residential thresholds for common use areas is that the child receptor cannot tolerate any incremental risk over that which occurs in the residential setting. Applying this approach categorically across common use exposure scenarios is conservative. For common use areas, this streamlined risk assessment will rely on a lead response action threshold of 700 mg/kg.

3.7 RISK CHARACTERIZATION

Risk characterization is the integration of the exposure and toxicity information to make quantitative estimates and/or qualitative statements regarding potential risk to human health. This section describes the risk characterization process for possibly carcinogenic COPCs, for non-carcinogenic COPCs, and for lead.

3.7.1 Methods for Calculating Theoretical Excess Lifetime Cancer Risks

To characterize the potential for carcinogenic effects, a LADD is combined with a CSF to calculate a probability that an individual would develop cancer over a lifetime of exposure to a specific COPC, with the following equation:

$$Risk = LADD \times CSF_{oral}$$

Theoretical excess lifetime cancer risks are evaluated based on an acceptable cancer risk. EPA (1991c) indicates that carcinogenic effects at a site should first be evaluated based on the 1×10^{-4} cancer risk level, but depending on site-specific conditions, a range of 1×10^{-6} to 1×10^{-4} may be used. Cancer risks less than 1×10^{-6} are typically considered *de minimis*.

3.7.2 Non-carcinogenic Risk Characterization Methods

For non-carcinogenic compounds, a potential hazard is expressed as a hazard quotient (HQ), which is the ratio of an ADD for a site-specific receptor to an acceptable RfD for that chemical. The HQ is calculated as follows:

$$HQ = {}^{ADD}\!/_{RfD}$$

An RfD is developed with the assumption that the degree of toxicity of non-carcinogenic compounds is based on the ability of organisms to repair and detoxify after exposure to a compound. The repair and detoxification mechanisms must be exceeded by some critical concentration (threshold) before the health effect is manifested. This threshold view holds that a range of exposures from just above zero to some finite value (i.e., the RfD) can be tolerated by an individual without an appreciable risk of adverse effects.

HQs are summed for all chemical intakes to yield a hazard index (HI) for each exposure pathway. An HI equal to or less than one indicates that no adverse non-carcinogenic health effects are expected to occur from cumulative exposure to multiple chemicals and exposure pathways. However, an HI greater than one does not provide a prediction of the severity or probability of the effects, but rather provides an indication that such effects may occur, especially in sensitive subpopulations. An HI above one indicates the need for further evaluation. For example, effects of different chemicals are not necessarily additive (although the HI approach assumes as such), nor do all chemicals affect the same target organ. Thus, EPA recommends that if an HI exceeds one, further evaluation should occur to categorize hazards based on chemical-specific and route-specific toxicity (i.e., which chemicals act on the same target organ, by which route of entry) (EPA, 1989).

3.7.3 Risk Characterization of Lead

For purposes of this EE/CA the lead action thresholds for residential use (700 mg/kg) has been used to characterize lead risk associated with potential residential use and common use areas within the Wallace Yard or Spur Line ROWs.

3.8 RISK CHARACTERIZATION RESULTS

The results of the quantitative risk characterization are presented in Table 3-1 and the non-lead risk calculations for each scenario are included in Appendix C. Table 3-1 can be summarized as follows:

- The estimated theoretical cancer risks associated with all common use exposure scenarios for an RME exposure were less than 3×10^{-5} which is within EPA's target cancer risk range of 1×10^{-6} to 1×10^{-4}.

- The estimated non-carcinogenic risk associated with all common use exposure scenarios for a non-lead RME exposure for metals had HIs below EPA's target risk index of one.

- Lead concentrations in at least one sample exceed 700 mg/kg (EPA's Coeur d'Alene Basin threshold for a common use, child receptor scenario) within the following Wallace Yard sub-areas (shown in Figure 3-1):

    - Visitor Center Parking Area
    - Area WY-1
    - Area WY-2
    - Area WY-3
    - Area WY-4 (individual sample location WY-148 exhibits lead concentrations that exceed 700 mg/kg and may require discrete area capping)
    - Visitor Center
    - I-90 Corridor

- Lead concentrations in the Hercules Mill area exceed the 700 mg/kg common use threshold.

- Lead concentrations for the Spur Lines exceed the Basin HHRA common use threshold of 700 mg/kg for a child receptor in several areas. Actual exposure will only occur if these areas are readily accessible.

- There are no data specific to the potential residential use areas; however, the lead concentrations within both the Wallace Yard and Spur Lines tends to indicate that the Basin HHRA residential threshold for lead of 700 mg/kg would likely be exceeded if residential use areas were located within the rights-of-way.

The quantification of risk combined with the discussions presented in earlier parts of this streamlined risk assessment leads to the following conclusions regarding characterization of human health risk at the Site:

- Lead is the predominant human health risk driver associated with the Site.

- Residential use areas that may be associated with either the Wallace Yard or Spur Line ROWs will likely require mitigation of lead risk; however, site specific characterization will be required.

- Given the location and potential use by local residents, including children, common use within the Wallace Yard area should be evaluated based on the Basin ROD threshold of 700 mg/kg. Accordingly, the Visitor Center and parking area, WY-1, WY-2, WY-3, and portions of WY-4 sub-areas will require mitigation of lead risk.

- The I-90 corridor will not require any risk mitigation since the area is inaccessible for common use due to steep slopes and proximity to I-90 and associated entrance/exit ramps.

- The Hercules Mill area requires risk mitigation for all of the use scenarios considered.

- Common use areas within the Spur Line ROWs that represent street ROWs will require risk mitigation for lead if concentrations within the use area are greater than 700 mg/kg.

- Other readily accessible common use areas within the Spur Line ROWs will require use and site specific evaluation.

Detailed descriptions of the proposed response actions for each of the Wallace Yard sub-areas and former Spur Lines are presented in Sections 6.1 and 6.2, respectively.

3.9 ECOLOGICAL RISK

Ecological risk assessments evaluate potential threats to the environment from releases of chemicals of potential concern and describe the likelihood, nature, and severity of adverse effects to ecological receptors (i.e., plants and animals). The three major steps of an ecological risk assessment are problem formulation, analysis, and risk characterization. Because this is a streamlined ecological risk evaluation as part of an EE/CA, much of the information contained in the Basin ERA has been used for this Site since it is a "subset" of the Basin.

The Basin ERA concluded that there are high concentrations of metals (primarily lead and zinc) present in the soil, sediment, and surface water of the Basin and these metals pose substantial risks to the plants and animals that inhabit the Basin. It was estimated within the Basin RI that 54.5 to 70 million tons of tailings were discharged during mining and milling operations in the Basin. Preliminary remediation goals (PRGs) for ecological receptors were developed for chemical stressors for the various receptor groups in the Basin. As noted in the Basin ERA, PRGs are often determined to be protective of the most sensitive ecological receptor that is exposed to a particular medium.

This streamlined ecological risk evaluation compared the PRGs developed for the Basin for appropriate receptors to site-specific metals data for the various areas of the Site. Three environmental priorities were identified in the ROD, based on the Basin ERA: 1) dissolved metals in surface water; 2) lead in floodplain soil and sediment; and 3) particulate lead in surface water. The discussion has been divided by geographic area (as opposed to receptor or habitat specific) to help identify actions, if any, for specific areas.

3.9.1 Wallace Yard

The Wallace Yard area in general represents upland habitat of marginal quality given the disturbed areas from man-made activities and frequent use/contact by humans. For the most part, this area is not in the floodplain of the SFCDR. The Wallace Yard area does not provide consistent and significant habitat to receptors of high ecological or societal value and, therefore, is not an area to be considered further in this streamlined ecological risk assessment. Thus, data from this area have not been compared to PRGs for the Basin ERA, and response actions deriving from this EE/CA will be based on the human health evaluation.

While the Basin ROD does identify the removal of sediment within the Wallace Yard area, it does not identify actions for addressing potential soil contamination within the city limits of Wallace specific to the protection of ecological receptors. Although sediment sampling was not a required work component of this EE/CA, a qualitative evaluation of the potential contribution of the Wallace Yard area has been made in the following paragraphs.

The Basin RI has indicated that approximately 61.9 million tons of tailings have been discharged to the SFCDR. In addition, sediment transport from the Upper SFCDR into the SFCDR (which starts at Wallace) may be in excess of 2,400 tons a year. The Wallace Yard area is generally well vegetated and bank stability through this area is good. Accordingly, any contribution of Mine Waste contaminated sediments in this area from Wallace Yard would be negligible compared to upstream sources.

Several surface water samples were collected in the Wallace Yard area (see Section 2.10.9). Surface water concentrations of lead were below the PRGs for Basin ERA based on acute endpoints and for the protection of aquatic plants but was above the PRGs for Basin ERA for chronic endpoints. Upon further examination, the upgradient surface water sample at this site contains measured concentrations of contaminants similar to or greater than downgradient samples for both dissolved and total fraction. This suggests that, even if there is a potential for adverse ecological risks as discussed in the Basin ERA as a result of surface water in the SFCDR, the Wallace Yard area has not contributed and is not contributing in any material way to such risk.

3.9.2 Spur Lines

Ninemile Creek and Canyon Creek are considered riparian and riverine habitat and include wetlands and deepwater habitats within and along the channel of each creek. Portions of these creeks are considered severely degraded riverine and riparian habitat, and fish populations have been adversely impacted. The Basin ERA includes PRGs for numerous receptors within these habitats. Other compounds such as arsenic and cadmium are not described herein since lead and zinc were the primary ecological risk drivers in the Basin ERA. As noted in the ERA on page 5-13, “in setting remedial goals, PRGs are often determined by levels of contaminants that would be protective of the most sensitive ecological receptor that is exposed to a particular medium.” Within the CDA Basin, these values were often lower than background soil, sediment, and surface water. As a result, in the areas where background levels of metals exceed potential effect levels, the PRGs default to the background levels.

Average soil concentrations of lead and zinc within the Spur Line ROWs exceed the PRGs for Basin ERA, which range from 2.5 to 522 mg/kg and 27 to 434 mg/kg, respectively, for terrestrial biota. The PRGs for Basin ERA were developed based on quality habitat; by comparison the Spur Lines are historic railbeds. The Spur Lines by definition are very narrow strips of land historically used for railroad purposes that do not provide consistent, high quality habitat to be protected. In addition, the PRGs for Basin ERA are a conservative benchmark for comparison since the area use factor for a railbed by the various upland mammalian receptors is likely to be significantly less than the value used as the basis for PRG development.

The potential for the railbed embankment within both Ninemile Creek and Canyon Creek to contribute to sediment loading was evaluated for comparison to the overall sediment loading estimates included in the Basin RI for these areas. The Basin RI sediment transport estimate included the following potential sediment sources: mine waste, rock debris situated adjacent to channels, channel bed sediment, bank erosion, and road drainage. Sediment loading for the Ninemile Creek drainage was estimated at approximately 8,400 tons/year while the Canyon Creek estimate was approximately 2,400 tons/year. The evaluation for this EE/CA only takes potential sediment transport as a result of erosion of railbed embankment into account.

Prior to estimating sediment loading from the railbed embankments, a site reconnaissance was conducted along the Spur Lines. The reconnaissance identified such features as the presence of the railbed (some portions of the railbed are currently serving as roads, both paved and unpaved); the existence of an embankment below the railbed; embankment dimensions as applicable; the proximity of the creek to the railbed embankment; and existing bank erosion protection (riprap or vegetation). Tables 2-1 and 2-2, respectively, present summaries of the information gathered during the site reconnaissance. Figure 3-2 presents a typical cross-section of the Spur Line railbed in relation to the stream channel. A photo record of the reconnaissance was also prepared and is included as Appendices A and B.

Erosion potential and the volume of embankment materials were only estimated for segments where a railbed embankment exists. A railbed embankment was defined as an area along the railbed where fill material was brought in for construction of the Spur Line, as identified through the site reconnaissance. There are sections of the Spur Lines where the railbed gets close to the stream bank but fill material was not placed for construction of the railbed; therefore, sediment loading was not estimated for these portions of the Spur Lines. As shown in Tables 2-1 and 2-2, approximately 1.1 miles of the 3.1-mile Ninemile Creek Spur Line and approximately 0.7 miles of the 6.5-mile Canyon Creek Spur Line are considered "railbed embankment." These tables summarize the results from the reconnaissance, including embankment volume estimates as applicable. The tables also reference photographs within Appendices A or B that are representative of the railbed in each segment. Based on the data provided in Tables 2-1 and 2-2, the total surface area of these fill portions of the embankments that are subject to erosion is estimated to be approximately 2.3 acres for the Ninemile Creek spur, and 1.7 acres for the Canyon Creek spur.

Upon completion of the field reconnaissance, the sediment loading from the railbed embankments was estimated. The method utilized to estimate soil loss was one developed by the New York State Department of Environmental Conservation to estimate the relative stream bank losses along various reaches of the Boquet River. This method takes into account such factors as the embankment length, height, soil texture, stream alignment, vegetation, stream gradient, bank slope, and slope of the inside depositional bar in order to estimate a recession rate in feet per year, which was then translated to the volume/mass of soil displaced per year. The method identifies six recession rate factors and each factor is given a score of 0.3, 0.6, or 1.0. The product of all the factors is the estimated thickness of the embankment released to erosion on an annual basis (recession rate). Since the stream cross-section geometry, flow rates, stage heights, or stream velocities for the Spur Line embankments are not known, the analysis for this EE/CA conservatively assumed that the entire height of the embankment was subjected to stream flow. In addition, the maximum score for stream gradient was used for each segment estimated.

Tables 3-2 and 3-3 present recession rate factors applied for each Spur Line segment where a constructed embankment was determined to exist and the total calculated recession rate and erosion losses for the Ninemile Creek and Canyon Creek spurs, respectively. The average calculated recession rate, or soil thickness lost to erosion, is approximately 0.03 feet per year. The resulting estimates of the potential maximum annual sediment loading from the railbed embankments are approximately thirty cubic yards per year (44 tons/year) for the Canyon Creek Spur Line and ninety-eight cubic yards per year (145 tons/year) for the Ninemile Creek Spur Line. These calculations are based on the assumption that the entire height of the embankment is consistently submerged or exposed to erosion, which is a conservative assumption and a condition that may occur only rarely.

A comparison of these estimates to sediment loading estimates provided within the Basin RI is summarized as follows:

Spur Line Segment	Estimated Sediment Loading from Potential Erosion of Spur Line Embankments	Estimates from Basin RI
Ninemile Creek	145 tons/year	8,356 tons/year (1990 through 1997)
Canyon Creek	44 tons/year	2,400 tons/year (1990 through 1997)

Based on these results, and considering the observations made during the site reconnaissance, the railbed embankments do not constitute a significant source of sediment loading in these two drainage areas. The railbeds of these two spurs have been in place for over 100 years and no maintenance of the embankments has been performed for over 50 years. Applying the results of the railbed embankment erosion analysis over a period of 50 years would result in the loss of approximately 1.5 feet of soil along the length of the embankments. During the site reconnaissance survey the railbed embankment, where it is adjacent to the stream channel, was found to be stable and no areas of significant erosion were identified.

Collection of sediment and surface water samples were not part of the approved work scope for the Spur Lines; however, any contribution of the Spur Line ROW to sediment impacts within either Ninemile Creek or Canyon Creek would be negligible compared to other sources.

3.10 CONCLUSIONS OF STREAMLINED ECOLOGICAL RISK EVALUATION

Based on a review of the data and the PRGs developed as part of the Basin ERA, the Site is not contributing to any adverse impacts to ecological receptors in any material way and, therefore, response action objectives for this EE/CA, solely to protect ecological resources, are not necessary. Erosion of discrete segments of former embankment that serve as creek channel banks, where soil concentrations exceed the PRGs for the ERA, may warrant response actions to address potential source contributions to surface water. However, no such erosion has been observed.

4.0 IDENTIFICATION OF RESPONSE ACTION OBJECTIVES

This section identifies the fundamental basis for the selection of response actions under CERCLA to be implemented within the Site, including: 1) any statutory limits (value or timeframe) applicable to implementation of the response action; and 2) the overall scope, goals, and objectives of the response actions.

4.1 STATUTORY LIMITS

To the extent that a private entity undertakes the proposed CERCLA response action, the statutory limits (monetary ceiling and duration) for fund-financed removal actions do not apply.

A proposed non-time critical removal action that costs more than $25 million or is more than $10 million and is 50 percent greater in cost than the least-costly, protective, Applicable or Relevant and Appropriate Requirement (ARAR) compliant alternative, may trigger review by the EPA National Remedy Review Board (NRRB). If necessary, EPA will ensure that proposed cleanup strategies receive appropriate NRRB review.

4.2 SCOPE, GOALS, AND OBJECTIVES

4.2.1 Scope of the Response Action

This EE/CA addresses that portion of the Wallace Yard that lies outside of the Trail Corridor between the Wallace Branch MM 78.9 to MM 79.8. The remaining portion of the Wallace Yard area (including the Trail Corridor) has been remediated under the Wallace-Mullan Branch Response Action. This EE/CA also addresses the Spur Lines.

The response actions presented within this EE/CA are intended to address the human health risk identified within the stream lined risk assessment presented in Section 3.0. As indicated in Section 3.9, the Site does not appear to have contributed in any material way to ecological risks that may exist in the immediate Site area. The Basin ROD may address such risks.

4.2.2 Goals and Objectives of the Response Actions

The goal of this EE/CA is to effectively address Mine Waste associated with former railroad activities in affected media at the Site in a manner that is protective of human health and the environment and to attain applicable or relevant and appropriate requirements (ARARs) to the extent practicable considering the exigencies of the situation. The discussion in Section 3.0 indicated that the only affected media within the site that affects human health is soils impacted by lead. Groundwater also has concentrations of metals above human health screening levels; however, there is no current or reasonably anticipated future use of groundwater within the Wallace Yard area.

Evaluation of groundwater within the Spur Line areas was not part of the approved work scope for this EE/CA. In any case, the area of the railbed within the Spur Line ROWs is less than 0.5 percent of the alluvial valley areas. Therefore, contribution to groundwater impact through leaching of metals from the railbed area (if any) would likely be immaterial relative to the remainder of the tailings-impacted valley areas in which the Spur Lines are located.

Based on the potential health risk identified in Section 3.8 for lead impacted soils, the following human health Response Action Objectives (RAOs) have been identified for the Site:

- For portions of Wallace Yard or the Spur Lines that either are or may be reasonably anticipated to become residential use areas:
    - Reduce human exposure to soils, including residential garden soils, that have concentrations of lead greater than 700 mg/kg or arsenic greater than 100 mg/kg (although arsenic was not found to be a risk driver within the Site, this provision is being included for consistency with the Basin ROD).
- Reduce human exposure to soils within readily accessible common use areas of Wallace Yard or the Spur Lines based on the following criteria:
    - Lead concentrations above 700 mg/kg.

4.2.3 Compliance with ARARs and Other Criteria

The NCP 40 C.F.R. §300.415(j) regulation, implementing CERCLA, provides that removal actions must, to the extent practicable considering the exigencies of the situation, attain ARARs under federal environmental or state environmental laws or facility siting laws. In determining whether compliance with ARARs is practicable, EPA may consider the scope of the proposed removal action [40 C.F.R. §300.415(j)(2)]. Based on the Site RAOs, this removal action will address soils impacted by lead.

The Wallace-Mullan Branch EE/CA and the Basin FS includes an analysis of ARARs for a soil response action similar to that proposed for this Site. The Wallace-Mullan Branch EE/CA is the most relevant reference point for this site as the response actions recommended within that EE/CA were specific to a railroad ROW where human health risk associated with lead in soils was the primary driver for the response action. The geographic scope of the Wallace-Mullan Branch EE/CA is broader than that associated with Wallace Yard and the Spur Lines; therefore, some of the potential ARARs identified in that EE/CA will not be applicable to this one. The scope of the Basin FS in terms of media addressed as well as geographic extent is also broader than that addressed within this EE/CA. Therefore, the Wallace-Mullan Branch EE/CA and Basin FS ARARs have been considered in developing the potential ARARs and To Be Considered (TBC) criteria for the Site. Further, TBC criteria are not ARARs.

The potential ARARs and TBCs for the response actions contemplated within this EE/CA are presented in Appendix D. A discussion (that incorporates pertinent elements of the Wallace-Mullan Branch EE/CA) of these ARARs is presented below.

The proposed response actions contemplated in this EE/CA are limited to actions within the Wallace Yard and Spur Line ROWs. Although these actions will reduce the potential for release of hazardous substances from the ROW, the actions are not intended to address possible discharges of hazardous substances from the lateral zones of the ROW into wetlands or surface waters or to make such possible discharges meet water quality standards. Accordingly, Sections 301 and 303 of the Clean Water Act, 33 United States Code (U.S.C.) §§1251, 1253, will not be considered as ARARs for these actions, except to the extent necessary to address stormwater discharges, as described in Appendix D.

There is no known present use of groundwater within the Wallace Yard area and future use may be precluded by institutional controls. Contribution to groundwater impact associated with Mine Waste contaminated materials within the Spur Line ROWs would be negligible, if any. The proposed response actions are not intended to address groundwater contamination. Therefore, the Safe Drinking Water Act, 42 U.S.C. §§300f et seq., will not be considered an ARAR for this action.

The applicability or relevance of Subtitle C of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. §§6901 et seq., or the RCRA-authorized State program, relating to management and disposal of hazardous waste, may also be limited for this project. Certain wastes produced through the extraction and beneficiation of minerals have been excluded from regulation as a hazardous waste under RCRA Subtitle C pursuant to 42 U.S.C. §6921(b)(3)(A)(ii). Such wastes, known as "Bevill exempt," include mine tailings and other Mine Waste components with elevated concentrations of lead, zinc, arsenic, and cadmium within the Site. Even if the Mine Waste of concern is not Bevill exempt, and otherwise meets EPA's definition of a hazardous waste, management of these wastes may still be exempt from compliance with RCRA Land Disposal Restrictions (LDRs) or RCRA minimum technology requirements for land disposal. The need to comply with such RCRA requirements may be triggered when wastes are moved from one "area of contamination" to another. Wastes left in place or consolidated within one area of contamination are not subject to such RCRA requirements. For purposes of this response action, the removal and consolidation of Mine Waste contaminated materials within or adjacent to the Wallace Yard and Spur Line ROWs, including the transfer from one ROW to the other, is deemed to occur within the same area of contamination. Therefore, RCRA LDR and minimum technology requirements are not applicable requirements for the removal and disposal/consolidation of these wastes as contemplated in this EE/CA.

RCRA Subtitle LDRs may, however, be relevant and appropriate for certain elements of the response action selected for the Site, including for the management and disposal of Principal Threat Materials (PTMs). PTMs are those materials that have the highest potential for impact to human health and the environment. Protection of human health and the environment will be assured by properly disposing the minor fraction of materials to be excavated along the ROW that constitute PTM, in compliance with the Off-Site Disposal Rule, 42 U.S.C. §§9621(d)(3), 40 C.F.R. §§300.440, and all other applicable requirements. Previous EPA sampling results indicate that there may be material within the Hercules Mill Area that exceeds PTM standards. As noted in the Coeur d'Alene Basin ROD (Section 11), PTM levels have been defined in this geographic area to include 15,000 ppm arsenic, 71,000 ppm cadmium, 84,600 ppm lead, and 33,000 ppm mercury. Prior to disposal, removed soil from this area will be sampled, as described in Section 6.1.6, and compared to these levels. No other potential PTMs have been identified within the scope of this EE/CA. RCRA Subtitle C also provides treatment standards for debris contaminated with hazardous waste ("hazardous debris"), 40 CFR 268.45, IDAPA 58.01.05.011, although the lead agency may determine that such debris is no longer hazardous, consistent with 40 CFR 261.3(f)(2), IDAPA 52.01.05. These requirements will be applicable for debris contaminated with hazardous waste that will be managed outside of the designated area of contamination.

Under the Clean Air Act, 42 U.S.C. §§7401 et seq., and the Idaho Air Pollution Act, §§16.01 et. seq., there may be, respectively, chemical-specific ARARs for emission of lead and particulates, and action-specified ARARs for control of fugitive dust during remediation. Additional ARARs and other criteria are identified in Appendix D.

5.0 IDENTIFICATION AND ANALYSIS OF RESPONSE ACTIONS

The SOW requires that the analysis of the response actions within this EE/CA be made in a manner that ensures that this early action be consistent with any long-term action that may eventually be required. In particular, compatibility with the Coeur d'Alene Basin ROD must be considered. Therefore, the analysis of alternatives presented within this section relies on and adopts much of the analysis of alternatives presented within the Basin FS.

5.1 IDENTIFICATION OF POSSIBLE RESPONSE ACTIONS

The goal of this EE/CA is to effectively address Mine Waste associated with former railroad activities in soils at the Site in a manner that is protective of human health and the environment and in compliance with ARARs. The RAOs developed in this EE/CA minimize the potential for direct exposure of people to lead contamination in soil. The Basin FS includes a detailed identification and initial screening analysis of alternative response actions that would be applicable to the human health soils exposure pathway for lead within the Coeur d'Alene Basin. This analysis is applicable to the Site area and has been adopted for this EE/CA. After the initial screening, the Basin FS retained five different remedial alternatives for the lead in soils exposure pathway. Those alternatives, as summarized in the Basin ROD, are as follows:

- ***Soil Alternative S1 – No Action*** – This alternative would leave contaminated soil in place with no change in existing conditions. It would not remove contaminated soil from residential yards and gardens in the basin; it would provide no information, education, or counseling for residents with contaminated yards; and it would not monitor blood lead levels to evaluate the impacts of continued exposure. This no-action alternative provides a baseline against which to compare the action alternatives.

- ***Soil Alternative S2 – Information and Intervention*** – This alternative would include deed notices, pamphlet distribution, press releases, public meetings, publicly posted notices, and advisory signs in public areas to both inform the public of risk mitigation and new risk information and solicit public input and involvement. This alternative also would include a program similar to the Panhandle Health Department's (PHD) Lead Health Intervention Program, which provides personal health and hygiene information to help mitigate exposure to contaminants. Services also include biological monitoring, yard and home sampling, and nursing follow-up services. An institutional controls program that would include local construction regulations (developed and implemented in conjunction with local zoning, building, or planning commissions) may also be considered in certain areas if risk conditions warrant.

- ***Soil Alternative S3 – Information and Intervention and Access Modifications*** – In addition to information and intervention described in Alternative S2, this alternative would include constructing fences or other barriers around certain areas and providing maintenance to prevent or limit access to certain areas where risk level and persistency warrant. This alternative is not intended for use at residential properties.

- ***Soil Alternative S4 – Information and Intervention, Access Modifications, and Partial Removal and Barriers*** – In addition to information and intervention described in Alternative S2, this alternative would include removing a limited amount of contaminated soil and placing clean barriers. Contaminated yards would be excavated to a typical depth of about 1 foot. Garden areas would be provided with a minimum of 2 feet of clean fill. In order to mitigate potential exposure

pathways, the excavated areas would be backfilled with clean soils and/or capped. Where appropriate, structure exteriors would be pressure-washed before remedial measures are performed, to reduce the potential for recontamination from lead-based paint. Risk would be further reduced by installing visual markers to delineate the limits of soil removal. In addition to residential yards, common use areas such as streets, alleys, rights-of-way, and playgrounds would also be candidates for remediation if soil contamination and exposure risks warranted. This alternative would also include revegetation and interim dust control during soil excavation. For recreational areas, this alternative would include site improvements to reduce exposure risks. These would be specific to individual recreational areas and, in addition to partial soil removal and access restrictions, could include stabilizing river banks, constructing paved boat ramps and parking areas, excavating or capping day-use and overnight camping areas, and providing picnic tables.

- ***Soil Alternative S5 – Information and Intervention and Complete Removal*** – In addition to information and intervention described in Alternative S2, this alternative would include complete removal and disposal of soil that exceeds action levels. The depth of contaminated soil is expected to vary considerably within the Basin, but complete removal is considered to be excavation of residential yard and garden areas to a depth of 4 feet. If warranted, structure exteriors would be pressure-washed to reduce the potential for recontamination from lead-based paint. This alternative would include backfilling the properties with clean soil to re-establish site grades and revegetating the reclaimed ground surface. It would also include interim dust control during soil excavation. This alternative is not envisioned for recreational areas.

The Conceptual Site Model summarized in the Basin FS identifies the following types of areas where soil may contribute to human health exposure for residents, visitors, workers, and recreators:

- Residential yards;
- Street rights-of-way;
- Commercial and undeveloped properties; and
- Common areas.

The common use category used within this EE/CA extends the uses identified in Soil Alternative S4, above, to include commercial and undeveloped properties within the Wallace Yard area.

5.2 ANALYSIS OF REMOVAL ACTION ALTERNATIVES

The SOW specifies that decisions pertaining to the removal actions must be made to ensure consistency with any long-term action that may eventually be required. In particular, compatibility with the Basin ROD must be considered in the analysis. Removal action alternatives are to be evaluated against the short- and long-term aspects of three broad criteria: effectiveness, implementability, and cost. Below is a description of each of these criteria:

- ***Effectiveness*** – Each removal action alternative must be protective of human health, the environment, and workers during implementation. The ability to achieve the removal action objectives must be demonstrated. Compliance with ARARs to the extent practicable must also be accomplished.

- ***Implementability*** – The technical feasibility of each removal action alternative must be evaluated. Some factors to consider include demonstrated performance at similar sites and the ability to implement the action within the established time frame; the availability of manpower, equipment, services, laboratory space, and disposal facilities (if needed); and administrative issues such as permitting requirements, easements, and the ability to impose institutional controls.

- ***Cost*** – Includes direct and indirect capital costs, post removal site control, and the present worth of alternatives that will last longer than 12 months.

Once each response action alternative has been described and assessed against the criteria, a comparative analysis is required to evaluate the relative performance among all of the alternatives. The purpose of the comparative analysis is to identify the advantages and disadvantages of each alternative relative to one another so that key tradeoffs that would affect the remedy selection can be identified.

The Basin FS presents a comprehensive analysis of the potential response action alternatives. The final summary of the Basin FS comparative analysis is included in Appendix E for reference. (The costs included in the Basin FS comparative analysis are Basin-wide costs and are not strictly applicable to the Site; however, these costs relative to one another are applicable on a comparative basis to the Site. Section 6 discusses cost considerations specific to the implementation of the recommended remedy at the Site. The analysis of alternatives within the Basin FS is considered to be applicable to the Site, based on the presentation of site-specific conditions and the comparison to Basin-wide data in Section 2.0, and is adopted for this EE/CA. This approach also ensures consistency in the selection of the final recommended response action within the Basin ROD.

In the Basin ROD, EPA determined that the comparative analysis of alternatives resulted in Alternative S4 as representing the best balance of tradeoffs for the lead in soil exposure pathway. Consistent with the Basin FS and ROD, this EE/CA adopts Alternative S4 for the lead in soil pathway with the following modifications:

- The Lead Intervention Program that is included within the intervention portion of the S4 alternative described within the Basin ROD is not applicable to the Site. The need for this program largely rises from the pervasive presence of lead contamination within the Coeur d'Alene Basin. The primary source of this lead contamination is a result of the previous Mine Waste discharge and other non-railroad related mining activities.

5.3 ACHIEVEMENT OF THE SITE RAOs

The Basin ROD S4 alternative was developed to address the soils within residential and common use areas that are impacted by lead as well as other metals. Accordingly, the Basin S4 alternative, with the modification described in Section 5.2, will achieve the RAOs for the Site specified in Section 4.2.2.

Section 6 of this EE/CA discusses the recommended application of Alternative S4 to the specific circumstances of the Site.

6.0 RECOMMENDED REMOVAL ACTION ALTERNATIVE

The Basin ROD subdivides the recommended Alternative S4 for the soil exposure pathway into several remedy components. Those components that are generally applicable to the contemplated response action for the Site are as follows:

- Sampling (as needed).
- Remediation of residential yards.
- Remediation of street rights-of-way.
- Remediation of common use areas.
- Dust suppression during remedial activities.
- Disposal of contaminated materials.

The application of these components to specific portions of the Site is discussed in the following sections. During the remedial design phase of the project, additional analyses will be performed and additional details may be incorporated into the specific response actions to be taken in specific areas of the site. The EE/CA leaves the option for using several different types of soil covers including: asphalt pavement, a granular (gravel) cover or a vegetated soil cover. The remedial design will specify which type of cover is to be used for each area and the reason for that type of cover. For areas not subject to heavy traffic a vegetated soil cover will be the preferred barrier, as this type of cover typically allows less infiltration of rainwater to underlying contaminated soils as compared to a granular cover. Asphalt and granular covers will be considered for high traffic areas, with asphalt being preferred in areas where snow plowing may be required to maintain access to residences. Placement of a warning barrier will be addressed during remedial design in areas where remaining contaminant levels, beneath a barrier or cover, exceed action levels. In addition, analyses will be performed to adequately design all ditches in areas subject to response actions, including the evaluation of the need for armoring or erosion protection.

6.1 WALLACE YARD

The implementation of any response action in the Wallace Yard portion of the Site should consider the existing and reasonably anticipated future land use. As discussed in Section 3, the following types of uses are found in Wallace Yard (excludes the Hercules Mill area, which is discussed in Section 6.1.5):

- Existing residential (two locations – less than 1 percent of the area).
- Existing common use area (Wallace Visitor Center and parking area – approximately 12 percent of the area).
- I-90 (approximately 7 percent of the area).
- Future common use or industrial area (currently open area – approximately 76 percent of the area).
- Existing industrial/manufacturing use (approximately 4 percent of the area).

The recommended remedy for each of these use categories is discussed below.

6.1.1 Residential Areas

The two residential areas within Wallace Yard are using the property under a lease with UPRR. The approximate extent of these areas is shown on Figures 6-1 and 6-2. These areas will be remediated consistent with the Basin ROD prescribed residential yards program. The specific details of the residential area remediation will be determined during remedial design; however, the remediation will be consistent with that outlined within the Basin ROD for residential areas. Those requirements are summarized as follows:

- ***Sampling*** – The yard, unpaved driveway, landscaped areas, unpaved garage areas, and other use areas will be sampled to determine the extent of the required remediation. Paved areas will not be sampled and will not require any further remediation. The sampling will extend to 18 inches in all, non-paved, use areas.

- ***Remediation*** – Yard and other use area soils with lead concentrations exceeding 700 mg/kg will require a barrier, such as vegetation, that will need to be continuous and sustainable with no bare soil exposed. The barrier will also need to reduce direct exposure to contaminated soil and migration of soil to dust in homes. In general, yard soil with lead concentrations greater than 700 mg/kg or arsenic concentrations greater than 100 mg/kg will be removed to a depth of 1 foot and backfilled with clean soils. For those yards with contamination at depth, a visual marker will be placed prior to backfilling. In contaminated garden areas, clean soil will be provided to a depth of 2 feet.

During the excavation process, all existing sod and soil coverings will be removed and disposed of along with the soil. Larger trees and shrubs generally will be left in place. After soil removal and backfilling, the yard will be revegetated. Lawn areas of remediated yards will generally be revegetated with sod. Steep hillsides not currently planted with vegetation will be stabilized and hydroseeded with native grasses. To the extent practicable, all yard landscaping will be returned to its original condition. The maintenance of barriers will be the responsibility of the property owners.

The cleanup of residential yards includes drainage improvements to ensure that contaminated material from areas yet to be cleaned is not transported to remediated areas. These drainage improvements will improve the long-term protectiveness of the partial removals. Where appropriate, the exteriors of structures will be pressure-washed and encapsulated (repainted) before remedial measures are performed to reduce the potential for recontamination from lead-based paint. This will be coordinated with the Department of Housing and Urban Development paint abatement programs. Programs for paint abatement and stabilization will be coordinated with the soil cleanup and sequenced to mitigate exposures as quickly as possible while limiting the possibility of recontamination.

Disposal of soil and other materials removed as part of the remediation of the existing residential areas within Wallace Yard will be within the IDEQ's Big Creek Repository, provided the soils are within the acceptance criteria (described in Section 6.1.5). If the soils do not meet the acceptance criteria based on characterization sampling, then disposal will take place off-site at a properly permitted disposal facility in accordance with all applicable laws and regulations.

6.1.2 Existing Common Area (Wallace Visitor Center and Parking Area)

The existing Wallace Visitor Center and parking area is presently owned by the City of Wallace. Any remedial activity for this area will require consultation with and approval for access from the City. This area will be addressed in a manner that is consistent with the specified remedy for common use areas within the Basin ROD. The specific recommended remedy for this area is as follows:

- ***Sampling*** – No additional sampling is required for these areas.
- ***Remediation*** – Based on the risk analysis presented in Section 3.8 of this EE/CA, the recommended response action for this area is as follows:

Sub-Area	Recommended Remedy
Visitor Center Area – West of road and south of I-90 (see Figure 6-1, Area VC)	Removal and replacement with vegetated soil cover in discrete areas based on sampling results, as necessary to ensure a 12-inch clean barrier in all areas. (See Figures 6-1 and 6-4.)
Parking Area – East of road and south of I-90 (see Figure 6-1, Area VC-P)	Place 12-inch clean gravel barrier with limited removal at the edge of the barrier area to maintain a smooth transition. (See Figures 6-1 and 6-4)

- ***Disposal*** – Based on existing sampling, the soils to be removed from the Visitor Center Area contain metals concentrations less than the criteria for Principal Threat Materials (PTMs), as described in Section 6.1.5, and will be placed in IDEQ's Big Creek Repository.

6.1.3 Future Common Use Areas

Portions of Wallace Yard are currently open area, shown in Figure 3-1 as WY-1, WY-2, WY-3, and WY-4. As discussed in Section 3. 3, a portion of Area WY-2 is currently in use as an industrial/manufacturing area. UPRR (the current owner of this property) has discussed with the Silver Valley Economic Development Council (SVEDC) the potential use of this property for additional industrial/manufacturing activities. However, given the uncertainties associated with the timing of future development and potential inconsistencies with the Basin ROD, this area will be evaluated and addressed as a common use area. Therefore, the future use of all of the currently open areas of the Wallace Yard (WY-1, WY-2, WY-3, and WY-4) will be considered to be common use areas, which would support recreational or commercial uses.

The specific elements of the removal action for these areas are listed below:

- ***Sampling*** – No additional sampling is required for these areas.

- ***Remediation*** – Based on the risk analysis presented in Section 3.8 of this EE/CA, the recommended response action for this area is as follows:

Wallace Yard Sub-Area	Recommended Remedy
WY-1	Common Use: • Place 12-inch clean vegetated barrier. (See Figures 6-1 and 6-3.)
WY-2	CommonUse: • Place 12-inch clean vegetated barrier. (See Figures 6-2 and 6-3.)
WY-3	Common Use: • Place 6-inch or 12-inch clean vegetated barrier to ensure a 12-inch cover. (See Figure 6-2.)
WY-4	CommonUse: • Hydroseed as necessary to promote vegetative cover for erosion control. • Soil removal or capping required related to sample WY-148 only.

- ***Disposal*** – Based on existing sampling, the soils from these areas contain metals concentrations less than the criteria for Principal Threat Materials (PTM). It is anticipated that all soils will be covered in place and therefore no offsite disposal will be necessary.

6.1.4 Interstate 90

The I-90 area consists primarily of pavement. There are small unpaved areas between the access ramps and the main roadway of the interstate, identified as Area I-90-A on Figure 3-1.

- ***Sampling*** – No additional sampling is required for this area.

- ***Remediation*** – Based on the risk analysis presented in Section 3.8 of this EE/CA, the recommended response action for this area is as follows:

Wallace Yard Sub-Area	Recommended Remedy
Paved areas	No further action.
Unpaved area between access ramps and main roadway (See Figure 6-1, Area I90-A)	Common Use: • Hydroseed as necessary to promote vegetative cover for erosion control. • Soil removal or capping not required due to inaccessibility of area due to steep slopes and proximity to I-90 and entrance/exit ramps.

6.1.5 Hercules Mill Site

The recommended remedy within the Basin ROD for several mill sites, including the Hercules Mill located in the Wallace Yard, consists of a combination of removals, capping, and access controls. The location of the Hercules Mill area is shown on Figure 6-1. Consistent with the Basin ROD, the recommended response action for the Hercules Mill site is as follows:

- ***Sampling*** – Additional sampling is necessary prior to implementation of the response action to determine if there are any materials that are equal to or exceed PTM criteria.

- ***Remediation*** – Based on the risk analysis presented in Section 3.8 of this EE/CA and the recommended response actions for mill sites within the Basin ROD, the recommended response action for this area is as follows:

Wallace Yard Sub-Area	Recommended Remedy
Hercules Mill	Common Use: • Decontaminate foundations. • Obliterate access to foundations. • Excavate and dispose of contaminated soils. • Grade and place 12-inch vegetated or gravel barrier as shown on Figure 6-4. • Erect chain-link fence at the location indicated on Figure 6-4. • Hydroseed and add mulch to bare hillside above foundations. • Remove and dispose of miscellaneous household refuse and construction debris east of the foundations. • Place signage to indicate no trespassing.

- ***Disposal*** – Because previous data collected by the EPA indicates that there may be material present within the Hercules Mill area that contain metal concentrations greater than the criteria for PTM, material to be removed will be sampled prior to disposal. If the soils have metals concentrations that exceed the PTM criteria, then the soils will be disposed off-site at a properly permitted disposal facility in accordance with all applicable laws and regulations. If the sampling data indicate metal concentrations in the removed soils are less than the PTM criteria, then the soils will be disposed of in IDEQ's Big Creek Repository.

In other response actions within the Coeur d'Alene Basin, PTM concentrations have been defined as: 127,000 mg/kg for antimony; 15,000 mg/kg for arsenic; 71,000 mg/kg for cadmium; 84,600 mg/kg for lead; and 33,000 mg/kg for mercury.

6.2 SPUR LINES

For areas within the Spur Line rights-of-way (ROWs) that either are or reasonably anticipated to become residential use areas (RUAs), the Site RAO for the Spur Lines is to reduce human exposure to soils that have concentrations of lead greater than 700 mg/kg or arsenic greater than 100 mg/kg. The determination of areas reasonably anticipated to be used in the future for residential use will likely be based upon factors such as past and existing land uses, location, institutional controls, and terrain conditions (e.g., areas with steep slopes, greater than 5:1, are not likely to be developed for residential use). Within readily accessible public common use areas along the Spur Line ROW, response actions intended to reduce human exposure to soils are considered based on the specific use of each area and the types of receptors potentially exposed (see Section 4.2.2).

As presented in Section 5.1, common use areas may include streets, alleys, rights-of-way, playgrounds, and commercial and undeveloped properties. As the Spur Lines are generally narrow strips of land and there is no commercial development in either Ninemile Creek or Canyon Creek, there are no portions of the Spur Lines that are considered commercial or undeveloped properties. Therefore, the common uses considered include portions of the Spur Lines used as streets, roads, or recreational access. Where the Spur Lines coincide with paved roadways (e.g., State Highway 4 along Canyon Creek), the pavement is generally considered an adequate barrier and no further action is proposed, although the remediation of shoulder areas within 1,000 feet of residences may be addressed in conjunction with residential use areas. Unpaved public roads are considered for response action where the lead concentration exceeds 700 mg/kg. Portions of the railbed that are visible and accessible, are privately owned and not used as public roads, but which are reasonably expected to be utilized for recreational access are considered for response action where lead concentrations exceed 700 mg/kg. No further action is proposed for areas where the railbed is no longer visible, or in areas where previous response actions (described in Section 2.2.1) have removed the railbed, as identified on Figure 1-2. Land uses within and along the Spur Line ROW were evaluated during field reconnaissance in both November 2004 and May 2007, the results of which are summarized in Section 2.6.

Based on the results of the field reconnaissance and application of the RAOs, as described above, the recommended remedies for each of the Spur Lines are presented below:

- ***Sampling*** – Any residential yard areas within the former WIRR Canyon Creek and former NPRy Ninemile Creek ROW will be sampled as part of the implementation of the remedy described below. The characterization provided within Section 2.10.5 for the remainder of Spur Line ROWs is adequate for implementation of the remedy within these areas; therefore, no further sampling of these portions of the ROW are required.

- ***Remediation*** – The recommended response actions for the Spur Line areas are as follows:

Recommended Remedial Actions for Former NPRy Along Canyon Creek (Spur Line on North Side of Canyon Creek)

Location (mile marker)	Field Observations/Notes	Remedial Action
MM 0 to 4.1	Rail spur runs beneath paved road.	Remediate road shoulders that are within railroad ROW and within 1,000 feet of residences.
MM 4.1 to 4.4	Railbed being used as dirt trail. Heavy usage.	Cap functional railroad ROW with minimum 12-inch cover.

Recommended Remedial Actions for Former NPRy Along Canyon Creek (Spur Line on North Side of Canyon Creek)

Location (mile marker)	Field Observations/Notes	Remedial Action
MM 4.4 to 4.9	Spur traverses mine waste pile or is not visible.	No further action.
MM 4.9 to 5.5	Existing unpaved road providing access to residences.	Pave road with asphalt.
MM 5.5 to 6.0	Actual ROW alignment is shifted down slope from the unpaved road. This section of the Spur Line is very steep and does not appear to be accessible.	No further action.
MM 6.0 to 6.3 (Junction with WIRR).	Railbed under road.	Remediate road shoulders within 1,000 feet of residences.
MM 6.3 to End	Former Hecla Mill area.	No further action.

Recommended Remedial Actions for Former WIRR Along Canyon Creek (Spur Line on South Side of Canyon Creek)

Location (mile marker)	Field Observations/Notes	Remedial Action
MM 0 to 0.8	Visible, existing portions of railbed that are within residential yard areas. Spur Line being encroached upon by local residence and used for storage/refuse of household materials. Storm drainage problems in area between MM 0.5 and MM 0.75.	Cap functional railroad ROW with minimum 12-inch cover. Coordinate with RUAs. Address drainage issues caused by railbed.
MM 0.8 to 3.25	Floodplain area. Railbed no longer visible, except around power poles.	No further action.
MM 3.25 to 3.5	Visible, existing portions of railbed that are within residential yard areas. Spur Line being encroached upon by local residence and used for storage/refuse of household materials.	Cap functional railroad ROW with minimum 12-inch cover. Coordinate with RUAs.
MM 3.5 to 3.75	Gem Assay Lab. Old bridge abutment visible. Embankment visible behind lab. ROW to east has been remediated by a combination of Gem Mine remediation and SVNRT removals.	Cap visible embankment – high lead concentrations in A profile.
MM 3.75 to 4.9	Rail spur runs beneath paved road.	Remediate road shoulders that are within railroad ROW and within 1,000 feet from residences.
MM 4.9 to 5.1	Abutments and embankments visible.	Cap with 12-inch clean gravel.
MM 5.1 to 5.75	Embankment not visible.	No further action.
MM 5.75 to 6.3	Embankment visible and being used as access road.	Cap with 12-inch clean gravel.
MM 6.3 to 6.95	ROW part of road.	Cap with 12-inch clean gravel on roadway and shoulders.
MM 6.95 to 7.25	Spur into Former Hecla Mill area.	No further action.

Recommended Remedial Actions for Former NPRy Along Ninemile Creek

Location (mile marker)	Field Observations/Notes	Remedial Action
MM 0 to 0.4	Spur line runs behind RV park and is being encroached upon by local residence and used for storage/refuse of household materials.	Cap functional railroad ROW with minimum 12-inch cover. Coordinate with RUAs.
MM 0.4 to 1.25	Railbed is visible, but heavily vegetated with grass. Trail usage appears to be light in this area.	Remediate only those portions adjacent to residences. Coordinate with RUAs.
MM 1.25 to 2.25	Railbed being used as dirt trail. Heavy access and recreational usage. Major access route to power lines at MM 1.37. Tailings bank visible within railroad ROW at MM 1.6.	Cap functional railroad ROW with minimum 12-inch cover. Remove tailings bank.
MM 2.25 to 2.6	Railbed is visible, but heavily vegetated with grass. Trail usage appears to be light in this area.	No further action.
MM 2.6 to 3.1	Railbed runs beneath and along shoulder of paved road.	Remediate road shoulders that are within railroad ROW and within 1,000 feet from residences.
MM 3.1 to 3.8	Existing unpaved road providing access to residences.	Pave road with asphalt.
MM 3.8 to End	Not accessible – steep grade, heavy vegetation.	No further action.

- ***Disposal*** – Based on existing sampling, the soils to be removed from these areas contain metal concentrations less than the criteria for Principal Threat Materials (PTMs), as described in Section 6.1.5, and will be placed in IDEQ's Big Creek Repository.

The Spur Line ROW areas are no longer owned by either UPRR or BNSF. Accordingly, any response actions within these areas must be coordinated with the current landowners.

As discussed in more detail in Section 6.4, it is anticipated that areas of the Spur Line ROW that fall within any area identified for residential yard response actions, based on additional sampling, would be remediated per the Basin ROD residential yards program.

During the implementation of the response action, any remaining rails and/or ties associated with the former spur lines will be removed. In those locations where rail is removed, the underlying railroad embankment will be restored to current use.

6.3 RESPONSE ACTION COST

The final cost of the recommended response action will be dependent on the remedial design. The estimated capital construction costs of the response actions recommended within this EE/CA, by area, are provided below.

Response Action Component	Estimated Cost
Wallace Yard	
Area WY-1	$695,000
Area WY-2	$857,000
Area WY-3	$317,000
Visitor Center	$102,000
Visitor Center Parking	$138,000
Residences	$137,000
Hercules Mill	$291,000
Former NPRy Spur – Canyon Creek	$771,000
Former WIRR Spur – Canyon Creek	$1,160,000
Former NPRy Spur – Ninemile Creek	$718,000
TOTAL COSTS:	**$5,186,000**

6.4 RESPONSE ACTIVITIES SCHEDULE

Relative to scheduling considerations, the removal actions recommended in Section 6.3 generally fall into one of two categories: 1) actions that are entirely within property that is owned or controlled by either UPRR or BNSF; and 2) actions that are within property controlled by others and where the activity within the ROW would represent only a part of a broader removal or response action outside of the ROW. The actions within Wallace Yard generally falls within the first category and the Spur Lines fall within the second.

Remediation of any residential use areas within the Spur Line ROWs will generally represent a portion of a broader residential use area that extends beyond the ROW. Such a partial remediation might not be effective. Therefore, any remediation of the residential use areas within the Canyon Creek or Ninemile Creek area should generally be performed as part of any remediation of residential use areas that are performed as part of the Basin ROD implementation for these areas. This recommendation is based on the fact that in most cases the railbed or embankment area would represent only a small portion of an adjacent residential or common use area. It would be more disruptive to the property owner to perform the remediation of the railbed or embankment area separate from the remainder of the area.

Given the above discussion, the conceptual schedule for the response action is as follows:

ACTIVITY		PRELIMINARY SCHEDULE[a]
Final EE/CA		March 2008.
Action Memorandum Issued by EPA		March 2008.
Submit Final Remedial Design Report (RDR)	Preliminary Design Report	Within 3 months after EPA issues Action Memorandum.
	Pre-Final Design Report	Within 2 months after submittal of Preliminary Design Report (assuming agency comments received within 30 days).
	Final Design Report	Within 6 weeks after submittal of Pre-Final Design Report (assuming agency comments received in 30 days).
Prepare Maintenance and Repair Plan	To be submitted with Final Remedial Design	
RESPONSE ACTION IMPLEMENTATION		
WALLACE YARD		
Determine disposition of leases for two existing residential use areas.		Within 6 months after EPA issues Action Memorandum
Common Use Areas	Install barrier in WY-1, WY-2, and WY-3 areas • Perform discrete area removal and replacement in Visitor Center area; and • Install gravel barrier in Visitor Center parking area.	Anticipated to be completed during the 2008 construction season following approval of the final design, assuming access agreement provided by City of Wallace for the Visitor Center and parking area. Detailed Schedule: • Obtain access concurrent with Design. • Solicit Bids within 45 days of RDR approval. • Mobilize within 30 days of receipt of bids. • Complete response actions within 5 months.
Residential Areas	Sample and perform yard remediation, as necessary.	
Hercules Mill Area	Perform decontamination; install barrier and fencing.	
SPUR LINE AREAS		
Identified public road/street ROWs within Canyon Creek and Ninemile Creek area. Other areas identified in Section 6.2 where spur line is being used as a trail or residential access.	Perform removal and replacement with clean road base material, asphalt pavement, or minimum 12-inch cover.	Anticipated to be completed during the 2008 construction season following approval of the final design, assuming access agreement from local authorities or unless EPA and IDEQ determine that the response action should be part of the Basin ROD implementation. To follow same schedule as described above for Wallace Yard.
Other common use or residential areas that may be within the spur line ROW and which require response actions.	As required.	Recommended to be performed as part of the broader Basin ROD program under agreement with IDEQ.

[a] The schedule for construction activities assume approvals are obtained such that the entire construction season is available.

6.5 CONTROLS ON LAND USE AND MEASURES TO ENSURE INTEGRITY OF RESPONSE ACTION

Any portion of Wallace Yard or the Spur Line ROWs that are under either UPRR or BNSF's control may have land use controls put in place to ensure that future use of the property is consistent with the risk assessments presented within this EE/CA. These land use controls may also provide information to any future landowners as to the presence of any Mine Waste contaminated materials and precautions that should be taken to limit exposures to these materials. Idaho has adopted the Uniform Environmental Covenants Act (UECA), codified at Idaho Code § 55-3002 et seq. Pursuant to this statute, it appears that state law would allow the establishment of effective controls to prohibit certain land uses, including a prohibition on the use of groundwater. Consistent with that, the proposed response action includes restrictions on the use of contaminated groundwater within the Wallace Yard for drinking water or other purposes involving direct human contact.

Response action measures that require the installation of barriers, signage, fencing, and other access controls will require routine inspection and maintenance of these facilities. Such maintenance and inspection activities would be performed on a quarterly basis in accordance with a Maintenance and Repair Plan that would be approved by IDEQ and EPA.

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TABLES

TABLE 2-1
FORMER NPRy SPUR LINE RECONNAISSANCE SUMMARY
NINEMILE CREEK

MM Range		Embankment (Y or N)[1]	Length (mile) No Emb.	Length (mile) Emb.	Distance to Water Horizontal "Z" (ft)	Distance to Water Vertical "V" (ft)	Railbed/Embankment Width at Top "W" (ft)	Railbed/Embankment Height "H" (ft)	Adjacent Creek Flow (Y or N)	Adjacent Flood Flow (Y or N)	Riprap (in.)	Vegetation on slope	Estimated Embankment Volume (cy)[3]	Photos	Embankment Erosion Potential during Observed Flow	Embankment Erosion Potential during Flood Event
					(See Note 2)											
0.00	0.21	N	0.21	-	-	-	14	7.5	Y	Y	20	<25%	N/A	NM-1 to NM-3	None	None
0.21	0.29	N	0.08	-	-	-	16	8	Y	Y	24	>50%	N/A	NM-4	None	None
0.29	0.60	N	0.31	-	25	-	-	7.5	Y	Y	18	>80%	N/A	NM-5 to NM-6	None	None
0.60	0.90	N	0.30	-	25	-	-	8	Y	Y	10	>80%	N/A	NM-5	None	None
0.90	1.10	N	0.20	-	-	-	22	8	N	Y	10	>80%	N/A	NM-7 to NM-8	None	None
1.10	**1.30**	**Y**	**-**	**0.20**	**25**	**-**	**25**	**8**	**N**	**Y**	**-**	**>80%**	**12,830**	**NM-9 to NM-10**	**None[4]**	**Low**
1.30	1.50	N	0.20	-	-	-	22	7.5	Y	Y	-	>80%	N/A	NM-11 to NM-13	None	None
1.50	**1.70**	**Y**	**-**	**0.20**	**25**	**2**	**21**	**7**	**N**	**Y**	**-**	**>50%**	**9,580**	**NM-14 to NM-15**	**None[4]**	**Low to Moderate**
1.70	1.90	N	0.20	-	-	-	28	6	N	Y	-	>80%	N/A	NM-16 to NM-18	None	None
1.90	**2.10**	**Y**	**-**	**0.20**	**42**	**2**	**25**	**8**	**N**	**Y**	**-**	**>50%**	**12,830**	**NM-19 to NM-20**	**None[4]**	**Low to Moderate**
2.10	**2.40**	**Y**	**-**	**0.30**	**70**	**2**	**20**	**8**	**N**	**Y**	**-**	**>50%**	**16,900**	**NM-21 to NM-23**	**None[4]**	**Low to Moderate**
2.40	**2.60**	**Y**	**-**	**0.20**	**12**	**2**	**14**	**7**	**N**	**Y**	**-**	**>80%**	**7,670**	**NM-24 to NM-27**	**None[4]**	**Low**
2.60	3.10	N	0.50	-	-		24	-	N	N	-	>50%	N/A	NM-28 to NM-32	None	None
			2.00	**1.10**									**59,810**			

Notes:
1) Considered an embankment only where the railbed appears to have been constructed of fill material (i.e., excludes embankments that represent native, in-place material).
2) A schematic, typical cross-section of the Railbed/Embankment is presented on Figure 3-2 to illustrate these dimensions with respect to the creek.
3) For the purpose of estimating the embankment volume, the embankment was assumed to be trapezoidal with 2H:1V side slopes and the cross-sectional area equal to ((W +(4H + W)) / 2) * H), as shown on Figure 3-2.
4) Erosion of the embankment is assumed to not exist during the observed flow due to lack of contact of the embankment with the creek.

TABLE 2-2
FORMER WIRR SPUR LINE RECONNAISSANCE SUMMARY
CANYON CREEK (BURKE CANYON)

MM Range		Embankment (Y or N)[1]	Length (mile) No Emb.	Length (mile) Emb.	Distance to Water Horiz. "Z" (ft) (See Note 2)	Distance to Water Vert. "V" (ft) (See Note 2)	Railbed/Embankment Width at Top "W" (ft) (See Note 2)	Railbed/Embankment Height "H" (ft) (See Note 2)	Adjacent Creek Flow (Y or N)	Adjacent Flood Flow (Y or N)	Riprap (in.)	Vegetation on slope	Estimated Embankment Volume (cy)[3]	Photos	Embankment Erosion Potential during Observed Flow	Embankment Erosion Potential during Flood Event
0.00	0.10	N	0.10		-	-	25	-	Y	Y	36	<25%	N/A	BC-1 to BC-2	None	None
0.10	0.30	N	0.20		-	-	25	7	Y	Y	36	<25%	N/A	BC-3 to BC-5	None	None
0.30	0.30	N	0.00		-	-	16	8	Y	Y	24	<25%	N/A	BC-6 to BC-7	None	None
3.20	3.30	N	0.10		-	-	22	8	Y	Y	18	<25%	N/A	BC-8	None	None
3.30	3.50	N	0.20		-	-	20	8	Y	Y	20	<25%	N/A	BC-10	None	None
3.50	3.60	N	0.10		-	-	18	8	Y	Y	20	<25%	N/A	BC-11 to BC-12	None	None
4.20	**4.60**	**Y**		**0.40**	**25**	**2**	**20**	**10**	**N**	**Y**	**18**	**<25%**	**31,290**	**BC-13**	**None[4]**	**Very Low**
4.60	4.60	N	0.00		-	-	-	10	Y	Y	25	<25%	N/A	BC-14	None	None
5.00	5.60	N	0.60		-	-	30	8	Y	Y	25	<25%	N/A	BC-15 to BC-18	None	None
5.80	**6.10**	**Y**		**0.30**	**30**	**2**	**18**	**7**	**N**	**Y**	**-**	**-**	**13,140**	**BC-19**	**None[4]**	**Low**
6.10	6.40	N	0.30		-	-	18	6	Y	Y	24	<25%	N/A	BC-20	None	None
6.40	6.50	N	0.10		-	-	30	2	N	N	-	<25%	N/A	BC-21 to BC-23	None	None
			1.70	**0.70**									**44,430**			

Notes:
1) Considered an embankment only where the railbed appears to have been constructed of fill material (i.e., excludes embankments that represent native, in-place material).
2) A schematic, typical cross-section of the Railbed/Embankment is presented on Figure 3-2 to illustrate these dimensions with respect to the creek.
3) For the purpose of estimating the embankment volume, the embankment was assumed to be trapezoidal with 2H:1V side slopes and the cross-sectional area equal to ((W +(4H + W)) / 2) * H), as shown on Figure 3-2.
4) Erosion of the embankment is assumed to not exist during the observed flow due to lack of contact of the embankment with the creek.

TABLE 2-3
NINEMILE – LAND USE ADJACENT TO ROW

MM Range		Adjacent Land Use			Photos
		Residential	Open	Commercial	
0.00	0.21	X		X	NM-1 to NM-3
0.21	0.29	X		X	NM-4
0.29	0.60	X	X		NM-5 to NM-6
0.60	0.90	X			NM-5
0.90	1.10	X	X		NM-7 to NM-8
1.10	1.30	X			NM-9 to NM-10
1.30	1.50	X	X		NM-11 to NM-13
1.50	1.70	X	X		NM-14 to NM-15
1.70	1.90	X	X		NM-16 to NM-18
1.90	2.10	X			NM-19 to NM-20
2.10	2.40	X			NM-21 to NM-23
2.40	2.60		X		NM-24 to NM-27
2.60	3.10	X	X		NM-28 to NM-32
3.10	3.70	X	X		NM-28 to NM-32
3.70	4.75		X		NM-28 to NM-32

TABLE 2-4
BURKE CANYON – LAND USE ADJACENT TO ROW

MM Range		Adjacent Land Use			Photos
		Residential	Open	Commercial	
0.00	0.10		X		BC-1 to BC-2
0.10	0.30	X			BC-3 to BC-5
0.30	3.20		X		BC-6 to BC-7
3.20	3.30	X			BC-8
3.30	3.50	X			BC-10
3.50	4.20	X			BC-11 to BC-12
4.20	4.60		X		BC-13
4.60	5.00		X		BC-14
5.00	5.80	X	X		BC-15 to BC-18
5.80	6.10		X		BC-19
6.10	6.40		X		BC-20
6.40	6.50			X	BC-21 to BC-23
6.50	6.75		X		

TABLE 2-5
TEST PIT LOCATIONS NOT SAMPLED
WALLACE YARD

Prefix	Number	Comments
WY	54	Slope, No Sample Collected
WY	57	Slope, No Sample Collected
WY	61	Slope, No Sample Collected
WY	67	Slope, No Sample Collected
WY	68	Slope, No Sample Collected
WY	110	Buried Utilities, No Sample Collected
WY	114	Buried Utilities, No Sample Collected
WY	116	Concrete, No Sample Collected
WY	138	Slope, No Sample Collected
WY	144	Slope, No Sample Collected
WY	147	Slope, No Sample Collected
WY	149	Slope, No Sample Collected

TABLE 2-6
TEST PIT LOCATIONS NOT SAMPLED
FORMER NPRy LINE NINEMILE CREEK

Prefix	Number	Comments
NM	08	Property owner did not provide consent to access
NM	010	Property owner did not provide consent to access
NM	016	Property owner did not provide consent to access
NM	019	Property owner did not provide consent to access
NM	022	No Access because of steep embankment and thick vegetation not suited for the backhoe
NM	023	No Access because of steep embankment and thick vegetation not suited for the backhoe
NM	024	No Access because of steep embankment and thick vegetation not suited for the backhoe
NM	025	No Access because of steep embankment and thick vegetation not suited for the backhoe
NM	026	No Access because of steep embankment and thick vegetation not suited for the backhoe
NM	027	No Access because of steep embankment and thick vegetation not suited for the backhoe

TABLE 2-7
TEST PIT LOCATIONS NOT SAMPLED
CANYON CREEK

Spur Line	Prefix	Number	Comments
Former NPRy	NP	04	Could not access site due to thick vegetation and railbed was too narrow for the backhoe
	NP	011	Property owner did not provide consent to access
	NP	012	Property owner did not provide consent to access
	NP	013	Property owner did not provide consent to access
	NP	014	Property owner did not provide consent to access
	NP	015	Property owner did not provide consent to access
	NP	016	This portion of the railbed is under paved road
	NP	017	Property owner did not provide consent to access
	NP	018	Property owner did not provide consent to access
	NP	019	Property owner did not provide consent to access
Former WIRR	UP	04	Could not access site due to thick vegetation and the railbed was too narrow for a backhoe
	UP	05	Property owner did not provide consent to access
	UP	013	Property owner did not provide consent to access
	UP	014	Property owner did not provide consent to access
	UP	015	Property owner did not provide consent to access
	UP	016	Property owner did not provide consent to access

TABLE 2-8
ANALYTICAL RESULTS FOR METALS SAMPLING
WALLACE YARD

			Analyte	Arsenic	Cadmium	Lead	Zinc
			Units				
Sample ID	Sample Date	Depth Interval	Sub-Area Fig. 3-1	mg/kg	mg/kg	mg/kg	mg/kg
HM-10-A	11/19/2004	0 - 6 in.	HM	319 J	13	5190	1600
HM-10-B	11/19/2004	6 - 24 in.	HM	257 J	9.36	2680	1180
HM-11-A	11/19/2004	0 - 6 in.	HM	11.7 J	2.77 J	1930	377
HM-11-B	11/19/2004	6 - 24 in.	HM	45.4 J	5.99 J	2780	992
HM-12-A	11/19/2004	0 - 6 in.	HM	10.7 J	2.03 J	967	248
HM-12-B	11/19/2004	6 - 24 in.	HM	11.4 J	2.53 J	1200	281
HM-13-A	11/19/2004	0 - 6 in.	HM	129 J	2.95 J	408	309
HM-13-B	11/19/2004	6 - 24 in.	HM	103 J	5.13 J	1580	875
HM-14-A	11/19/2004	0 - 6 in.	HM	11.4 J	4.37 J	1280	353
HM-14-B	11/19/2004	6 - 24 in.	HM	13.5 J	4.26 J	866	233
HM-15-A	11/19/2004	0 - 6 in.	HM	12.1 J	1.97 J	812	355
HM-15-B	11/19/2004	6 - 24 in.	HM	11 J	1.26 J	390	211
HM-1-A	11/19/2004	0 - 6 in.	HM	80.1 J	28.1	20300	6020
HM-1-B	11/19/2004	6 - 24 in.	HM	126 J	25.4	14500	4950
HM-2-A	11/19/2004	0 - 6 in.	HM	57.6 J	24.1	14900	5180
HM-2-B	11/19/2004	6 - 24 in.	HM	66.5 J	39.8	21800	7790
HM-3-A	11/19/2004	0 - 6 in.	HM	12.5 J	4.13	384	227
HM-3-B	11/19/2004	6 - 24 in.	HM	18.2 J	1.7	249	197
HM-4-A	11/19/2004	0 - 6 in.	HM	37.5 J	27.4	9840	5100
HM-4-B	11/19/2004	6 - 24 in.	HM	16.7 J	10.5	12000	4840
HM-5-A	11/19/2004	0 - 6 in.	HM	75.9 J	10.2	35500	3990
HM-5-B	11/19/2004	6 - 24 in.	HM	105 J	9.81	51000	2060
HM-6-A	11/19/2004	0 - 6 in.	HM	66.2 J	2.01	37400	1000
HM-6-B	11/19/2004	6 - 24 in.	HM	32 J	2.01	35400	1060
HM-7-A	11/19/2004	0 - 6 in.	HM	31.5 J	19	6530	2320
HM-7-B	11/19/2004	6 - 24 in.	HM	16.8 J	7.37	1960	1080
HM-8-A	11/19/2004	0 - 6 in.	HM	49 J	8.35	17800	1890
HM-8-B	11/19/2004	6 - 24 in.	HM	108 J	8.39	33400	1580
HM-9-A	11/19/2004	0 - 6 in.	HM	28.1 J	7.8	12900	1700
HM-9-B	11/19/2004	6 - 24 in.	HM	32 J	10.6	16100	1950
WY-51-A	5/27/2003	0 - 6 in.	HM	267	11.9	1190	3810
WY-51-B	5/27/2003	6 - 24 in.	HM	110	51.6	18500	9040
WY-52-A	5/27/2003	0 - 6 in.	HM	86.7	22.8	12900	3430
WY-52-B	5/27/2003	6 - 24 in.	HM	191	162	42000	14800
WY-53-A	5/19/2003	0 - 6 in.	HM	42.1 J	85.1	23400	13800
WY-53-B	5/19/2003	6 - 24 in.	HM	473 J	81.3	23400	12000
WY-56-A	5/19/2003	0 - 6 in.	HM	698 J	21.1	26300	3600
WY-56-B	5/19/2003	6 - 24 in.	HM	1170 J	44.8	28000	5650
WY-60-A	5/19/2003	0 - 6 in.	HM	304 J	16.5	27800	3470
WY-60-B	5/19/2003	6 - 24 in.	HM	< 5 J	18.4	1860	901
WY-66-A	5/19/2003	0 - 6 in.	HM	1870 J	27.9	2890	1480
WY-66-B	5/19/2003	6 - 24 in.	HM	528 J	186	21900	31600
WY-69-A	5/19/2003	0 - 6 in.	HM	234	29.6	30300	6140 J
WY-69-B	5/19/2003	6 - 24 in.	HM	853	38.1	27500	5090 J
WY-70-A	5/19/2003	0 - 6 in.	HM	26.5	5.16	8360	1130 J
WY-70-B	5/19/2003	6 - 24 in.	HM	106	29.3	27200	4650 J
WY-74-A	5/19/2003	0 - 6 in.	HM	19.7	2.9	1140	600 J
WY-74-B	5/19/2003	6 - 24 in.	HM	9.73	1.3	471	330 J
WY-79-A	5/19/2003	0 - 6 in.	HM	24	20.7	17100	3570 J
WY-79-B	5/19/2003	6 - 24 in.	HM	20.4	32.2	18800	3240 J

TABLE 2-8
ANALYTICAL RESULTS FOR METALS SAMPLING
WALLACE YARD

			Analyte	Arsenic	Cadmium	Lead	Zinc
			Units				
Sample ID	Sample Date	Depth Interval	Sub-Area Fig. 3-1	mg/kg	mg/kg	mg/kg	mg/kg
WY-103-A	5/15/2003	0 - 6 in.	I-90	14.7	3.57	622	561 J
WY-103-B	5/15/2003	6 - 24 in.	I-90	21.6	31.4	5270	3030 J
WY-111-A	5/15/2003	0 - 6 in.	I-90	29.5	0.371	100	51.6
WY-111-B	5/15/2003	6 - 24 in.	I-90	30.2	11	2010	1880
WY-117-A	5/15/2003	0 - 6 in.	I-90	28.3	0.287	98.8	45.3
WY-117-B	5/15/2003	6 - 24 in.	I-90	26.5	3.44	744	759
WY-124-A	5/15/2003	0 - 6 in.	I-90	21.2	0.372	98	96.6
WY-124-B	5/15/2003	6 - 24 in.	I-90	27	1.71	313	384
WY-134-A	5/15/2003	0 - 6 in.	I-90	22.3	0.411	108	71.3
WY-134-B	5/15/2003	6 - 24 in.	I-90	25.5	3.08	690	783
WY-141-A	5/15/2003	0 - 6 in.	I-90	14.3	1.11	310	334 J
WY-141-B	5/15/2003	6 - 24 in.	I-90	18.4	1.21	333	219 J
WY-75-A	5/20/2003	0 - 6 in.	I-90	22.3	1.38	380	204 J
WY-75-B	5/20/2003	6 - 24 in.	I-90	19.8	0.806	170	194 J
WY-81-A	5/20/2003	0 - 6 in.	I-90	15.8	3.13	422	601 J
WY-81-B	5/20/2003	6 - 24 in.	I-90	59.2	46.6	15800	7500 J
WY-87-A	5/20/2003	0 - 6 in.	I-90	19.9	5.3	1010	869 J
WY-87-B	5/20/2003	6 - 24 in.	I-90	29.3	17.4	2900	2460 J
WY-95-A	5/28/2003	0 - 6 in.	I-90	27.1	1.78	500	367
WY-95-B	5/28/2003	6 - 24 in.	I-90	29.2	2.32	767	676
VC-1-A	11/22/2004	0 - 6 in.	VC	10 J	2.02 J	369	263
VC-1-B	11/22/2004	6 - 24 in.	VC	5.53 J	0.83 J	129	139
VC-2-A	11/22/2004	0 - 6 in.	VC	9.07 J	0.257 J	60.6	86.9
VC-2-B	11/22/2004	6 - 24 in.	VC	13.8 J	0.6 J	134	115
VC-3-A	11/22/2004	0 - 6 in.	VC	11.3 J	0.348 J	98.7	109
VC-3-B	11/22/2004	6 - 24 in.	VC	9.25 J	0.524 J	182	128
VC-4-A	11/22/2004	0 - 6 in.	VC	12.1 J	0.863 J	175	176
VC-4-B	11/22/2004	6 - 24 in.	VC	11.7 J	0.511 J	82.6	160
VC-5-A	11/22/2004	0 - 6 in.	VC	6.71	0.192 J	52.5 J	69.7 J
VC-5-B	11/22/2004	6 - 24 in.	VC	36.8	6.09 J	1030 J	920 J
VC-6-A	11/22/2004	0 - 6 in.	VC	11	1.67 J	199 J	342 J
VC-6-B	11/22/2004	6 - 24 in.	VC	20.1	7.87 J	3420 J	1260 J
WY-101-A	5/29/2003	0 - 6 in.	VC	13.3	0.292	73	133
WY-101-B	5/29/2003	6 - 24 in.	VC	9.57	1.21	193	256
WY-102-A	5/28/2003	0 - 6 in.	VC	38.7	8.85	2130	1550
WY-102-B	5/28/2003	6 - 24 in.	VC	35.6	7.95	1730	1310
WY-113-A	5/29/2003	0 - 6 in.	VC	27.9	4.14	1090	643
WY-113-B	5/29/2003	6 - 24 in.	VC	39.5	5.95	1610	926
WY-120-A	5/29/2003	0 - 6 in.	VC	13.5	1.13	135	217
WY-120-B	5/29/2003	6 - 24 in.	VC	16.9	1.32	218	286
WY-62-A	5/28/2003	0 - 6 in.	VC	39.7	2.79	700	920
WY-62-B	5/28/2003	6 - 24 in.	VC	39.7	5.51	1090	1310
WY-71-A	5/28/2003	0 - 6 in.	VC	36.8	8.87	2180	1350
WY-71-B	5/28/2003	6 - 24 in.	VC	94.1	38.8	9590	6280
WY-85-A	5/28/2003	0 - 6 in.	VC	12.5	< 0.173	51.6	122
WY-85-B	5/28/2003	6 - 24 in.	VC	23.8	2.06	444	435
WY-86-A	5/28/2003	0 - 6 in.	VC	12.6	0.258	59.5	128
WY-86-B	5/28/2003	6 - 24 in.	VC	10.6	1.04	108	365
WY-92-A	5/29/2003	0 - 6 in.	VC	6.18	0.527	72.5	158
WY-92-B	5/29/2003	6 - 24 in.	VC	12.3	1.41	191	305
WY-93-A	5/28/2003	0 - 6 in.	VC	12.9	2.06	374	374
WY-93-B	5/28/2003	6 - 24 in.	VC	12.9	0.214	52.4	125
WY-94-A	5/28/2003	0 - 6 in.	VC	15.1	0.442	90.1	156
WY-94-B	5/28/2003	6 - 24 in.	VC	11.4	0.956	134	378

TABLE 2-8
ANALYTICAL RESULTS FOR METALS SAMPLING
WALLACE YARD

			Analyte	Arsenic	Cadmium	Lead	Zinc
			Units				
Sample ID	Sample Date	Depth Interval	Sub-Area Fig. 3-1	mg/kg	mg/kg	mg/kg	mg/kg
WY-115-A	5/15/2003	0 - 6 in.	VC-P	18.8	3.89	826	697
WY-115-B	5/15/2003	6 - 24 in.	VC-P	37.5	4.01	1130	697
WY-121-A	5/15/2003	0 - 6 in.	VC-P	65.5	8.57	4640	1710 J
WY-121-B	5/15/2003	6 - 24 in.	VC-P	17.2	2.57	576	596 J
WY-122-A	5/15/2003	0 - 6 in.	VC-P	23.4	26.5	2530	3020
WY-122-B	5/15/2003	6 - 24 in.	VC-P	32.4	102	8800	10800
WY-123-A	5/15/2003	0 - 6 in.	VC-P	21.2	4.58	958	864
WY-123-B	5/15/2003	6 - 24 in.	VC-P	25.8	1.4	277	393
WY-129-A	5/15/2003	0 - 6 in.	VC-P	77.6	21.9	8280	4760 J
WY-129-B	5/15/2003	6 - 24 in.	VC-P	69.8	153	17900	23200 J
WY-130-A	5/15/2003	0 - 6 in.	VC-P	14.7	3.95	817	898 J
WY-130-B	5/15/2003	6 - 24 in.	VC-P	11.2	2.81	476	601 J
WY-131-A	5/15/2003	0 - 6 in.	VC-P	17.2	3.67	644	713
WY-131-B	5/15/2003	6 - 24 in.	VC-P	24.1	1.48	252	353
WY-132-A	5/15/2003	0 - 6 in.	VC-P	16.7	3.73	682	862 J
WY-132-B	5/15/2003	6 - 24 in.	VC-P	32.2	11.1	1810	5780 J
WY-133-A	5/15/2003	0 - 6 in.	VC-P	104	13.7	3300	1980 J
WY-133-B	5/15/2003	6 - 24 in.	VC-P	23.1	50	4940	14600 J
WY-139-A	5/15/2003	0 - 6 in.	VC-P	19	4.21	897	726
WY-139-B	5/15/2003	6 - 24 in.	VC-P	29.8	13.6	3030	2570
WY-140-A	5/15/2003	0 - 6 in.	VC-P	26.5	11.7	2230	1690
WY-140-B	5/15/2003	6 - 24 in.	VC-P	25.4	50.7	7400	6810
WY-100-A	5/19/2003	0 - 6 in.	WY-1	229	16.6	2430	1570
WY-100-B	5/19/2003	6 - 24 in.	WY-1	22.5	6.22	2740	805
WY-104-A	5/16/2003	0 - 6 in.	WY-1	47.7	10.5	2570	1720 J
WY-104-B	5/16/2003	6 - 24 in.	WY-1	27.3	22.4	6840	3530 J
WY-105-A	5/19/2003	0 - 6 in.	WY-1	33.2	15	2900	2140
WY-105-B	5/19/2003	6 - 24 in.	WY-1	9.15	10.7	1410	1350
WY-106-A	5/19/2003	0 - 6 in.	WY-1	10.3	6.5	1250	672 J
WY-106-B	5/19/2003	6 - 24 in.	WY-1	< 5	1.42	522	205 J
WY-107-A	5/19/2003	0 - 6 in.	WY-1	47	10.1	5920	1990 J
WY-107-B	5/19/2003	6 - 24 in.	WY-1	5.21	3.36	1120	358 J
WY-108-A	5/16/2003	0 - 6 in.	WY-1	24.4	24.5	4260	3850 J
WY-108-B	5/16/2003	6 - 24 in.	WY-1	13	5.56	2010	700 J
WY-109-A	5/16/2003	0 - 6 in.	WY-1	11.4	9.94	1220	1190
WY-109-B	5/16/2003	6 - 24 in.	WY-1	14.1	8.31	1280	1220
WY-112-A	5/16/2003	0 - 6 in.	WY-1	8.69	1.07	483	251 J
WY-112-B	5/16/2003	6 - 24 in.	WY-1	99.3	1.75	285	205 J
WY-119-A	5/16/2003	0 - 6 in.	WY-1	65.2	31.1	11600	3310
WY-119-B	5/16/2003	6 - 24 in.	WY-1	10	7.73	2930	1130
WY-127-A	5/16/2003	0 - 6 in.	WY-1	20.3	1.19	532	219
WY-127-B	5/16/2003	6 - 24 in.	WY-1	14.5	42	4500	3630
WY-128-A	5/16/2003	0 - 6 in.	WY-1	8.63	2.8	953	541
WY-128-B	5/16/2003	6 - 24 in.	WY-1	6.98	1.07	2850	233
WY-137-A	5/16/2003	0 - 6 in.	WY-1	59	15.7	5170	3190
WY-137-B	5/16/2003	6 - 24 in.	WY-1	< 5	0.721	271	145
WY-143-A	5/16/2003	0 - 6 in.	WY-1	52.6	30.6	10800	4120
WY-143-B	5/16/2003	6 - 24 in.	WY-1	8.67	120	3120	9400
WY-146-A	5/16/2003	0 - 6 in.	WY-1	183	82.2	25400	6790
WY-146-B	5/16/2003	6 - 24 in.	WY-1	140	74.6	21300	6370
WY-58-A	5/20/2003	0 - 6 in.	WY-1	12.4 J	1.08	168	284
WY-58-B	5/20/2003	6 - 24 in.	WY-1	54.4 J	40.8	10900	7450
WY-59-A	5/20/2003	0 - 6 in.	WY-1	156 J	21.7	27000	2990
WY-59-B	5/20/2003	6 - 24 in.	WY-1	122 J	33	25200	5480
WY-63-A	5/20/2003	0 - 6 in.	WY-1	22.4 J	0.961	229	173
WY-63-B	5/20/2003	6 - 24 in.	WY-1	24 J	0.942	258	281
WY-64-A	5/20/2003	0 - 6 in.	WY-1	22.1 J	12.4	4210	2000
WY-64-B	5/20/2003	6 - 24 in.	WY-1	55.6 J	39.1	15800	6300
WY-65-A	5/20/2003	0 - 6 in.	WY-1	17.5 J	1.95	573	966
WY-65-B	5/20/2003	6 - 24 in.	WY-1	22.7 J	1.84	586	833
WY-72-A	5/20/2003	0 - 6 in.	WY-1	77.8 J	47.7	12300	7910
WY-72-B	5/20/2003	6 - 24 in.	WY-1	57.9 J	35.6	17000	6980
WY-73-A	5/20/2003	0 - 6 in.	WY-1	18.1	1.56	333	678 J

TABLE 2-8
ANALYTICAL RESULTS FOR METALS SAMPLING
WALLACE YARD

			Analyte	Arsenic	Cadmium	Lead	Zinc
			Units				
Sample ID	Sample Date	Depth Interval	Sub-Area Fig. 3-1	mg/kg	mg/kg	mg/kg	mg/kg
WY-73-B	5/20/2003	6 - 24 in.	WY-1	34	5.02	2730	820 J
WY-76-A	5/20/2003	0 - 6 in.	WY-1	24.3	4.03	1110	593 J
WY-76-B	5/20/2003	6 - 24 in.	WY-1	114	48.4	25600	7740 J
WY-77-A	5/20/2003	0 - 6 in.	WY-1	15.7	2.89	1020	982 J
WY-77-B	5/20/2003	6 - 24 in.	WY-1	321	21.7	16900	4050 J
WY-78-A	5/20/2003	0 - 6 in.	WY-1	72.6	35.9	11400	4400 J
WY-78-B	5/20/2003	6 - 24 in.	WY-1	29	203	29600	31700 J
WY-80-A	5/19/2003	0 - 6 in.	WY-1	11.4	1.54	309	320 J
WY-80-B	5/19/2003	6 - 24 in.	WY-1	6.26	3.1	804	646 J
WY-82-A	5/20/2003	0 - 6 in.	WY-1	199	34.3	25100	4380 J
WY-82-B	5/20/2003	6 - 24 in.	WY-1	17.7	58.7	3770	3570 J
WY-83-A	5/19/2003	0 - 6 in.	WY-1	111	29.2	10100	4180 J
WY-83-B	5/19/2003	6 - 24 in.	WY-1	254	41.6	13100	7130 J
WY-84-A	5/19/2003	0 - 6 in.	WY-1	42.7	11	2730	1620 J
WY-84-B	5/19/2003	6 - 24 in.	WY-1	27.4	24.4	10100	3620 J
WY-88-A	5/16/2003	0 - 6 in.	WY-1	51.3	13.1	3980	2130 J
WY-88-B	5/16/2003	6 - 24 in.	WY-1	6.84	45.5	245	2550 J
WY-89-A	5/19/2003	0 - 6 in.	WY-1	94.3	20.9	12800	2990 J
WY-89-B	5/19/2003	6 - 24 in.	WY-1	< 5	10	136	1530 J
WY-90-A	5/19/2003	0 - 6 in.	WY-1	11.3	6.83	1880	783 J
WY-90-B	5/19/2003	6 - 24 in.	WY-1	22.7	4.82	989	1150 J
WY-91-A	5/19/2003	0 - 6 in.	WY-1	55.5	11.2	2540	2190 J
WY-91-B	5/19/2003	6 - 24 in.	WY-1	13.1	5.37	1050	729 J
WY-96-A	5/16/2003	0 - 6 in.	WY-1	142	25.5	8280	3320 J
WY-96-B	5/16/2003	6 - 24 in.	WY-1	230	105	16700	8170 J
WY-97-A	5/16/2003	0 - 6 in.	WY-1	12.4	6.46	1910	1020 J
WY-97-B	5/16/2003	6 - 24 in.	WY-1	26.9	5.72	2420	911 J
WY-98-A	5/19/2003	0 - 6 in.	WY-1	29.8	15.2	5140	2050 J
WY-98-B	5/19/2003	6 - 24 in.	WY-1	7.99	7.9	4260	1060 J
WY-99-A	5/19/2003	0 - 6 in.	WY-1	9.69	5.21	1200	808 J
WY-99-B	5/19/2003	6 - 24 in.	WY-1	< 5	0.905	484	167 J
WY-10-A	5/27/2003	0 - 6 in.	WY-2	19.5	0.315	61.4	78.8
WY-10-B	5/27/2003	6 - 24 in.	WY-2	54	12.4	2440	2450
WY-12-A	5/27/2003	0 - 6 in.	WY-2	21.7	0.496	133	159
WY-12-B	5/27/2003	6 - 24 in.	WY-2	104	25.7	16800	4840
WY-13-A	5/22/2003	0 - 6 in.	WY-2	52.9	27.3	4760	2730
WY-13-B	5/22/2003	6 - 24 in.	WY-2	65.6	9.92	3800	1320
WY-14-A	5/22/2003	0 - 6 in.	WY-2	128	20	5610	2520
WY-14-B	5/22/2003	6 - 24 in.	WY-2	66.2	1.69	756	285
WY-16-A	5/22/2003	0 - 6 in.	WY-2	68.8	17.5	4310	1670
WY-16-B	5/22/2003	6 - 24 in.	WY-2	25.5	14.1	3790	2640
WY-17-A	5/22/2003	0 - 6 in.	WY-2	133	20.4	4340	695
WY-17-B	5/22/2003	6 - 24 in.	WY-2	241	19.1	13600	2310
WY-18-A	5/22/2003	0 - 6 in.	WY-2	317	72.1	14700	9530
WY-18-B	5/22/2003	6 - 24 in.	WY-2	243	5.69	1960	610
WY-19-A	5/22/2003	0 - 6 in.	WY-2	147	26.7	11900	3900
WY-19-B	5/22/2003	6 - 24 in.	WY-2	84.4	22.4	18800	9450
WY-1-A	5/28/2003	0 - 6 in.	WY-2	42	9.45	7680	1140
WY-1-B	5/28/2003	6 - 24 in.	WY-2	8.59	0.217	110	117
WY-21-A	5/22/2003	0 - 6 in.	WY-2	133	48	8870	5430
WY-21-B	5/22/2003	6 - 24 in.	WY-2	191	33	23300	4390
WY-22-A	5/22/2003	0 - 6 in.	WY-2	207	23.1	7000	3790
WY-22-B	5/22/2003	6 - 24 in.	WY-2	165	19.4	8820	3420
WY-23-A	5/22/2003	0 - 6 in.	WY-2	83	22	18400	9260
WY-23-B	5/22/2003	6 - 24 in.	WY-2	< 5	0.173	3.32	< 0.238
WY-24-A	5/22/2003	0 - 6 in.	WY-2	108	12.1	7940	1950
WY-24-B	5/22/2003	6 - 24 in.	WY-2	39.6	18.2	7800	3210
WY-26-A	5/22/2003	0 - 6 in.	WY-2	133	21.7	10800	2500
WY-26-B	5/22/2003	6 - 24 in.	WY-2	< 5	5.04	872	784
WY-27-A	5/22/2003	0 - 6 in.	WY-2	310	36.1	6030	3970
WY-27-B	5/22/2003	6 - 24 in.	WY-2	894	21.2	3200	1380
WY-28-A	5/22/2003	0 - 6 in.	WY-2	173	26.9	5820	5190
WY-28-B	5/22/2003	6 - 24 in.	WY-2	151	37.2	8830	5220

TABLE 2-8
ANALYTICAL RESULTS FOR METALS SAMPLING
WALLACE YARD

			Analyte	Arsenic	Cadmium	Lead	Zinc
			Units				
Sample ID	Sample Date	Depth Interval	Sub-Area Fig. 3-1	mg/kg	mg/kg	mg/kg	mg/kg
WY-2-A	5/27/2003	0 - 6 in.	WY-2	20	10.2	1680	1570
WY-2-B	5/27/2003	6 - 24 in.	WY-2	42.3	19.9	8100	2900
WY-30-A	5/22/2003	0 - 6 in.	WY-2	206	7.21	1330	760
WY-30-B	5/22/2003	6 - 24 in.	WY-2	44.3	11.2	1400	2240
WY-31-A	5/22/2003	0 - 6 in.	WY-2	444	57.4	10500	6450
WY-31-B	5/22/2003	6 - 24 in.	WY-2	32.5	39.2	940	3600
WY-33-A	5/21/2003	0 - 6 in.	WY-2	4200	5	46400	8630
WY-33-B	5/21/2003	6 - 24 in.	WY-2	22.1	5	3630	3330
WY-34-A	5/21/2003	0 - 6 in.	WY-2	335	5	4930	2710
WY-34-B	5/21/2003	6 - 24 in.	WY-2	170	5	5840	2460
WY-36-A	5/21/2003	0 - 6 in.	WY-2	676	5	32800	11900
WY-36-B	5/21/2003	6 - 24 in.	WY-2	44.2	5	6000	2880
WY-37-A	5/21/2003	0 - 6 in.	WY-2	162	5	14900	1780
WY-37-B	5/21/2003	6 - 24 in.	WY-2	325	5	20400	2490
WY-38-A	5/21/2003	0 - 6 in.	WY-2	20.7	6.94	2010	1330
WY-38-B	5/21/2003	6 - 24 in.	WY-2	30.5	2.92	1880	614
WY-39-A	5/21/2003	0 - 6 in.	WY-2	72.6	44.4	12700	5730
WY-39-B	5/21/2003	6 - 24 in.	WY-2	160	30.8	9810	2860
WY-3-A	5/28/2003	0 - 6 in.	WY-2	16.1	7.17	616	1960
WY-3-B	5/28/2003	6 - 24 in.	WY-2	9.28	1.73	136	413
WY-40-A	5/21/2003	0 - 6 in.	WY-2	26.9	16	3190	2610
WY-40-B	5/21/2003	6 - 24 in.	WY-2	12.5	4.66	692	885
WY-41-A	5/21/2003	0 - 6 in.	WY-2	44.7	7.57	1400	1390
WY-41-B	5/21/2003	6 - 24 in.	WY-2	39.7	26.3	5870	3890
WY-42-A	5/27/2003	0 - 6 in.	WY-2	12.8	5.23	995	664
WY-42-B	5/27/2003	6 - 24 in.	WY-2	56	15.4	6420	1940
WY-43-A	5/27/2003	0 - 6 in.	WY-2	44.4	26.1	5760	2930
WY-43-B	5/27/2003	6 - 24 in.	WY-2	16.7	50.9	455	2030
WY-44-A	5/27/2003	0 - 6 in.	WY-2	17.8	1.88	404	448
WY-44-B	5/27/2003	6 - 24 in.	WY-2	28	1.78	323	357
WY-45-A	5/21/2003	0 - 6 in.	WY-2	7.92	1.12	268	318
WY-45-B	5/21/2003	6 - 24 in.	WY-2	236	26.6	8290	4330
WY-46-A	5/28/2003	0 - 6 in.	WY-2	55.7	25.1	10400	3140
WY-46-B	5/28/2003	6 - 24 in.	WY-2	109	24.4	13900	4010
WY-47-A	5/27/2003	0 - 6 in.	WY-2	45.5	21	3610	3070
WY-47-B	5/27/2003	6 - 24 in.	WY-2	18.2	28.3	151	1860
WY-48-A	5/27/2003	0 - 6 in.	WY-2	155	34.9	9150	4530
WY-48-B	5/27/2003	6 - 24 in.	WY-2	51.5	21.9	7990	3240
WY-49-A	5/27/2003	0 - 6 in.	WY-2	22.5	6.21	640	760
WY-49-B	5/27/2003	6 - 24 in.	WY-2	8.87	1.48	215	416
WY-4-A	5/27/2003	0 - 6 in.	WY-2	30.9	24	3390	3420
WY-4-B	5/27/2003	6 - 24 in.	WY-2	38.9	15.7	5980	2870
WY-50-A	5/27/2003	0 - 6 in.	WY-2	63.6	10.2	2730	1910
WY-50-B	5/27/2003	6 - 24 in.	WY-2	197	35	9370	4220
WY-55-A	5/27/2003	0 - 6 in.	WY-2	78.4	35.1	7040	4110
WY-55-B	5/27/2003	6 - 24 in.	WY-2	25.5	4.44	1050	690
WY-5-B	5/20/2003	6 - 24 in.	WY-2	< 5	5	338	714
WY-6-A	5/27/2003	0 - 6 in.	WY-2	62.2	14.7	1840	2560
WY-6-B	5/27/2003	6 - 24 in.	WY-2	34.8	14.4	1820	2300
WY-7-A	5/27/2003	0 - 6 in.	WY-2	112	66.1	11700	9780
WY-7-B	5/27/2003	6 - 24 in.	WY-2	56.5	18.1	3530	2770
WY-8-B	5/20/2003	6 - 24 in.	WY-2	23	9.31	1410	1160
WY-9-A	5/27/2003	0 - 6 in.	WY-2	20.3	7.56	1130	1030
WY-9-B	5/27/2003	6 - 24 in.	WY-2	20.6	6.23	1780	1180
WY-11-A	5/21/2003	0 - 6 in.	WY-3	< 5	9.03	389	1060
WY-11-B	5/21/2003	6 - 24 in.	WY-3	< 5	3.33	276	650
WY-15-A	5/21/2003	0 - 6 in.	WY-3	6.98	8.5	769	965
WY-15-B	5/21/2003	6 - 24 in.	WY-3	14.9	10.6	1540	1520
WY-20-A	5/21/2003	0 - 6 in.	WY-3	12.8	6.39	427	777
WY-20-B	5/21/2003	6 - 24 in.	WY-3	37.8	20.8	9300	3080
WY-25-A	5/21/2003	0 - 6 in.	WY-3	44	9.26	2740	1000
WY-25-B	5/21/2003	6 - 24 in.	WY-3	27.4	26.4	6010	4230
WY-29-A	5/21/2003	0 - 6 in.	WY-3	6.12	4.79	341	753
WY-29-B	5/21/2003	6 - 24 in.	WY-3	< 5	1.76	214	494
WY-32-A	5/21/2003	0 - 6 in.	WY-3	84.1	5	14000	3380

TABLE 2-8
ANALYTICAL RESULTS FOR METALS SAMPLING
WALLACE YARD

			Analyte	Arsenic	Cadmium	Lead	Zinc
			Units				
Sample ID	Sample Date	Depth Interval	Sub-Area Fig. 3-1	mg/kg	mg/kg	mg/kg	mg/kg
WY-32-B	5/21/2003	6 - 24 in.	WY-3	90.3	5	30200	4370
WY-35-A	5/21/2003	0 - 6 in.	WY-3	19.5	6.04	557	1620
WY-35-B	5/21/2003	6 - 24 in.	WY-3	8.62	1.6	162	496
WY-5-A	5/20/2003	0 - 6 in.	WY-3	< 5	9.53	346	1040
WY-8-A	5/20/2003	0 - 6 in.	WY-3	11.7	5.55	484	776
WY-118-A	5/16/2003	0 - 6 in.	WY-4	12.7	0.724	245	211
WY-118-B	5/16/2003	6 - 24 in.	WY-4	32	0.618	169	185
WY-125-A	5/16/2003	0 - 6 in.	WY-4	13.7	3.07	893	571
WY-125-B	5/16/2003	6 - 24 in.	WY-4	30.2	1.04	234	395
WY-126-A	5/16/2003	0 - 6 in.	WY-4	22	1.25	358	375
WY-126-B	5/16/2003	6 - 24 in.	WY-4	25.3	1.02	290	295
WY-135-A	5/16/2003	0 - 6 in.	WY-4	6.52	2.45	584	439
WY-135-B	5/16/2003	6 - 24 in.	WY-4	25.3	0.986	369	204
WY-136-A	5/16/2003	0 - 6 in.	WY-4	8.23	4.22	602	603
WY-136-B	5/16/2003	6 - 24 in.	WY-4	26.4	0.917	311	207
WY-142-A	5/16/2003	0 - 6 in.	WY-4	9.91	1.56	351	292
WY-142-B	5/16/2003	6 - 24 in.	WY-4	26.7	2.5	671	552
WY-145-A	5/16/2003	0 - 6 in.	WY-4	12.1	1.31	308	262
WY-145-B	5/16/2003	6 - 24 in.	WY-4	35.5	0.939	255	217
WY-148-A	5/15/2003	0 - 6 in.	WY-4	< 5	1.89	370	306 J
WY-148-B	5/15/2003	6 - 24 in.	WY-4	20.9	6.15	1670	1070 J

Notes

< Non-detect of reporting limit presented. Reporting limit used in calculations presented in Table 2-9.

J Estimate based on either spike returns, laboratory control samples and/or duplicates being out of a certain range of control.

TABLE 2-9
WALLACE YARD METALS SAMPLES SUMMARY STATISTICS

SUB-AREAS			ANALYTE			
			Arsenic	Cadmium	Lead	Zinc
	Basin RI Screening Levels		22 mg/kg	9.8 mg/kg	171 mg/kg	280 mg/kg
	Interval	Data				
Wallace Visitor Center (Sub-Area VC Fig. 3-1)	0-6 in	Number of Samples	17	17	17	17
		Number of NDs	0	1	0	0
		Minimum (mg/kg)	6.2	0.2	51.6	69.7
		Maximum (mg/kg)	39.7	8.9	2,180.0	1,550.0
		Mean (mg/kg)	17.0	2.1	465.3	399.9
	6-24 in.	Number of Samples	17	17	17	17
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	5.5	0.2	52.4	115.0
		Maximum (mg/kg)	94.1	38.8	9,590.0	6,280.0
		Mean (mg/kg)	23.7	4.9	1,196.4	864.6
Wallace Visitor Center Parking Area (East of Road) (Sub-Area VC-P Fig. 3-1)	0-6 in	Number of Samples	11	11	11	11
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	14.7	3.7	644.0	697.0
		Maximum (mg/kg)	104.0	26.5	8,280.0	4,760.0
		Mean (mg/kg)	36.8	9.7	2,345.8	1,629.1
	6-24 in.	Number of Samples	11	11	11	11
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	11.2	1.4	252.0	353.0
		Maximum (mg/kg)	69.8	153.0	17,900.0	23,200.0
		Mean (mg/kg)	29.9	35.7	4,235.5	6,036.4
I90 Corridor (Area between main roadway and access ramps) (Sub-Area I-90 Fig. 3-1)	0-6 in	Number of Samples	10	10	10	10
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	14.3	0.3	98.0	45.3
		Maximum (mg/kg)	29.5	5.3	1,010.0	869.0
		Mean (mg/kg)	21.5	1.8	364.9	320.1
	6-24 in.	Number of Samples	10	10	10	10
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	18.4	0.8	170.0	194.0
		Maximum (mg/kg)	59.2	46.6	15,800.0	7,500.0
		Mean (mg/kg)	28.7	11.9	2,899.7	1,788.5
Hercules Mill Area (Sub-Area HM Fig. 3-1)	0-6 in	Number of Samples	25	25	25	25
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	10.7	2.0	384.0	227.0
		Maximum (mg/kg)	1,870.0	85.1	37,400.0	13,800.0
		Mean (mg/kg)	180.2	16.1	12,700.8	2,868.0
	6-24 in.	Number of Samples	25	25	25	25
		Number of NDs	1	0	0	0
		Minimum (mg/kg)	5.0	1.3	249.0	197.0
		Maximum (mg/kg)	1,170.0	186.0	51,000.0	31,600.0
		Mean (mg/kg)	177.1	31.6	16,221.4	4,663.2

TABLE 2-9
WALLACE YARD METALS SAMPLES SUMMARY STATISTICS

SUB-AREAS			ANALYTE			
			Arsenic	Cadmium	Lead	Zinc
WY-1	0-6 in	Number of Samples	36	36	36	36
(Sub-Area WY-1 Fig. 3-1)		Number of NDs	0	0	0	0
		Minimum (mg/kg)	8.6	1.0	168.0	173.0
		Maximum (mg/kg)	229.0	82.2	27,000.0	7,910.0
		Mean (mg/kg)	55.8	15.8	5,827.8	2,175.6
	6-24 in.	Number of Samples	36	36	36	36
		Number of NDs	4	0	0	0
		Minimum (mg/kg)	5.0	0.7	136.0	145.0
		Maximum (mg/kg)	321.0	203.0	29,600.0	31,700.0
		Mean (mg/kg)	51.1	29.1	6,939.2	3,670.8
WY-2	0-6 in	Number of Samples	42	42	42	42
(Sub-Area WY-2 Fig. 3-1)		Number of NDs	0	0	0	0
		Minimum (mg/kg)	7.9	0.3	61.4	78.8
		Maximum (mg/kg)	4,200.0	72.1	46,400.0	11,900.0
		Mean (mg/kg)	215.0	20.0	7,377.8	3,333.4
	6-24 in.	Number of Samples	42	42	42	42
		Number of NDs	2	1	1	1
		Minimum (mg/kg)	5.0	0.2	3.3	0.2
		Maximum (mg/kg)	894.0	50.9	23,300.0	9,450.0
		Mean (mg/kg)	99.4	15.9	5,734.6	2,457.2
WY-3	0-6 in	Number of Samples	9	9	9	9
(Sub-Area WY-3 Fig. 3-1)		Number of NDs	2	0	0	0
		Minimum (mg/kg)	5.0	4.8	341.0	753.0
		Maximum (mg/kg)	84.1	9.5	14,000.0	3,380.0
		Mean (mg/kg)	21.7	7.1	2,228.1	1,263.4
	6-24 in.	Number of Samples	9	9	9	9
		Number of NDs	3	0	0	0
		Minimum (mg/kg)	5.0	1.6	162.0	494.0
		Maximum (mg/kg)	90.3	26.4	30,200.0	4,370.0
		Mean (mg/kg)	24.1	9.3	5,494.4	1,857.1
WY-4	0-6 in	Number of Samples	8	8	8	8
(Sub-Area WY-4 Fig. 3-1)		Number of NDs	1	0	0	0
		Minimum (mg/kg)	5.0	0.7	245.0	211.0
		Maximum (mg/kg)	22.0	4.2	893.0	603.0
		Mean (mg/kg)	11.3	2.1	463.9	382.4
	6-24 in.	Number of Samples	8	8	8	8
		Number of NDs	0	0	0	0
		Minimum (mg/kg)	20.9	0.6	169.0	185.0
		Maximum (mg/kg)	35.5	6.2	1,670.0	1,070.0
		Mean (mg/kg)	27.8	1.8	496.1	390.6
Data from Basin RI	Surface Soil	Frequency	236	235	264	237
Upper Basin		Minimum (mg/kg)	3	0.1	26	23
MidGradSeg01		Maximum (mg/kg)	1060	91	74700	18000
(Includes Wallace)		Mean (mg/kg)	45	8	2920	1150
	Subsurface Soil	Frequency	644	575	698	644
		Minimum (mg/kg)	2	0.1	10	20
		Maximum (mg/kg)	796	81	56900	14655
		Mean (mg/kg)	23	6	2180	923

Note:
The reporting limit was used for non-detect (ND) samples in calculations above.

TABLE 2-10
ANALYTICAL RESULTS FOR METALS SAMPLING
FORMER NPRy LINE NINEMILE CREEK

		Analyte	Arsenic	Cadmium	Lead	Zinc
		Reporting Limit	5.00	0.173	3.32	0.238
		Units	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Sample Date	Depth Interval				
NM-01-A	7/16/2003	0 - 1'	28.4	34.7	4930	5090
NM-01-B	7/16/2003	1' - 2'	19.6	13.7	2140	2120
NM-01-C	7/16/2003	2' - 3'	17.3	7.67	1190	1290
NM-02-A	7/16/2003	0 - 1'	11	6.61	1070	1120
NM-02-B	7/16/2003	1' - 2'	11	7.58	1080	3050
NM-02-C	7/16/2003	2' - 3'	11.5	4.2	806	1030
NM-03-A	7/16/2003	0 - 1'	55.5	23.3	8000	3320
NM-03-B	7/16/2003	1' - 2'	11	1.1	395	284
NM-03-C	7/16/2003	2' - 3'	12.5	1.21	401	320
NM-04-A	7/15/2003	0 - 1'	23.7	8.51	1690	1180
NM-04-B	7/15/2003	1' - 2'	6.54	1.12	239	399
NM-04-C	7/15/2003	2' - 3'	6.75	0.689	86.8	321
NM-05-A	7/15/2003	0 - 1'	39.7	2.67	544	782
NM-05-B	7/15/2003	1' - 2'	33	1.57	220	672
NM-05-C	7/15/2003	2' - 3'	35.5	1.63	290	648
NM-06-A	7/16/2003	0 - 1'	39.1	23.3	6230	3340
NM-06-B	7/16/2003	1' - 2'	< 5	1.27	57	477
NM-06-C	7/16/2003	2' - 3'	< 5	56	97.8	5040
NM-07-A	7/16/2003	0 - 1'	35.1	17.1	9460	2950
NM-07-B	7/16/2003	1' - 2'	56.1	6.1	1490	984
NM-07-C	7/16/2003	2' - 3'	29.3	5.12	1610	858
NM-09-A	7/24/2003	0 - 1'	10.2	5.46	1720	1140
NM-09-B	7/24/2003	1' - 2'	7.49	1.23	415	278
NM-09-C	7/24/2003	2' - 3'	6.19	0.574	96.4	117
NM-011-A	7/24/2003	0 - 1'	60.3	23.7	5190	3660
NM-011-B	7/24/2003	1' - 2'	< 5	0.354	77.7	152
NM-011-C	7/24/2003	2' - 3'	< 5	0.179	67.1	99
NM-012-A	7/24/2003	0 - 1'	18	13.1	1800	2100
NM-012-B	7/24/2003	1' - 2'	20.6	1.8	483	197
NM-012-C	7/24/2003	2' - 3'	< 5	< 0.173	67	70.1
NM-013-A	7/31/2003	0 - 1'	5.17	1.92	385	324
NM-013-B	7/31/2003	1' - 2'	< 5	< 0.173	60.4	76.9
NM-013-C	7/31/2003	2' - 3'	< 5	0.284	62	103
NM-014-A	7/24/2003	0 - 1'	17	3.14	3440	6470
NM-014-B	7/24/2003	1' - 2'	12.4	< 0.173	130	51.5
NM-014-C	7/24/2003	2' - 3'	11.5	< 0.173	149	60.2
NM-015-A	7/31/2003	0 - 1'	273	18.2	1890	6230
NM-015-B	7/31/2003	1' - 2'	36.4	1.61	2850	250
NM-015-C	7/31/2003	2' - 3'	21.3	2.79	8860	1620
NM-017-A	7/24/2003	0 - 1'	8.29	17.2	16200 (1)	3740
NM-017-B	7/24/2003	1' - 2'	< 5	9.42	10700	1620
NM-017-C	7/24/2003	2' - 3'	< 5	19.2	193	2310
NM-018-A	7/31/2003	0 - 1'	17.1	8.96	2670	1340
NM-018-B	7/31/2003	1' - 2'	101	15.4	7530	2220
NM-018-C	7/31/2003	2' - 3'	30	5.09	1210	657
NM-020-A	7/24/2003	0 - 1'	164	4.13	495	478
NM-020-B	7/24/2003	1' - 2'	16.1	0.268	181	225
NM-020-C	7/24/2003	2' - 3'	30.1	0.555	356	279
NM-021-A	7/24/2003	0 - 1'	19.8	8.04	248	1080
NM-021-B	7/24/2003	1' - 2'	14.8	16	193	1380
NM-021-C	7/24/2003	2' - 3'	17.1	9.58	237	1180
NM-028-A	7/24/2003	0 - 1'	108	9.14	16500 (2)	2110
NM-028-B	7/24/2003	1' - 2'	< 5	6.77	443	735
NM-028-C	7/24/2003	2' - 3'	< 5	11.4	43.3	1040
NM-029-A	7/24/2003	0 - 1'	32.6	14.2	52500 (2)	2820
NM-029-B	7/24/2003	1' - 2'	< 5	6.73	971	563
NM-029-C	7/24/2003	2' - 3'	< 5	8.81	2770	732
NM-1-05	5/23/2005	0' - 2'	40.4	3.19	2600	4580
NM-2-05	5/23/2005	0' - 1'	13.7	4.03	1300	5340
NM-3-05	5/23/2005	0' - 1.67'	96	1.13	457	1670
NM-4-05	5/23/2005	0' - 2'	18.1	2.33	611	373

Note relative to potential non-railroad sources or Laboratory Qualifier:

1 Located near East Fork Ninemile Creek and coincident with dirt road.
2 Near the Success waste rock pile
< Reporting limit used as concentration
J Estimate based on either spike returns, laboratory control samples and/or duplicates being out of a certain range of control.

TABLE 2-11
ANALYTICAL RESULTS FOR METALS SAMPLING
FORMER NPRy LINE CANYON CREEK

		Analyte	Arsenic			Cadmium			Lead			Zinc		
		Reporting Limit	5.00			0.173			3.32			0.238		
		Units	mg/kg			mg/kg			mg/kg			mg/kg		
Sample ID	Sample Date	Depth Interval												
Sample ID	Sample Date	Depth Interval	LT	Conc	Qualifier	LT	Conc	Qualifier	LT	Conc	Qualifier	LT	Conc	Qualifier
NP-01-A	8/1/2003	0' - 1'		21.9			39.7			8720	(1)		3410	
NP-01-B	8/1/2003	1' - 2'		56.4			27.6			13800			2920	
NP-01-C	8/1/2003	2' - 3'		24.9			34.9			8450			2540	
NP-02-A	8/1/2003	0' - 1'		101			32.3			24500	(2)		4430	
NP-02-B	8/1/2003	1' - 2'		13.1			67.6			3350			4020	
NP-02-C	8/1/2003	2' - 3'		21.7			64.8			4840			4070	
NP-03-A	8/1/2003	0' - 1'		22.1			7.97			6940			3070	
NP-03-B	8/1/2003	1' - 2'		18.1			33			5470			3930	
NP-03-C	8/1/2003	2' - 3'		38.4			29.4			6970			3150	
NP-05-A	8/1/2003	0' - 1'		19			18.2			6260			3360	
NP-05-B	8/1/2003	1' - 2'		30.8			17.8			7890			3610	
NP-05-C	8/1/2003	2' - 3'		22.5			8.77			2730			1790	
NP-06-A	8/1/2003	0' - 1'		50.9			26			9160			3550	
NP-06-B	8/1/2003	1' - 2'		6.18			8.41			1650			1870	
NP-06-C	8/1/2003	2' - 3'	<	5			1.93			785			1290	
NP-07-A	8/1/2003	0' - 1'		47.6			25.8			11600			3470	
NP-07-B	8/1/2003	1' - 2'	<	5			5.5			127			1450	
NP-07-C	8/1/2003	2' - 3'	<	5			8.56			263			982	
NP-08-A	8/1/2003	0' - 1'		27.6			10			5100			2540	
NP-08-B	8/1/2003	1' - 2'		40.8			23.1			7110			3420	
NP-08-C	8/1/2003	2' - 3'		19.6			26.4			4070			3440	
NP-09-A	8/1/2003	0' - 1'		38.9			11.6			3950			3420	
NP-09-B	8/1/2003	1' - 2'		30.3			18			7370			2870	
NP-09-C	8/1/2003	2' - 3'		41.6			23.9			13800			4380	
NP-010-A	8/1/2003	0' - 1'		30.4			12.4			4800	(3)		2580	
NP-010-B	8/1/2003	1' - 2'		42.5			23			13300	(3)		3060	
NP-010-C	8/1/2003	2' - 3'		28			17.5			5520	(3)		2350	

Note relative to potential non-railroad sources or Laboratory Qualifier:

1 Near the Silver Moon Mine
2 Near the Tamarack No. 7 Mine
3 Located downstream of Standard-Mammoth Campbell Adit and waste rock pile
< Reporting limit used as concentration
J Estimate based on either spike returns, laboratory control samples and/or duplicates being out of a certain range of control.

TABLE 2-12
ANALYTICAL RESULTS FOR METALS SAMPLING
FORMER WIRR LINE CANYON CREEK

		Analyte	Arsenic	Cadmium	Lead	Zinc
		Reporting Limit	5.00	0.173	3.32	0.238
		Units	mg/kg	mg/kg	mg/kg	mg/kg
Sample ID	Sample Date	Depth Interval				
UP-01-A	8/4/2003	0' - 1'	47.2	44	9740	3790
UP-01-B	8/4/2003	1' - 2'	37.7	46.4	10000	3540
UP-01-C	8/4/2003	2' - 3'	13.1	32.2	2910	3090
UP-02-A	8/4/2003	0' - 1'	58.5	21.5	21600 (1)	4040
UP-02-B	8/4/2003	1' - 2'	18.3	19.2	8190 (1)	4390
UP-02-C	8/4/2003	2' - 3'	11.1	11.7	3320 (1)	3220
UP-03-A	8/4/2003	0' - 1'	16.2	6.17	949	1230
UP-03-B	8/4/2003	1' - 2'	14	14.9	3130	1710
UP-03-C	8/4/2003	2' - 3'	27.9	38.1	486	4980
UP-06-A	8/4/2003	0' - 1'	52	40.7	11700	4130
UP-06-B	8/4/2003	1' - 2'	7.96	10.7	773	1600
UP-06-C	8/4/2003	2' - 3'	8.62	5.11	365	1650
UP-07-A	8/1/2003	0' - 1'	59.4	33.7	17300 (2)	2960
UP-07-B	8/1/2003	1' - 2'	222	29.1	52500 (2)	3470
UP-07-C	8/1/2003	2' - 3'	90.2	12.9	25200 (2)	1380
UP-08-A	8/1/2003	0' - 1'	66.8	44.4	17500	6310
UP-08-B	8/1/2003	1' - 2'	56.4	43.8	27600	8560
UP-08-C	8/1/2003	2' - 3'	9.41	32.7	1360	2510
UP-09-A	7/31/2003	0' - 1'	27.3	20.6	4750	3820
UP-09-B	7/31/2003	1' - 2'	6.66	2.27	758	614
UP-09-C	7/31/2003	2' - 3'	5.06	3.41	1040	609
UP-010-A	7/31/2003	0' - 1'	33.4	16.4	9900 (3)	3860
UP-010-B	7/31/2003	1' - 2'	129	39.8	37100 (3)	7180
UP-010-C	7/31/2003	2' - 3'	158	25.7	42700 (3)	4460
UP-011-A	7/31/2003	0' - 1'	140	73.8	21700	9310
UP-011-B	7/31/2003	1' - 2'	24.6	44.3	5050	8470
UP-011-C	7/31/2003	2' - 3'	50	55.7	12300	9540
UP-012-A	7/31/2003	0' - 1'	37	17.2	3730	3780
UP-012-B	7/31/2003	1' - 2'	41.9	35.9	8770	5450
UP-012-C	7/31/2003	2' - 3'	16.6	12.4	3270	2750
UP-017-A	7/31/2003	0' - 1'	88.6	39.5	32800	7050
UP-017-B	7/31/2003	1' - 2'	71.8	21.6	28400	3200
UP-017-C	7/31/2003	2' - 3'	< 5	66.5	99.4	3990
UP-018-A	7/31/2003	0' - 1'	155	72.6	31300	7720
UP-018-B	7/31/2003	1' - 2'	90.1	74.6	45400	8790
UP-018-C	7/31/2003	2' - 3'	9.79	46.8	4880	3480
UP-019-A	7/31/2003	0' - 1'	67.8	94.2	18300	9130
UP-019-B	7/24/2003	1' - 2'	20.8	29.8	2660	3960
UP-019-C	7/31/2003	2' - 3'	22.5	34.3	3480	3870

Note relative to potential non-railroad sources or Laboratory Qualifier:

1 Near Standard Mammoth Millsite
2 Adjacent to highway near Tamarack No. 7 Mine
3 Along Canyon Creek impacted riparian zone; downstream of Standard-Mammoth Capbell adit and waste rock
< Reporting limit used as concentration
J Estimate based on either spike returns, laboratory control samples and/or duplicates being out of a certain range of control.

TABLE 2-13
FORMER NPRy LINE NINEMILE
METALS SAMPLES SUMMARY STATISTICS

		ANALYTE			
		Arsenic	Cadmium	Lead	Zinc
Basin RI Screening Levels		22 mg/kg	9.8 mg/kg	171 mg/kg	280 mg/kg
Interval	Data				
0 - 1 foot	No. of NDs	0	0	0	0
	No. of Samples	19	19	19	19
	Minimum (mg/kg)	5.17	1.92	248	324
	Maximum (mg/kg)	273	34.7	52500	6470
	Mean (mg/kg)	50.8	12.8	7103	2593
1 - 2 foot	No. of NDs	6	2	0	0
	No. of Samples	19	19	19	19
	Minimum (mg/kg)	2.50	0.0865	57	51.5
	Maximum (mg/kg)	101	16.0	10700	3050
	Mean (mg/kg)	19.0	4.85	1561	828
2 - 3 foot	No. of NDs	7	2	0	0
	No. of Samples	19	19	19	19
	Minimum (mg/kg)	2.5	0.0865	43.3	60.2
	Maximum (mg/kg)	35.5	56.0	8860	5040
	Mean (mg/kg)	13.0	7.11	979	935
Data from Basin RI - Upper Basin - UpperSFCDRSeg01- Includes Spur Lines					
Surface Soil	Frequency	17	20	264	237
	Minimum (mg/kg)	6	0.5	26	23
	Maximum (mg/kg)	3010	225	74700	18000
	Mean (mg/kg)	290	33	2920	1150
Subsurface Soil	Frequency	15	15	45	15
	Minimum (mg/kg)	118	3.2	279	63
	Maximum (mg/kg)	2940	543	52200	83900
	Mean (mg/kg)	712	108	13700	16700

Note:
Excludes 2005 samples - not the same depth intervals
The reporting limit was used for non-detect (ND) samples in calculations above.

TABLE 2-14
FORMER NPRy LINE CANYON CREEK
METALS SAMPLES SUMMARY STATISTICS

		ANALYTE			
		Arsenic	**Cadmium**	**Lead**	**Zinc**
Basin RI Screening Levels		**22 mg/kg**	**9.8 mg/kg**	**171 mg/kg**	**280 mg/kg**
Interval	**Data**				
0 - 1 foot	No. of NDs	0	0	0	0
	No. of Samples	9	9	9	9
	Minimum (mg/kg)	19.00	7.97	3950	2540
	Maximum (mg/kg)	101	39.7	24500	4430
	Mean (mg/kg)	39.9	20.4	9003	3314
1 - 2 foot	No. of NDs	1	0	0	0
	No. of Samples	9	9	9	9
	Minimum (mg/kg)	2.50	5.5	127	1450
	Maximum (mg/kg)	56.4	67.6	13800	4020
	Mean (mg/kg)	26.7	24.89	6674	3017
2 - 3 foot	No. of NDs	2	0	0	0
	No. of Samples	9	9	9	9
	Minimum (mg/kg)	2.5	1.93	263	982
	Maximum (mg/kg)	41.6	64.8	13800	4380
	Mean (mg/kg)	22.4	24.02	5270	2666
Data from Basin RI - Upper Basin - UpperSFCDRSeg01- Includes Spur Lines					
Surface Soil	Frequency	17	20	264	237
	Minimum (mg/kg)	6	0.5	26	23
	Maximum (mg/kg)	3010	225	74700	18000
	Mean (mg/kg)	290	33	2920	1150
Subsurface Soil	Frequency	15	15	45	15
	Minimum (mg/kg)	118	3.2	279	63
	Maximum (mg/kg)	2940	543	52200	83900
	Mean (mg/kg)	712	108	13700	16700

Note:
Excludes 2005 samples - not the same depth intervals
The reporting limit was used for non-detect (ND) samples in calculations above.

TABLE 2-15
FORMER WIRR LINE CANYON CREEK
METALS SAMPLES SUMMARY STATISTICS

		ANALYTE			
		Arsenic	Cadmium	Lead	Zinc
Basin RI Screening Levels		22 mg/kg	9.8 mg/kg	171 mg/kg	280 mg/kg
Interval	Data				
0 - 1 foot	No. of NDs	0	0	0	0
	No. of Samples	13	13	13	13
	Minimum (mg/kg)	16.2	6.17	949	1230
	Maximum (mg/kg)	155	94.2	32800	9310
	Mean (mg/kg)	65.3	40.4	15482	5164
1 - 2 foot	No. of NDs	0	0	0	0
	No. of Samples	13	13	13	13
	Minimum (mg/kg)	6.66	2.27	758	614
	Maximum (mg/kg)	222	74.6	52500	8790
	Mean (mg/kg)	57.0	31.7	17718	4687
2 - 3 foot	No. of NDs	1	0	0	0
	No. of Samples	13	13	13	13
	Minimum (mg/kg)	2.50	3.41	99.4	609
	Maximum (mg/kg)	158	66.5	42700	9540
	Mean (mg/kg)	32.7	29.0	7801	3502
Data from Basin RI - Upper Basin - UpperSFCDRSeg01- Includes Spur Lines					
Surface Soil	Frequency	17	20	264	237
	Minimum (mg/kg)	6	0.5	26	23
	Maximum (mg/kg)	3010	225	74700	18000
	Mean (mg/kg)	290	33	2920	1150
Subsurface Soil	Frequency	15	15	45	15
	Minimum (mg/kg)	118	3.2	279	63
	Maximum (mg/kg)	2940	543	52200	83900
	Mean (mg/kg)	712	108	13700	16700

Note:
Excludes 2005 samples - not the same depth intervals
The reporting limit was used for non-detect (ND) samples in calculations above.

TABLE 2-16
ANALYTICAL RESULTS OF
WALLACE YARD ORGANIC SAMPLES

	TPH		VOCs
Sample ID	Diesel (mg/kg)	Lube Oil (mg/kg)	1,2,4-Trimethyl-benzene (mg/kg)
WY-69-A	<2	86.6	<0.0285
WY-69-B	<4	318	NA
WY-90-A	26.5	131	<0.0285
WY-90-B	<8	275	NA
WY-91-A	13.1	247	<0.0285
WY-91-B	<4	227	NA
WY-98-A	11.9	55.9	0.119
WY-98-B	<8	69.8	<0.0285
WY-100-A	<2	81.3	0.102
WY-100-B	21.6	128	<0.0285
WY-105-A	27.4	287	0.112
WY-105-B	<20	435	<0.0285
WY-113-A	<200	3920	<0.0285
WY-113-B	<20	257	NA
WY-115-A	<2	142	<0.0285
WY-115-B	<2	31.4	NA
WY-123-A	<12	362	<0.0285
WY-123-B	<2	34.2	NA
WY-129-A	101	1780	<0.0285
WY-129-B	241	1500	NA
WY-130-A	<2	148	<0.0285
WY-130-B	<2	46.1	NA
WY-133-A	<12	1100	<0.0285
WY-133-B	<4	237	NA

Notes:
NA = Not analyzed (If a particular "A" sample reported below its respective detection limit, the corresponding "B" sample was not analyzed).
All other VOCs (including BTEX), SVOCs, and PAHs reported below their respective detection limits.
EPA Region 9 Preliminary Remediation Goal for 1,2,4-trimethylbenzene is 52 mg/kg (residential) and 170 mg/kg (industrial)
BTEX = benzene, ethylbenzene, toluene, xylene
VOCs = volatile organic compounds
SVOCs = semi-volatile organic compounds
PAHs = polynuclear aromatic hydrocarbons
"A" sample = 0- to 6-inch depth
"B" sample = 6- to 24-inch depth

TABLE 2-17
SUMMARY OF ANALYTICAL RESULTS IN WALLACE YARD GROUNDWATER

Analyte	Reporting Limits	Units	Screening Levels (Basin RI)	MW-1	MW-2	MW-3	MW-4	MW-5	MW-6
WINTER 2003 SAMPLING EVENT (11/17/2003)									
Total Petroleum Hydrocarbons NWTPH-Dx									
Diesel Range Hydrocarbons	0.250	mg/L	NA	NS	ND	ND	ND	ND	ND
Lube Oil	0.500	mg/L	NA	NS	ND	ND	ND	ND	ND
Dissolved Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)									
Arsenic	3.64	ug/L	150	NS	ND	ND	ND	ND	ND
Lead	1.82	ug/L	1.09	NS	ND	ND	ND	ND	ND
Cadmium	3.45	ug/L	0.38	NS	25.3	84.7	78.1	16.5	ND
Zinc	4.80	ug/L	42	NS	4150	22600	17800	3460	466
PCBs (EPA Method 8081)									
All forms (7 analytes total)	0.100	ug/L	NA	NS	ND	ND	ND	ND	ND
VOCs (EPA Method 8260B)									
All forms, except chloroform (65 analytes total)	1.00 to 25.0	ug/L	NA	NS	ND	ND	ND	ND	ND
Chloroform	1.00	ug/L	NA	NS	ND	6.13	ND	ND	ND
SVOCs (EPA Method 8270C)									
All forms (67 analytes total)	10.0 to 50.0	ug/L		NS	ND	ND	ND	ND	ND
FALL 2004 SAMPLING EVENT (10/28/2004)									
Dissolved Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)									
Arsenic	1.00	ug/L	150	ND	ND	ND	ND	ND	ND
Lead	1.00	ug/L	1.09	ND	8.00	ND	ND	ND	ND
Cadmium	4	ug/L	0.38	ND	28.5	101.0	85.4	18.7	ND
Zinc	10.00	ug/L	42	668	4320	25300	18000	3800	815

Notes:
ND = Not detected
NS = Not sampled
NA = Not applicable
ug/L = micrograms per liter

TABLE 2-18
SUMMARY OF ANALYTICAL RESULTS IN SURFACE WATER NEAR THE WALLACE YARD

Analyte	Reporting Limits	Units	Screening Levels (Basin RI)	SOUTH FORK COEUR D'ALENE						TRIBUTARIES		
				Predicted Upstream (SF12) Concentration (Basin RI)	SW-1	SW-2	SW-3	SW-4	Predicted Downstream (SF239) Concentration (Basin RI)	PC-1 Placer Creek	DG-1 Daly Gulch	UC-1 Unknown Canyon
Winter 2003 Sampling Event (11/17/2003)												
Dissolved Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)												
Arsenic	3.64	ug/L	150	NA	ND	ND	ND	ND	NA			
Lead	1.82	18	1.09	15.5	ND	ND	ND	ND	11			
Cadmium	3.45	ug/L	0.38	8.78	8.80	7.77	6.66	7.70	7.23			
Zinc	4.80	ug/L	42	1430	1520	1420	1210	1430	1080			
Total Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)												
Arsenic	4	ug/L	50	NA	ND	ND	ND	ND	NA			
Lead	2	ug/L	15	36.5	3	3	ND	4	42.8			
Cadmium	3.45	ug/L	2	9.16	11.00	7.77	6.60	7.70	7.06			
Zinc	4.80	ug/L	30	1440	1750	1440	1210	1460	1070			
General Water Quality (EPA Method 160.1/160.2)												
TDS	10.0	mg/L	NA	NA	114	106	90	99	NA			
TSS	5.00	mg/L	NA	NA	ND	ND	ND	ND	NA			
Fall 2004 Sampling Event (10/28/2004)												
Dissolved Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)												
Arsenic	1.0	ug/L	150	NA	ND	ND	ND	ND	NA	ND	3.8	ND
Lead	1.0	ug/L	1.09	15.5	ND	ND	ND	ND	11	ND	ND	16
Cadmium	4.0	ug/L	0.38	8.78	7.53	7.60	7.07	7.54	7.23	ND	ND	4.66
Zinc	10.0	ug/L	42	1430	1420	1430	1350	1470	1080	ND	ND	573
Total Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)												
Arsenic	1.00	ug/L	50	NA	ND	ND	ND	ND	NA	ND	2.16	1.6
Lead	1.00	ug/L	15	36.5	ND	2	3	2.0	42.8	ND	3	422
Cadmium	0.04	ug/L	2	9.16	8.06	7.88	7.70	7.85	7.06	ND	0.16	6.13
Zinc	10	ug/L	30	1440	1450	1400	1380	1440	1070	ND	ND	1210
General Water Quality (EPA Method 160.1/160.2)												
TDS	10.0	mg/L	NA	NA	87	83	80	85		63	84	179
TSS	5.00	mg/L	NA	NA	3.5	4.1	3.9	3.8		3.4	3.4	20.3

TABLE 2-18
SUMMARY OF ANALYTICAL RESULTS IN SURFACE WATER NEAR THE WALLACE YARD

				SOUTH FORK COEUR D'ALENE						TRIBUTARIES		
Analyte	**Reporting Limits**	**Units**	**Screening Levels (Basin RI)**	**Predicted Upstream (SF12) Concentration (Basin RI)**	**SW-1**	**SW-2**	**SW-3**	**SW-4**	**Predicted Downstream (SF239) Concentration (Basin RI)**	**PC-1 Placer Creek**	**DG-1 Daly Gulch**	**UC-1 Unknown Canyon**
March 2005 Sampling Event (03/29/2005)												
Dissolved Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)												
Arsenic	1.0	ug/L	150	NA	ND	ND	ND	ND	NA	ND	ND	ND
Lead	1.0	ug/L	1.09	15.5	ND	ND	ND	ND	11	ND	ND	1.6
Cadmium	4.0	ug/L	0.38	8.78	5.92	4	6.86	4.61	7.23	ND	ND	ND
Zinc	10.0	ug/L	42	1430	1120	754	1290	877	1080	5	5	309
Total Metals (As, Pb - EPA Method 6010/7000; Cd, Zn - EPA Method 200)												
Arsenic	1.00	ug/L	50	NA	ND	ND	ND	ND	NA	ND	ND	ND
Lead	1.00	ug/L	15	36.5	ND	3	2	2.0	42.8	ND	ND	156
Cadmium	0.04	ug/L	2	9.16	6.52	4.24	7.43	4.88	7.06	ND	ND	2.71
Zinc	10	ug/L	30	1440	1120	768	1350	910	1070	ND	ND	485

Notes:
ND = Not detected
NA = Not available or Not Applicable

TABLE 2-19
FLOW MEASUREMENTS

Reach	Location	Date:		11/17/2003		10/28/2004			3/29/2005		
		Site ID									
		In Stream	Inflow	In Stream	Net Loss (-) or Gain (+)	In Stream	Inflow	Net Loss (-) or Gain (+)	In Stream	Inflow	Net Loss (-) or Gain (+)
				cfs	cfs	cfs	cfs	cfs	cfs	cfs	cfs
SW1 - SW2	1	SW-1	-	110		61	-		272		
	2	-	PC-1			-	15			40	
	3	SW-2	-	109		64	-		Note 1		
					(0)			(13)			-
SW2 - SW3	4	-	DG-1			-	1			3	
	5	SW-3	-	113		75	-		283		
					4			11			(32)
SW3 - SW4	6	-	UC-1			-	0			0	
	7	SW-4		123		79	-		301		
					10			4			18
Total for SW-1 to SW-4:					14			2			(14)

Note

(1) The substrate at SW-2 was unstable during the higher flows resulting in a questionable flow measurement; therefore, the measured flow (283 cfs) at SW-2 was not used.

TABLE 2-20
DISSOLVED CADMIUM LOADING

Reach	Location	Date:		11/17/2003		10/28/2004			3/29/2005		
		Flow at SW-1 (cfs):		110		61			272		
		Site ID		Loading (lbs/day)		Loading (lbs/day)			Loading (lbs/day)		
		In Stream	Inflow	In Stream	Net Loss (-) or Gain (+)	In Stream	To Stream	Net Loss (-) or Gain (+)	In Stream	To Stream	Net Loss (-) or Gain (+)
SW1 - SW2	1.00	SW-1	-	5.19		2.49	-		8.70	-	
	2.00	-	PC-1	-		-	0		-	0	
	3.00	SW-2	-	4.53		2.61	-		Note 2	-	
					(0.66)			0.12			-
SW2 - SW3	4.00	-	DG-1	-		-	0		-	0	
	6.00	SW-3	-	4.03		2.86	-		10.46	-	
					(0.50)			0.25			1.76
SW3 - SW4	7.00	-	UC-1	-		-	0		-	0	
	8.00	SW-4	-	5.12		3.20	-		7.47		
					1.09			0.34			(2.99)
Total for SW-1 to SW-4:					(0.07)			0.71			(1.23)

Notes:

(1) Analytical samples for 3/29/05 were taken a day later than flow measurements; therefore, loading is approximate

(2) The substrate at SW-2 was unstable during the higher flows resulting in a questionable flow measurement; therefore, the measured flow (283 cfs) at SW-2 was not used.

TABLE 2-21
DISSOLVED ZINC LOADING

Reach	Location	Date:		11/17/2003		10/28/2004			3/29/2005		
		Flow at SW-1 (cfs):		110		61			272		
		Site ID		Loading (lbs/day)		Loading (lbs/day)			Loading (lbs/day)		
		In Stream	Inflow	In Stream	Net Loss (-) or Gain (+)	In Stream	To Stream	Net Loss (-) or Gain (+)	In Stream	To Stream	Net Loss (-) or Gain (+)
SW1 - SW2	1	SW-1	-	897		470	-		1641	-	
	2	-	PC-1	-		-	0		-	1	
	3	SW-2	-	836		490	-		Note 2	-	
					(61)			20			-
SW2 - SW3	4	-	DG-1	-		-	0		-	0	
	6	SW-3	-	739		546	-		1966	-	
					(97)			56			324
SW3 - SW4	7	-	UC-1	-		-	0		-	0	
	8	SW-4	-	951		623	-		1422	-	
					212			77			(544)
Total for SW-1 to SW-4:					54			153			(220)

Notes:

(1) Analytical samples for 3/29/05 were taken a day later than flow measurements; therefore, loading is approximate

(2) The substrate at SW-2 was unstable during the higher flows resulting in a questionable flow measurement; therefore, the measured flow (283 cfs) at SW-2 was not used.

TABLE 2-22
SUMMARY OF NET GAINS AND LOSSES FOR FLOW AND METALS LOADING

Date:	11/17/2003			10/28/2004			3/28/2005		
Flow at SW-1 (cfs):	109.54			61.44			272.00		
	Net Loss (-) or Gain (+)			Net Loss (-) or Gain (+)			Net Loss (-) or Gain (+)		
	Flow	Dis. Cd Load	Dis. Zn Load	Flow	Dis. Cd Load	Dis. Zn Load	Flow	Dis. Cd Load	Dis. Zn Load
REACH	cfs	lbs/day	lbs/day	cfs	lbs/day	lbs/day	cfs	lbs/day	lbs/day
SW1 - SW2	(0.2)	(0.66)	(61)	(12.8)	0.12	20	–	–	–
SW2 - SW3	4.0	(0.50)	(97)	11.0	0.25	56	(32.2)	1.76	324
SW3 - SW4	10.1	1.09	212	3.5	0.34	77	18.0	(2.99)	(544)
Total Delta for SW-1 to SW-4:	**13.9**	**(0.07)**	**54**	**1.7**	**0.71**	**153**	**(14.2)**	**(1.23)**	**(220)**
	SF228			SF239			Net Loss (-) or Gain (+)		
	Flow	Dis. Cd Load	Dis. Zn Load	Flow	Dis. Cd Load	Dis. Zn Load	Flow	Dis. Cd Load	Dis. Zn Load
	cfs	lbs/day	lbs/day	cfs	lbs/day	lbs/day	cfs	lbs/day	lbs/day
Expected Total Delta from SF228 to SF239 from Basin RI:	**115**	**0.50**	**89**	**230**	**7.76**	**1110**	**115**	**7.26**	**1021**
(SW-4 – SW -1) / (SF239 – SF228) Percent:	**12%**	**(1%)**	**5%**	**1%**	**10%**	**15%**	**(12%)**	**(17%)**	**(22%)**

Notes:

(1) Analytical samples for 3/29/05 were taken a day later than flow measurements; therefore, loading is approximate.

(2) The substrate at SW-2 was unstable during the higher flows resulting in a questionable flow measurement; therefore, the measured flow (283 cfs) at SW-2 was not used.

TABLE 2-23
COMPARISON OF GROUNDWATER AND SURFACE WATER LOADING ESTIMATES
WALLACE YARD

November 2003 (11/17/2003)

Dissolved Zinc Loading								
Range of GW Flux & Loading			**SFCDR Segments**					
			SW-1 to SW-3		**SW-2 to SW-3**		**SW-2 to SW-4**	
Hyd. Cond. K (cm/s)	**GW Flux (cfs)**	**Potential Zn Loading in GW (lbs/day)**	**Incremental Zn Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Zn Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Zn Load (lbs/day)**	**% Potentially Attributable to GW**
10^{-1}	0.18	11.5	(158)	**NA**	(97)	**NA**	115	10.0%
10^{-2}	0.018	1.15	(158)	**NA**	(97)	**NA**	115	1.0%

Dissolved Cadmium Loading								
Range of GW Flux & Loading			**SFCDR Segments**					
			SW-1 to SW-3		**SW-2 to SW-3**		**SW-2 to SW-4**	
Hyd. Cond. K (cm/s)	**GW Flux (cfs)**	**Potential Cd Loading in GW (lbs/day)**	**Incremental Cd Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Cd Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Cd Load (lbs/day)**	**% Potentially Attributable to GW**
10^{-1}	0.18	0.05	(1.16)	**NA**	(0.5)	**NA**	0.59	8.5%
10^{-2}	0.018	0.005	(1.16)	**NA**	(0.5)	**NA**	0.59	0.8%

NA: Because the observed cadmium and zinc loading in surface water decreases through this reach a comparison with the potential groundwater loading is not applicable.

TABLE 2-23
COMPARISON OF GROUNDWATER AND SURFACE WATER LOADING ESTIMATES
WALLACE YARD

October 2004 (10/28/2004)

Dissolved Zinc Loading								
Range of GW Flux & Loading			**SFCDR Segments**					
			SW-1 to SW-3		**SW-2 to SW-3**		**SW-2 to SW-4**	
Hyd. Cond. K (cm/s)	**GW Flux (cfs)**	**Potential Zn Loading in GW (lbs/day)**	**Incremental Zn Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Zn Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Zn Load (lbs/day)**	**% Potentially Attributable to GW**
10^{-1}	0.18	11.5	76	15.1%	56	20.5%	133	8.6%
10^{-2}	0.018	1.15	76	1.5%	56	2.1%	133	0.9%

Dissolved Cadmium Loading								
Range of GW Flux & Loading			**SFCDR Segments**					
			SW-1 to SW-3		**SW-2 to SW-3**		**SW-2 to SW-4**	
Hyd. Cond. K (cm/s)	**GW Flux (cfs)**	**Potential Cd Loading in GW (lbs/day)**	**Incremental Cd Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Cd Load (lbs/day)**	**% Potentially Attributable to GW**	**Incremental Cd Load (lbs/day)**	**% Potentially Attributable to GW**
10^{-1}	0.18	0.05	0.37	13.5%	0.25	20.0%	0.59	8.5%
10^{-2}	0.018	0.005	0.37	1.4%	0.25	2.0%	0.59	0.8%

TABLE 3-1
RISK CHARACTERIZATION SUMMARY

Areas & Use Scenarios			Lead Risk			Non-Lead Risk				
						Exposure Point Concentration [2]			RME Theoretical Excess Lifetime Cancer Risk	RME Hazard Index
Area	**Applicable Sub-Area (Fig. 3-1)**	**Potential Use Scenario**	**Pb [2] mg/kg**	**Basin ROD Action Level**	**Sample Results > Action level**	**As mg/kg**	**Cd mg/kg**	**Zn mg/kg**		
Wallace Yard	VC: Visitor Center	Common Use	465	700	**Yes (discrete areas)**	17	2	400	2.4×10^{-6}	0.07
	VC-P: Visitor Center Parking	Common Use	2,346	700	**Yes**	37	10	1,629	5.3×10^{-6}	0.17
	I-90 Corridor	Common Use	365	700	**Yes (discrete areas)**	22	2	320	3.2×10^{-6}	0.09
	WY-1	Common Use	5,828	700	**Yes**	56	16	2,176	8.0×10^{-6}	0.25
	WY-2	Common Use	7,378	700	**Yes**	215	20	3,333	3.1×10^{-5}	0.86
	WY-3	Common Use	2,228	700	**Yes**	22	7	1,263	3.2×10^{-6}	0.1
	WY-4	Common Use	464	700	**Yes (discrete areas)**	11	2	382	1.6×10^{-6}	0.05
	Current Residential	Residential	NS [3]	700	**Yes If > 700**	NC [1]	NC [1]	NC [1]	NC [1]	NC [1]
	HM: Hercules Mill	Common Use	12,701	700	**Yes**	180	16	2,868	6.5×10^{-6}	0.04
Spur Lines	Former NPRy Ninemile Creek	Common Use	7,103	700	**Yes [4]**	51	13	2,593	7.3×10^{-6}	0.23
	Former NPRy Canyon Creek	Common Use	9,003	700	**Yes [4]**	40	20	3,314	5.7×10^{-6}	0.21
	Former WIRR Canyon Creek	Common Use	15,482	700	**Yes [4]**	65	40	5,164	9.3×10^{-6}	0.35
	Current Residential	Residential	NS [3]	700	**Yes If > 700**	NC [1]	NC [1]	NC [1]	NC [1]	NC [1]

Notes
(1) NC indicates non-lead risk not calculated. Risks from other metals assumed to be addressed by lead remediation.
(2) Average concentration of samples from 0- to 6-inch depth interval.
(3) Current residential properties not specifically sampled.
(4) Remediation of specific segments of former spur lines based on location, use and lead concentration.

TABLE 3-2
RAILBED EMBANKMENT EROSION ESTIMATE CALCULATIONS
NINEMILE

MM Range		Embankment (Y or N)	Length (miles)	Embankment Dimensions & Volume: Height "H" (ft)	Width "W" (ft)	Volume (cy)	Recession Rate Factors (See Legend Below): T	S	V	G	B1	B2	Recession Rate (feet/yr.)[1]	Volume Displaced (cy/yr)[2]	Mass Displaced (T/yr)[3]
1.10	1.30	Y	0.20	8	25	12,830	1.0	0.3	0.3	1.0	0.6	0.3	0.016	11.3	16.8
1.50	1.70	Y	0.20	7	21	9,580	1.0	0.3	0.6	1.0	0.6	0.3	0.032	19.8	29.5
1.90	2.10	Y	0.20	8	25	12,830	1.0	0.3	0.6	1.0	0.6	0.3	0.032	22.7	33.7
2.10	2.40	Y	0.30	8	20	16,900	1.0	0.3	0.6	1.0	0.6	0.3	0.032	34.0	50.5
2.40	2.60	Y	0.20	7	14	7,670	1.0	0.3	0.3	1.0	0.6	0.3	0.016	9.9	14.7
			1.10			**59,810**								**97.8**	**145.2**

Notes:

1) Recession Rate in feet/year is calculated as the product of all Recession Rate Factors

2) Displaced Volume calculation assumes the entire height of the embankment is submerged, or exposed to erosion. Assuming 2(H):1(V) side slope.

3) Displaced Mass calculation assumes a unit weight of 110 pounds per cubic foot

Recession Rate Factor Legend

Soil Texture (T)	
0.3	clay, silty clay, silty clay loam
0.6	sandy clay, loam, silt loam
1.0	loamy sands, gravel

Stream Alignment (S)	
0.3	straight to slightly curved
0.6	moderately curved
1.0	sharply curved, near 90degrees

Vegetation (V)	
0.3	trees
0.6	weeds, grass, shrubs
1.0	crop, pasture, lawn, road

Stream Gradient (G)	
0.3	slight (few to no riffles)
0.6	moderate (balance of pools & riffles)
1.0	high (primarily riffles)

Bank Slope (B1)	
0.3	slight (3:1 or less)
0.6	moderate (> 3:1 but < 1:1.1)
1.0	steep (1:1 to vertical)

Slope of Inside Depositional Bar (B2)	
0.3	steep (> 3:1)
0.6	moderate (< 3:1 but > 10:1)
1.0	slight (< 10:1)

TABLE 3-3
RAILBED EMBANKMENT EROSION ESTIMATE CALCULATIONS
CANYON CREEK (BURKE CANYON)

MM Range		Embankment (Y or N)	Length (miles)	Embankment Dimensions & Volume: Height "H" (ft)	Width "W" (ft)	Volume (cy)	Recession Rate Factors (See Legend Below): T	S	V	G	B1	B2	Recession Rate (feet/yr.)[1]	Volume Displaced (cy/yr)[2]	Mass Displaced (T/yr)[3]
4.20	4.60	Y	0.40	10	20	31,290	(See Note 4)						0.000	0.0	0.0
5.80	6.10	Y	0.30	7	18	13,140	1.0	0.3	0.6	1.0	0.6	0.3	0.032	29.8	44.2
			0.70			**44,430**								**29.8**	**44.2**

Notes:

1) Recession Rate in feet/year is calculated as the product of all Recession Rate Factors
2) Displaced Volume calculation assumes the entire height of the embankment is submerged, or exposed to erosion. Assuming 2(H):1(V) side slope.
3) Displaced Mass calculation assumes a unit weight of 110 pounds per cubic foot
4) Due to the presence of large diameter riprap along this reach, erosion was not estimated (See Photo BC-13)

Recession Rate Factor Legend

Soil Texture (T)	
0.3	clay, silty clay, silty clay loam
0.6	sandy clay, loam, silt loam
1.0	loamy sands, gravel

Stream Alignment (S)	
0.3	straight to slightly curved
0.6	moderately curved
1.0	sharply curved, near 90degrees

Vegetation (V)	
0.3	trees
0.6	weeds, grass, shrubs
1.0	crop, pasture, lawn, road

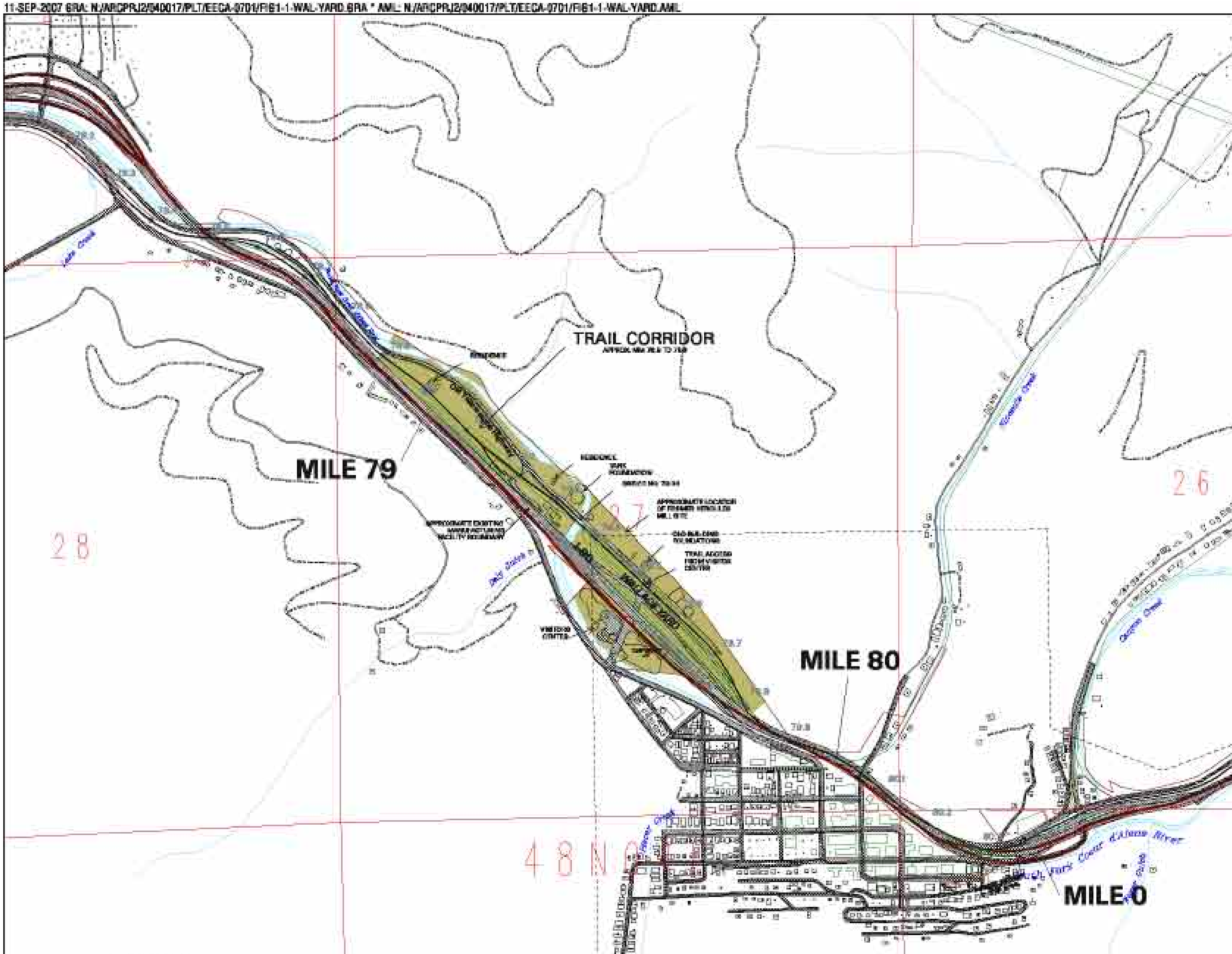
Stream Gradient (G)	
0.3	slight (few to no riffles)
0.6	moderate (balance of pools & riffles)
1.0	high (primarily riffles)

Bank Slope (B1)	
0.3	slight (3:1 or less)
0.6	moderate (> 3:1 but < 1:1.1)
1.0	steep (1:1 to vertical)

Slope of Inside Depositional Bar (B2)	
0.3	steep (> 3:1)
0.6	moderate (< 3:1 but > 10:1)
1.0	slight (< 10:1)

FIGURES

11-SEP-2007 BRA: N:/ARCPRJ2/040017/PLT/EECA-0701/FIG1-1-WAL-YARD.BRA * AML: N:/ARCPRJ2/040017/PLT/EECA-0701/FIG1-1-WAL-YARD.AML



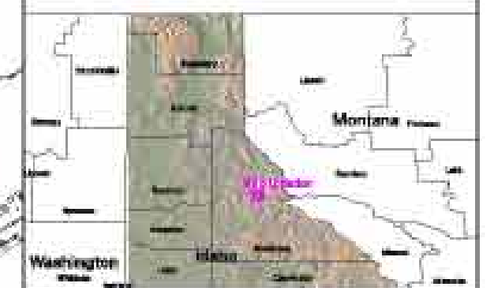
EXPLANATION

Hydrography
- River or Stream
- Open Water

Transportation
- Primary Road
- Secondary Road
- Improved Road
- Unimproved Road
- Trail

Railroad Right of Way
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:
1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.6 outside of the 26 foot wide Trail Corridor.



N

1:10800
1 INCH = 900 FEET
SCALE IN FEET

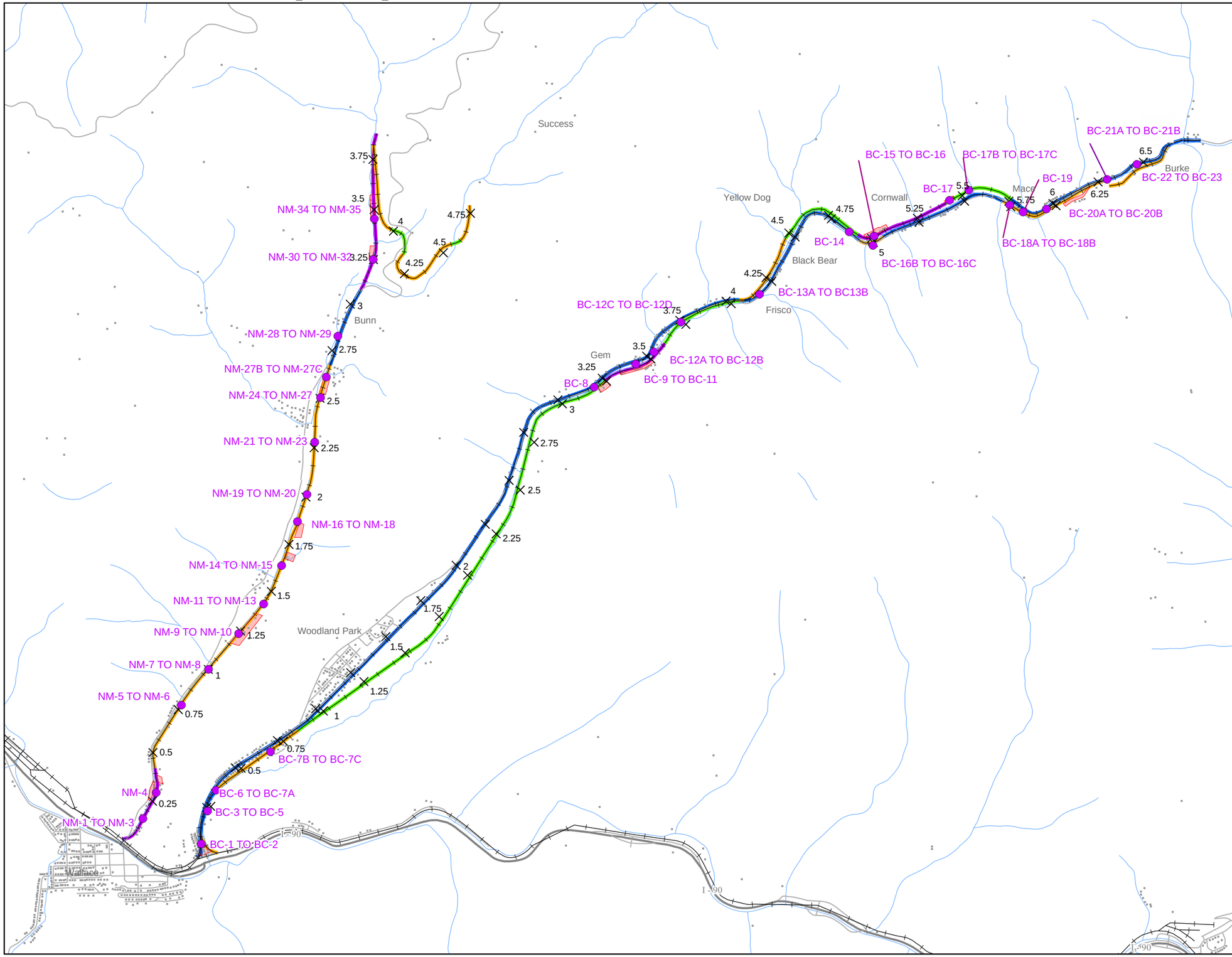
900 0 900

FIGURE 1-1

WALLACE YARD EE/CA
WALLACE YARD MAP

PROJECT: 040017-0024	DATE: SEPTEMBER 11, 2007	
REV: 0	BY: CRL	CHECKED: MWC

12-SEP-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG1-2_SPUR-PHOTOS_BF.MXD



EXPLANATION

- General Location of Photos
- Milepost
- Railroad

Transportation

- Interstate 90
- Road or Street

Hydrography

- River or Stream

Railbed Status

- Railbed Visible
- Railbed Removed or not visible
- Railbed covered by road (Gravel)
- Railbed covered by road (Paved)
- Adjacent Residential Property

N

1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

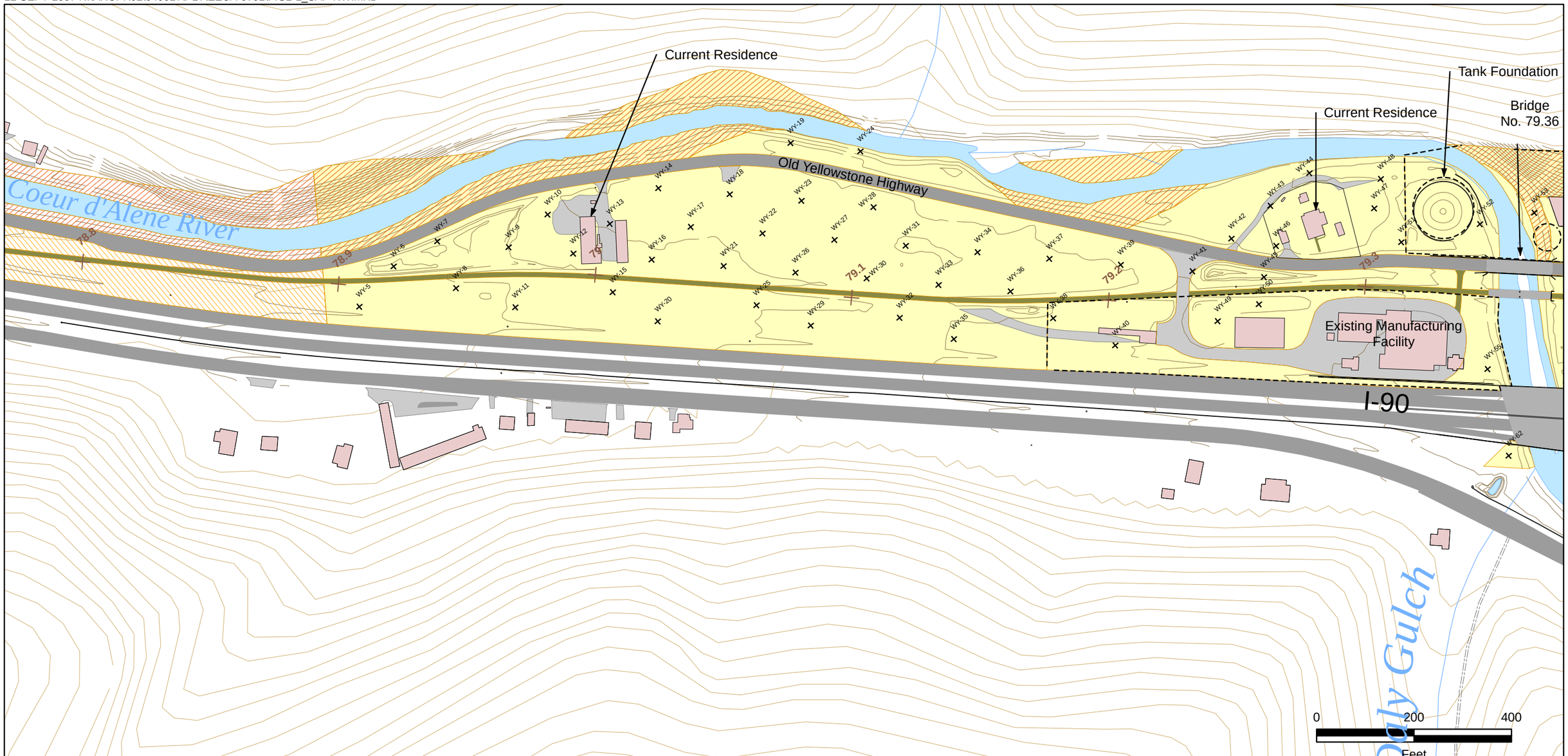
2,500 1,250 0 2,500

FIGURE 1-2

WALLACE YARD CANYON AND NINEMILE CREEK SPUR LINE LOCATION AND PHOTO INDEX

PROJECT: 040017;040024	DATE: SEP 12, 2007	
REV: 0	BY: MW	CHECKED: TM

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-1_SAP-NW.MXD



Legend

- Historic Structure
- Current Structure

Sample Locations

- Test Pit Location
- Test Pit Designated for TPH/VOC/SVOC Sampling
- Mile Marker

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

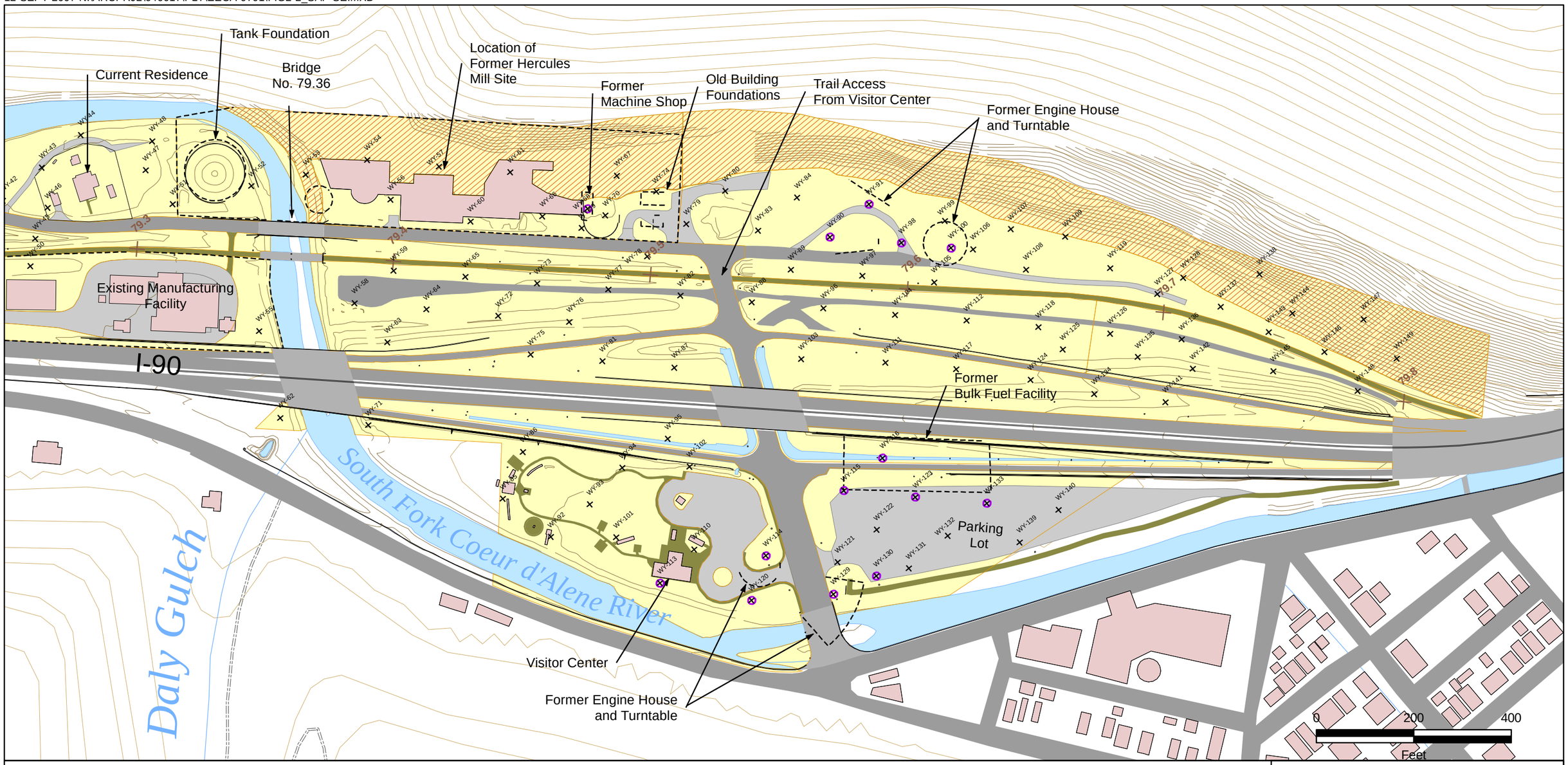
Notes:
1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.
2) Location of Buildings are approximate.

FIGURE 2-1

WALLACE YARD EE/CA
WALLACE YARD MAP
QUARTER ACRE SAMPLE GRID
NORTHWEST SECTION OF YARD

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-2_SAP-SE.MXD



Legend

- Historic Structure
- Current Structure

Sample Locations

- Test Pit Location
- Test Pit Designated for TPH/VOC/SVOC Sampling
- Mile Marker

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

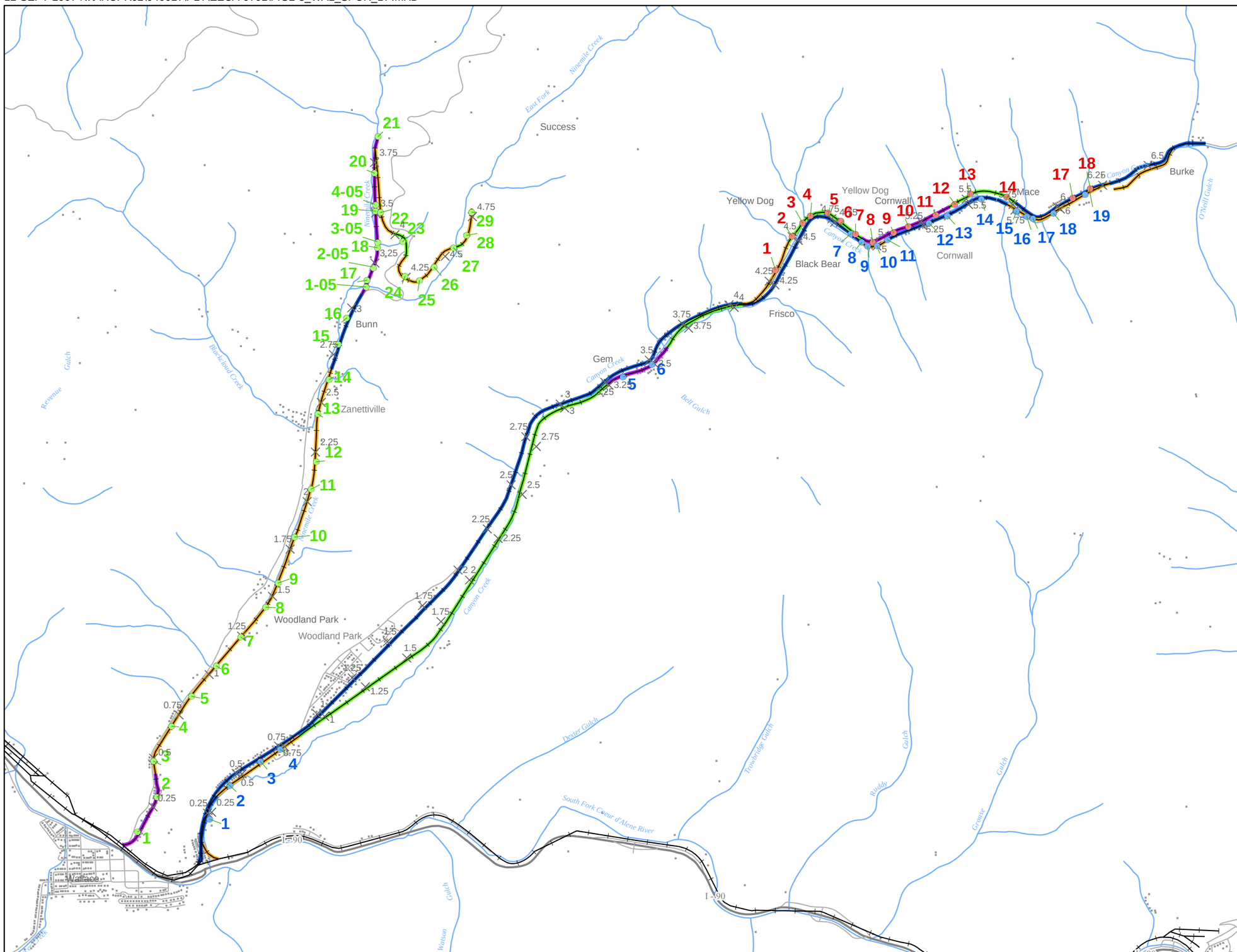
2) Location of Buildings are approximate.

FIGURE 2-2

WALLACE YARD EE/CA
WALLACE YARD MAP
QUARTER ACRE SAMPLE GRID
SOUTHEAST SECTION OF YARD

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-3_WAL_SPUR_BF.MXD



EXPLANATION

- River or Stream
- Interstate 90
- Road or Street
- Railroad Survey
- Railbed Visible
- Railbed Removed or not visible
- Railbed covered by road (Gravel)
- Railbed covered by road (Paved)
- mileposts
- Canyon Creek NPRy
- Canyon Creek WIRR
- Ninemile Creek

N

1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

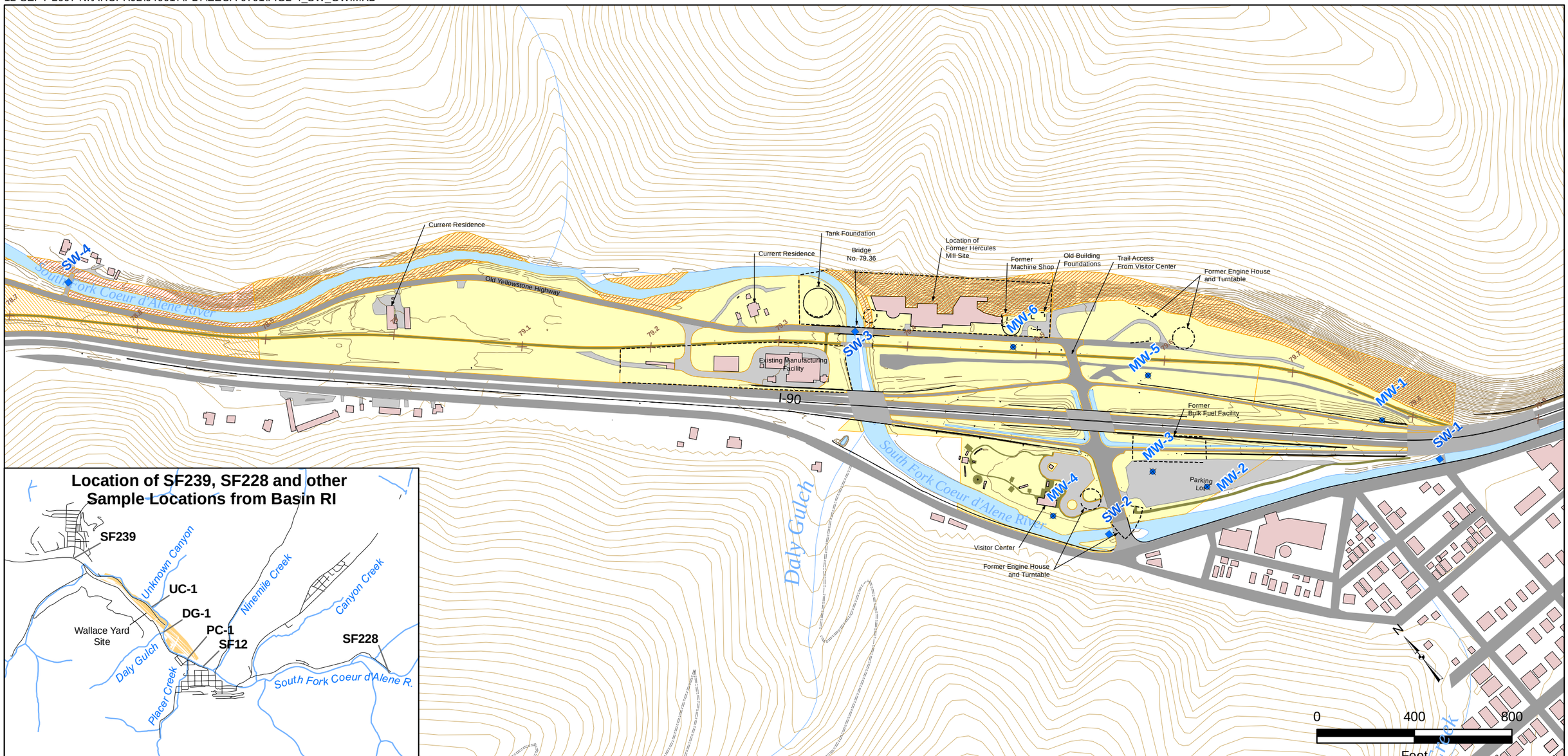
2,500 1,250 0 2,500

FIGURE 2-3

WALLACE YARD
CANYON AND NINEMILE CREEK
SPUR SAMPLE LOCATIONS

PROJECT: 040017;040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: TM

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-4_SW_GW.MXD



Legend

- Historic Structure
- Current Structure

Sample Locations

- Groundwater Well
- Surface Water Sampling Location

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

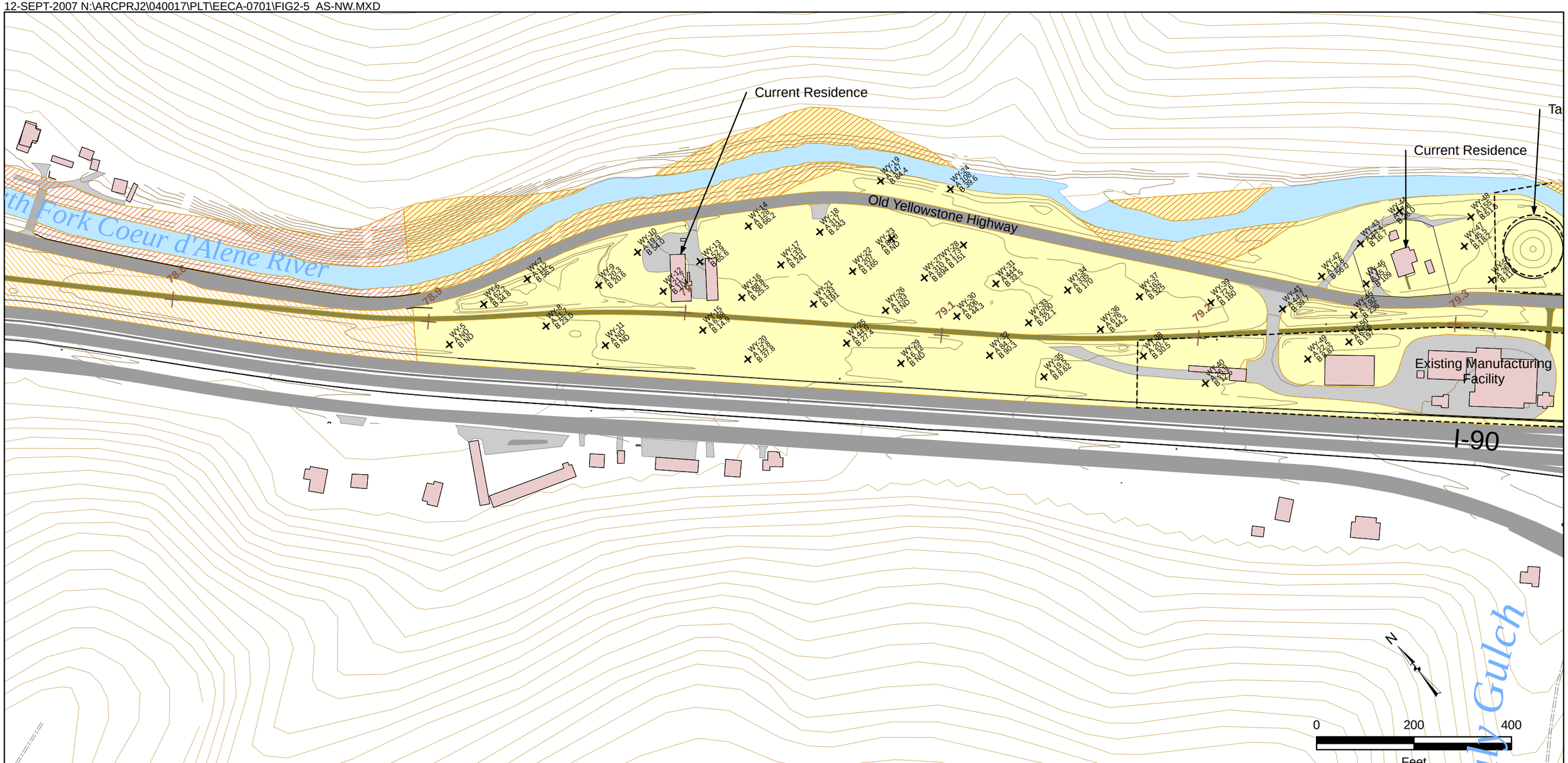
2) Location of Buildings are approximate.

FIGURE 2-4

WALLACE YARD EE/CA SURFACE WATER/GROUNDWATER SAMPLING LOCATIONS

PROJECT: 040017-040024	DATE: SEPT, 12 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-5_AS-NW.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
- A: 0-6 inch depth
- B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

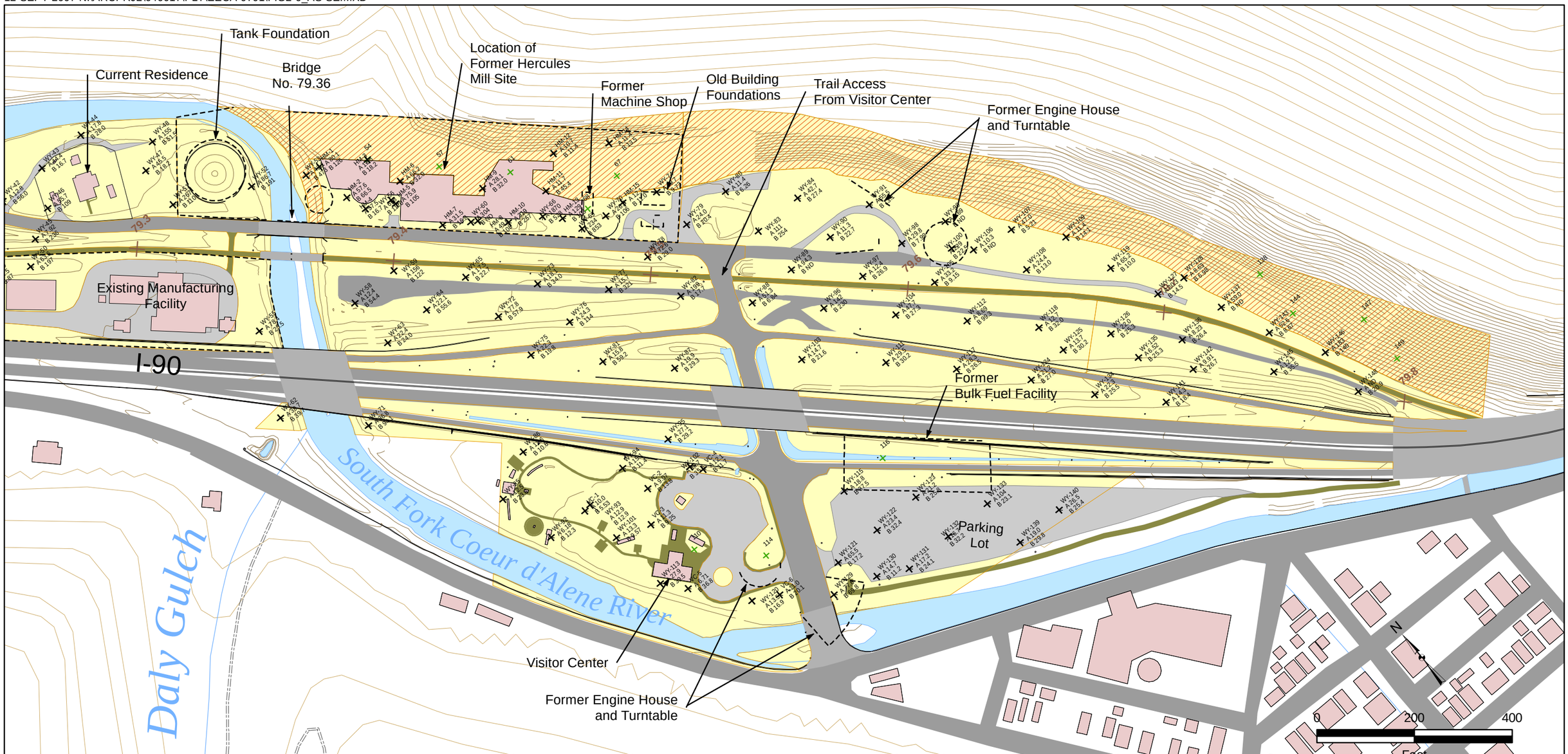
1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

2) Location of Buildings are approximate.

FIGURE 2-5

WALLACE YARD EE/CA
NORTHWEST SECTION OF YARD
ARSENIC (MG/KG)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

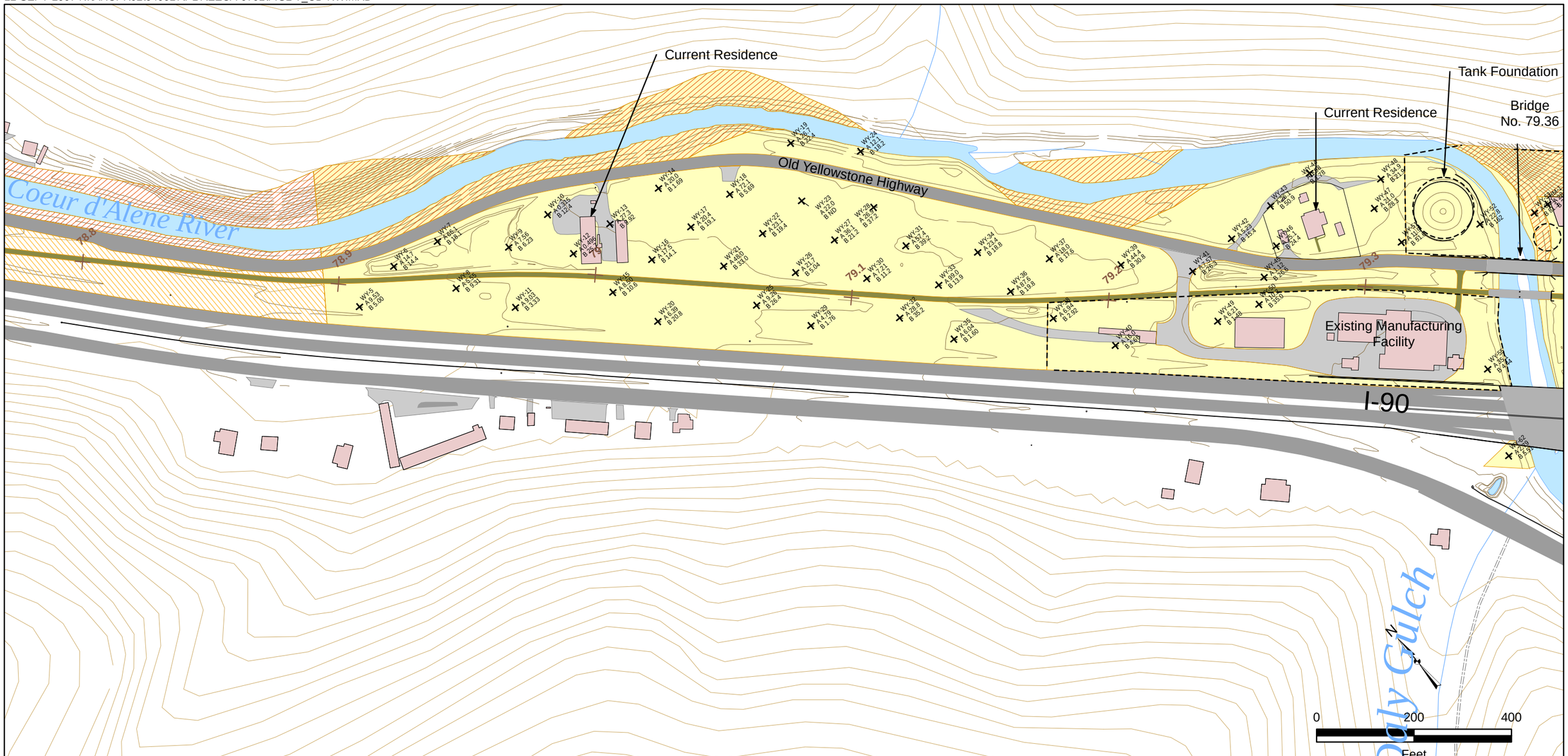
2) Location of Buildings are approximate.

FIGURE 2-6

WALLACE YARD EE/CA
SOUTHEAST SECTION OF YARD
ARSENIC (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-7_CD-NW.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

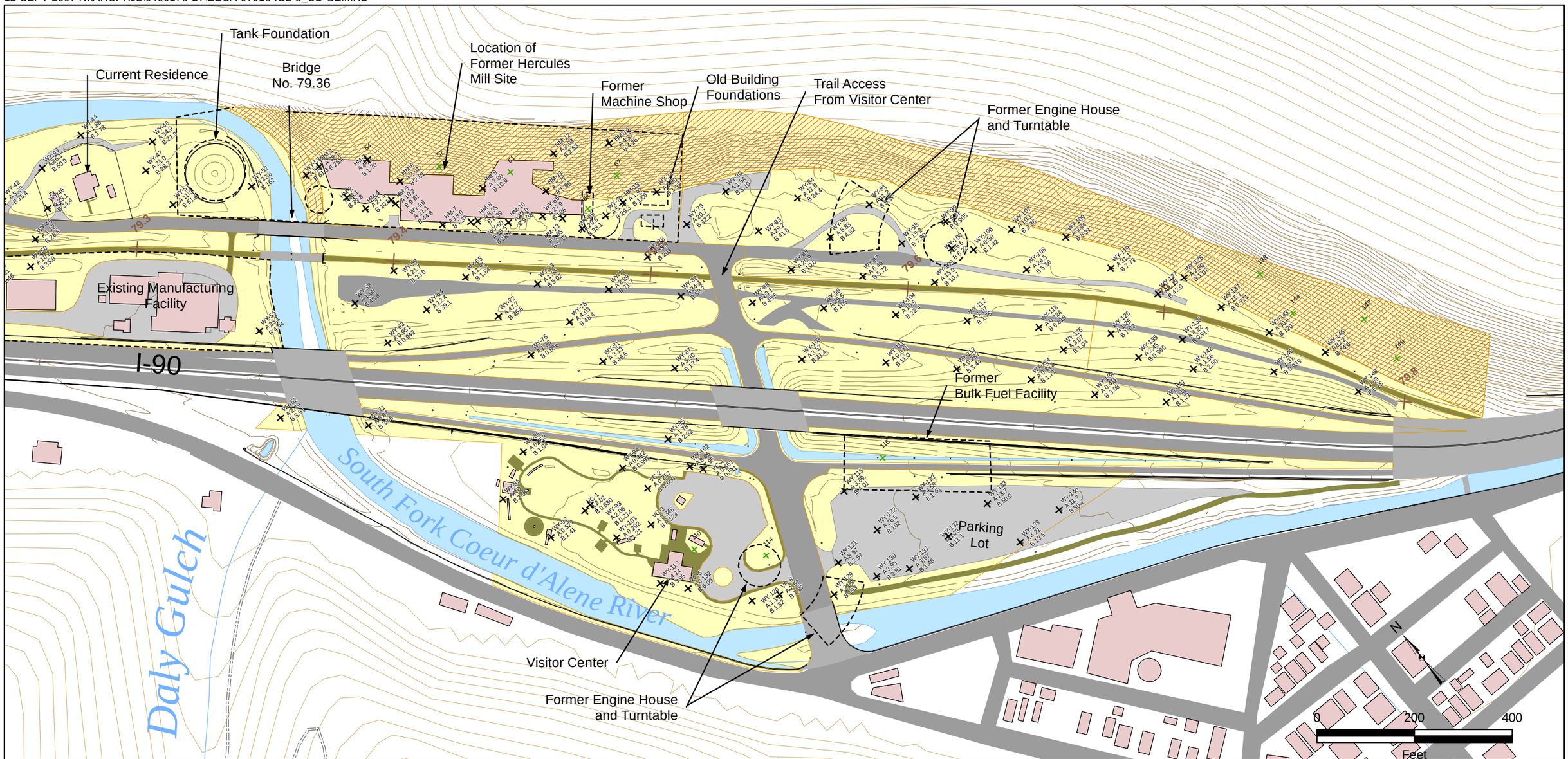
1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

2) Location of Buildings are approximate.

FIGURE 2-7

WALLACE YARD EE/CA
NORTHWEST SECTION OF YARD
CADMIUM (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

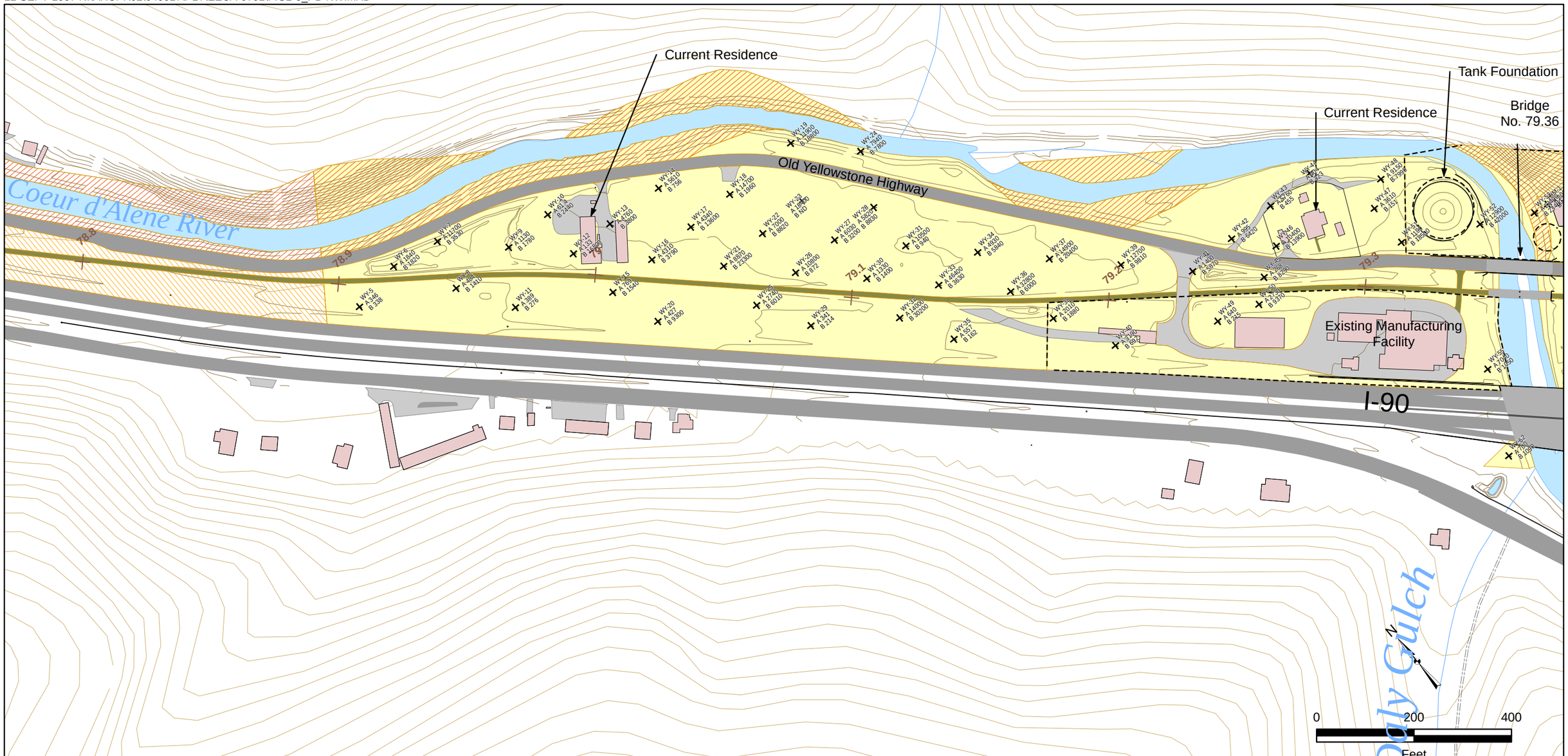
2) Location of Buildings are approximate.

FIGURE 2-8

WALLACE YARD EE/CA
SOUTHEAST SECTION OF YARD
CADMIUM (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-9_PB-NW.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

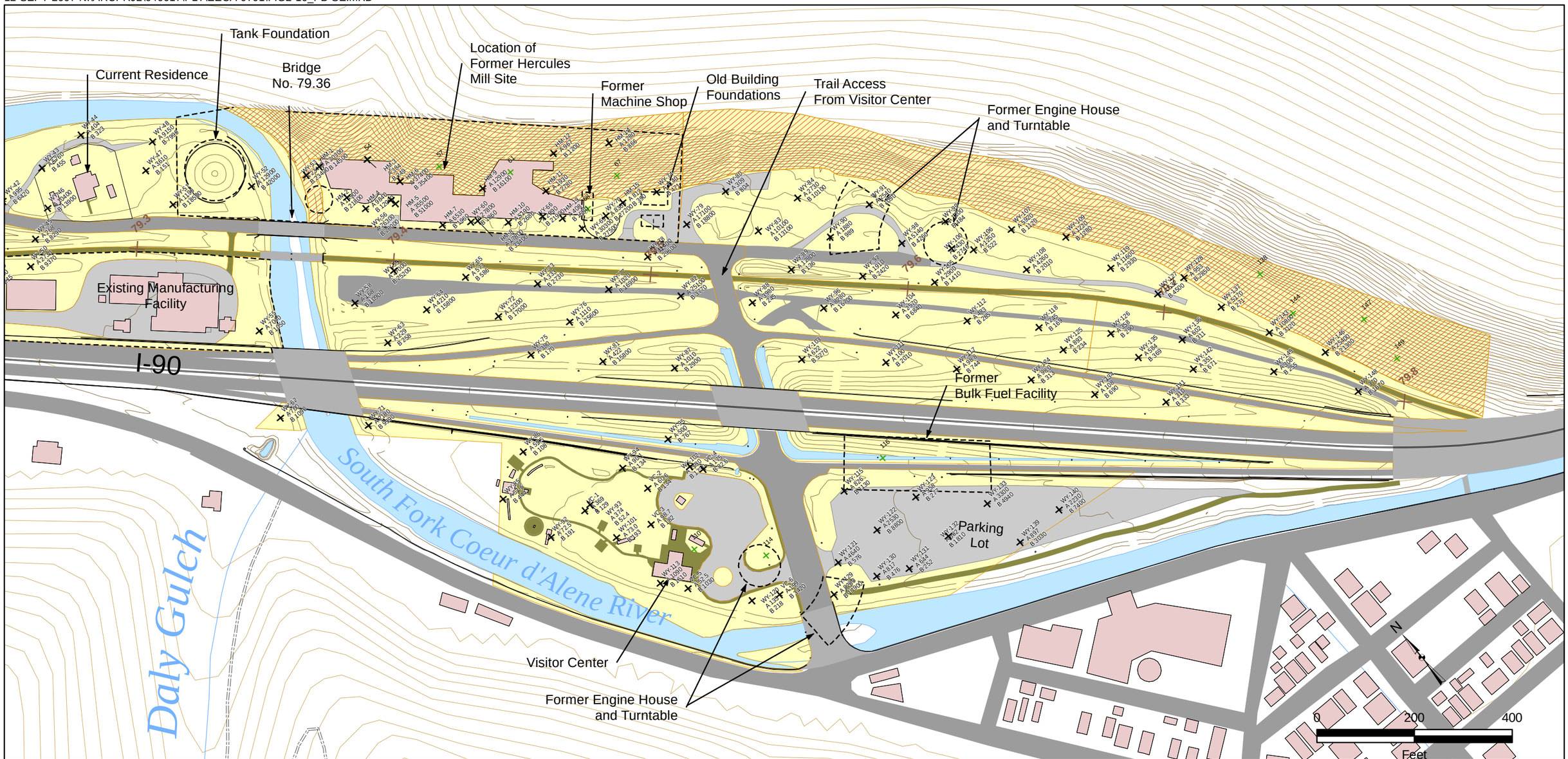
2) Location of Buildings are approximate.

FIGURE 2-9

WALLACE YARD EE/CA NORTHWEST SECTION OF YARD LEAD (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-10_PB-SE.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

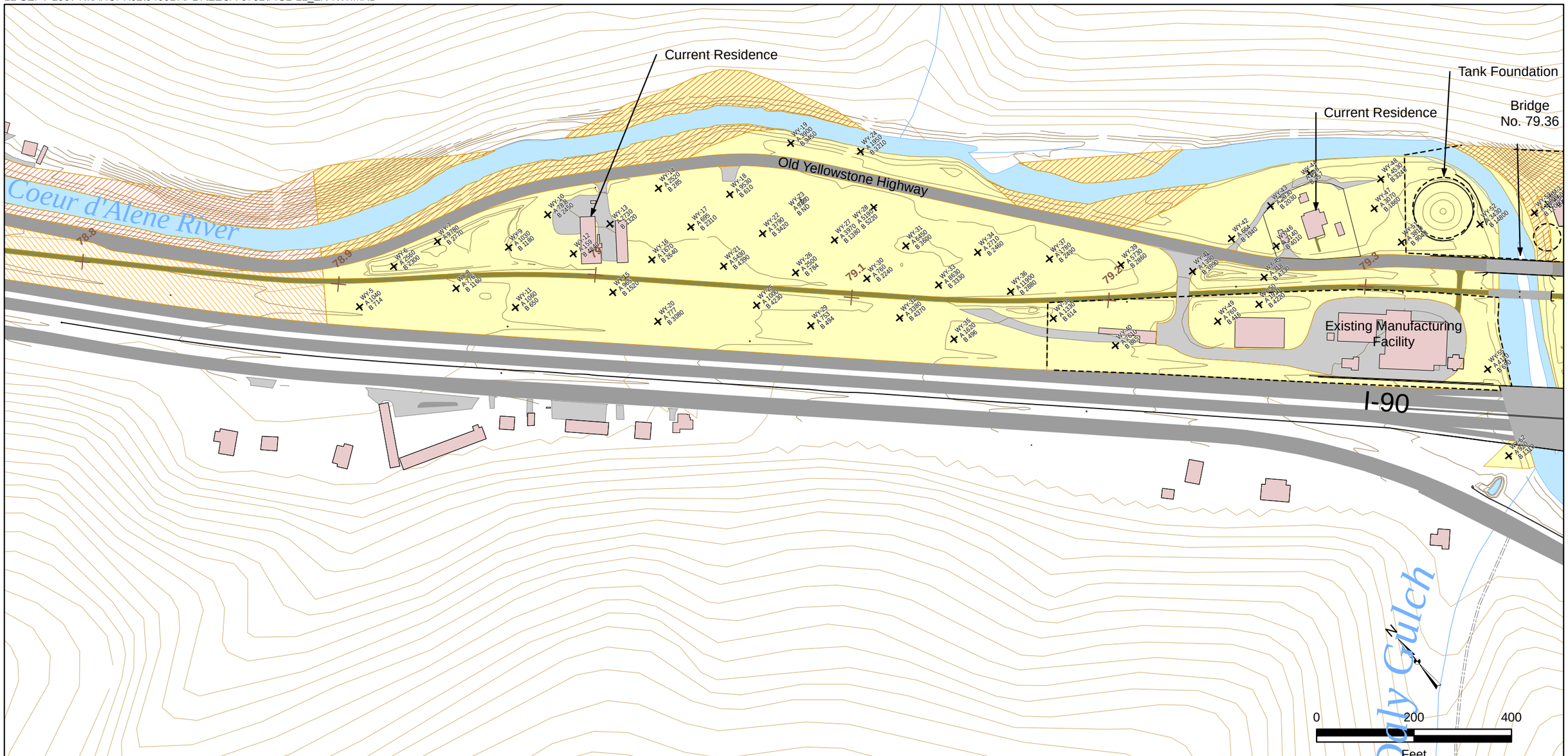
2) Location of Buildings are approximate.

FIGURE 2-10

WALLACE YARD EE/CA
SOUTHEAST SECTION OF YARD
LEAD (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-11_ZN-NW.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
- A: 0-6 inch depth
- B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

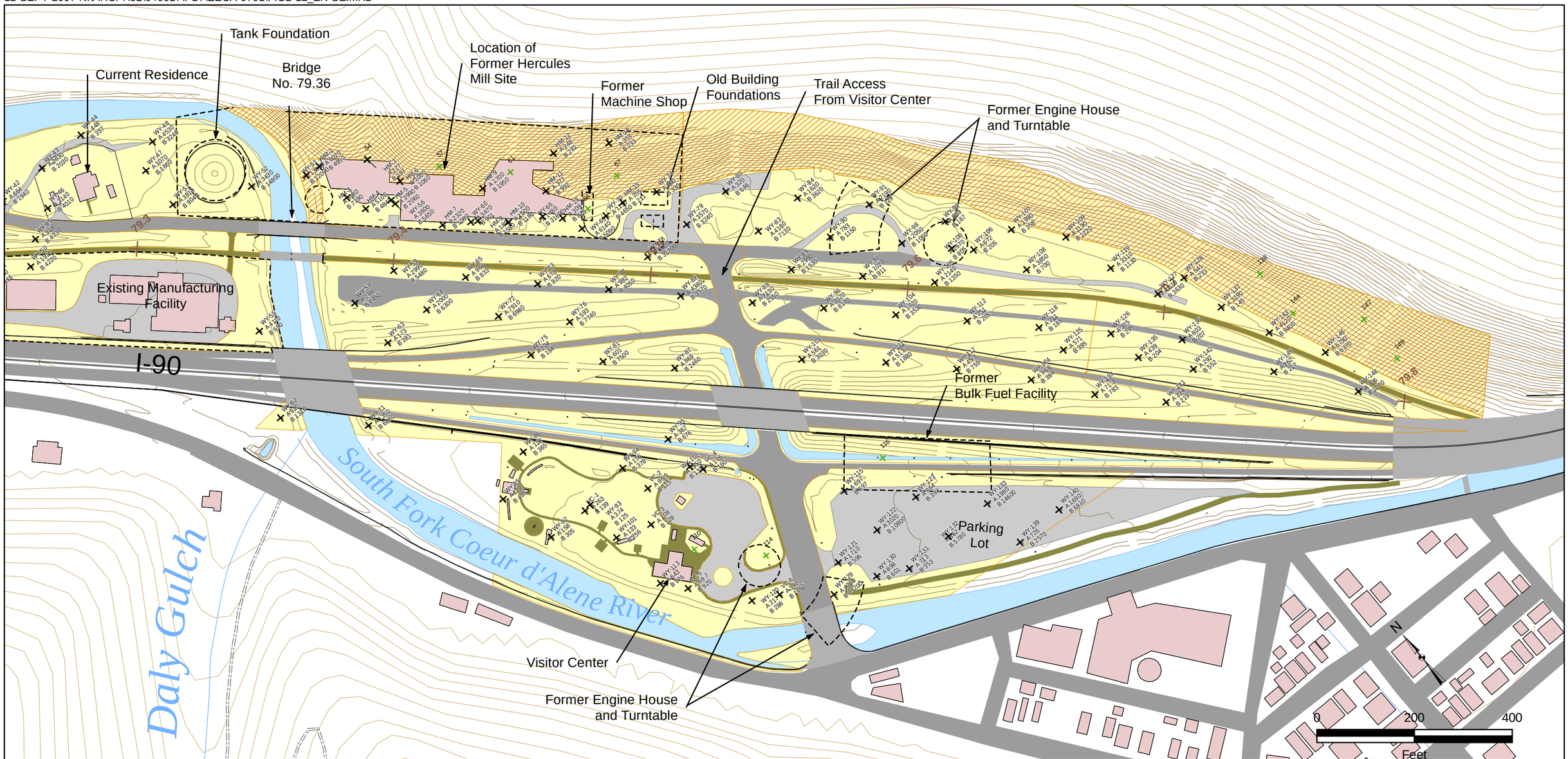
2) Location of Buildings are approximate.

FIGURE 2-11

WALLACE YARD EE/CA
NORTHWEST SECTION OF YARD
ZINC (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-12_ZN-SE.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

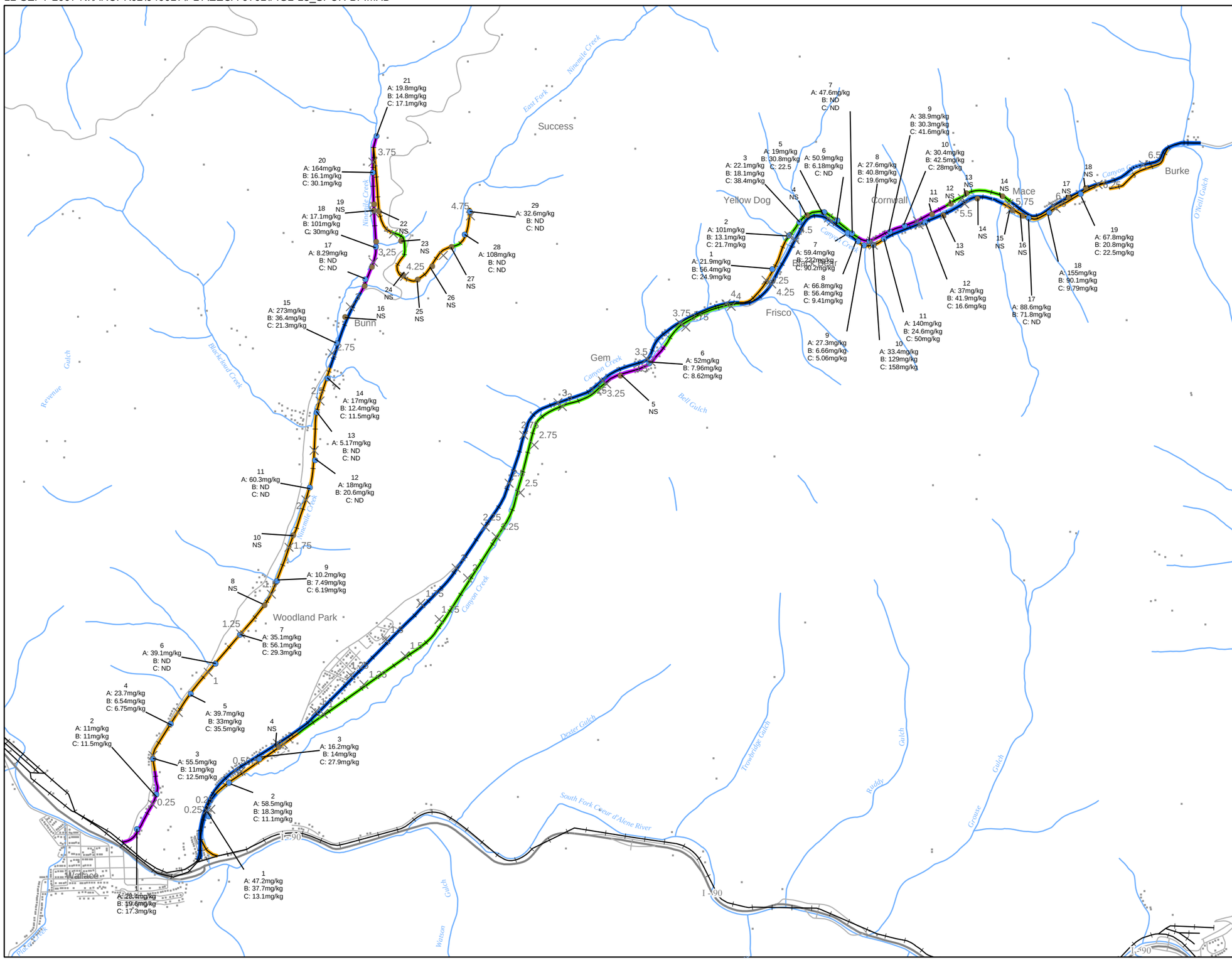
2) Location of Buildings are approximate.

FIGURE 2-12

WALLACE YARD EE/CA
SOUTHEAST SECTION OF YARD
ZINC (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-13_SPUR-BF.MXD



EXPLANATION

mileposts

Sample Locations

Sample Locations

Not Accessible or Access Not Granted

Railroad

Railbed Status

Railbed Visible

Railbed Removed or not visible

Railbed covered by road (Gravel)

Railbed covered by road (Paved)

Transportation

Interstate 90

Road or Street

Hydrography

River or Stream

N

1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

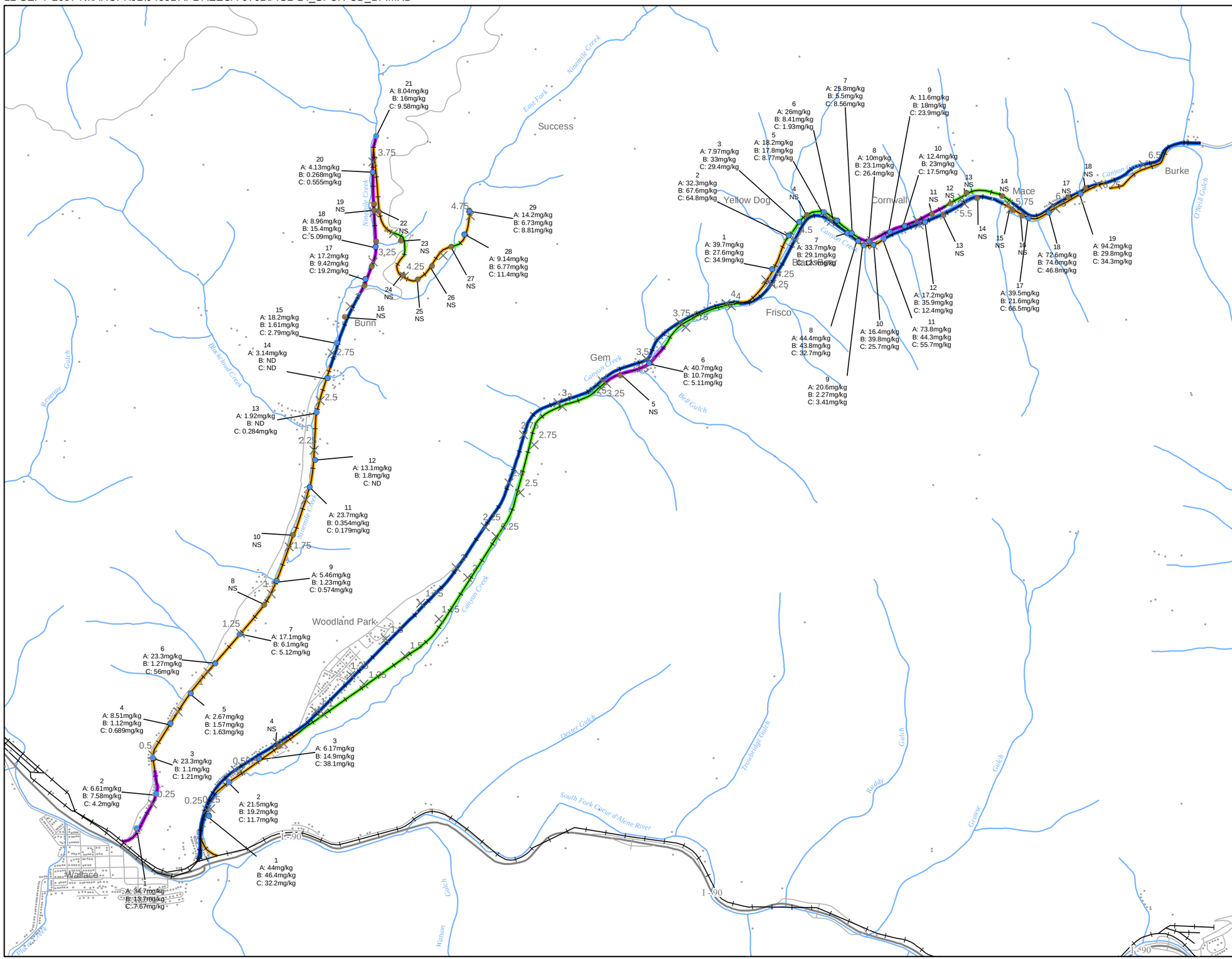
2,500 1,250 0 2,500

FIGURE 2-13

WALLACE YARD
CANYON AND NINEMILE CREEK
SPUR LINE SAMPLE ANALYTES
ARSENIC

PROJECT: 040017;040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: TM

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-14_SPUR-CD_BF.MXD



EXPLANATION

mileposts

Sample Locations

Sample Locations

Not Accessible or Access Not Granted

Railroad

Railbed Status

Railbed Visible

Railbed Removed or not visible

Railbed covered by road (Gravel)

Railbed covered by road (Paved)

Transportation

Interstate 90

Road or Street

Hydrography

River or Stream

N

1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

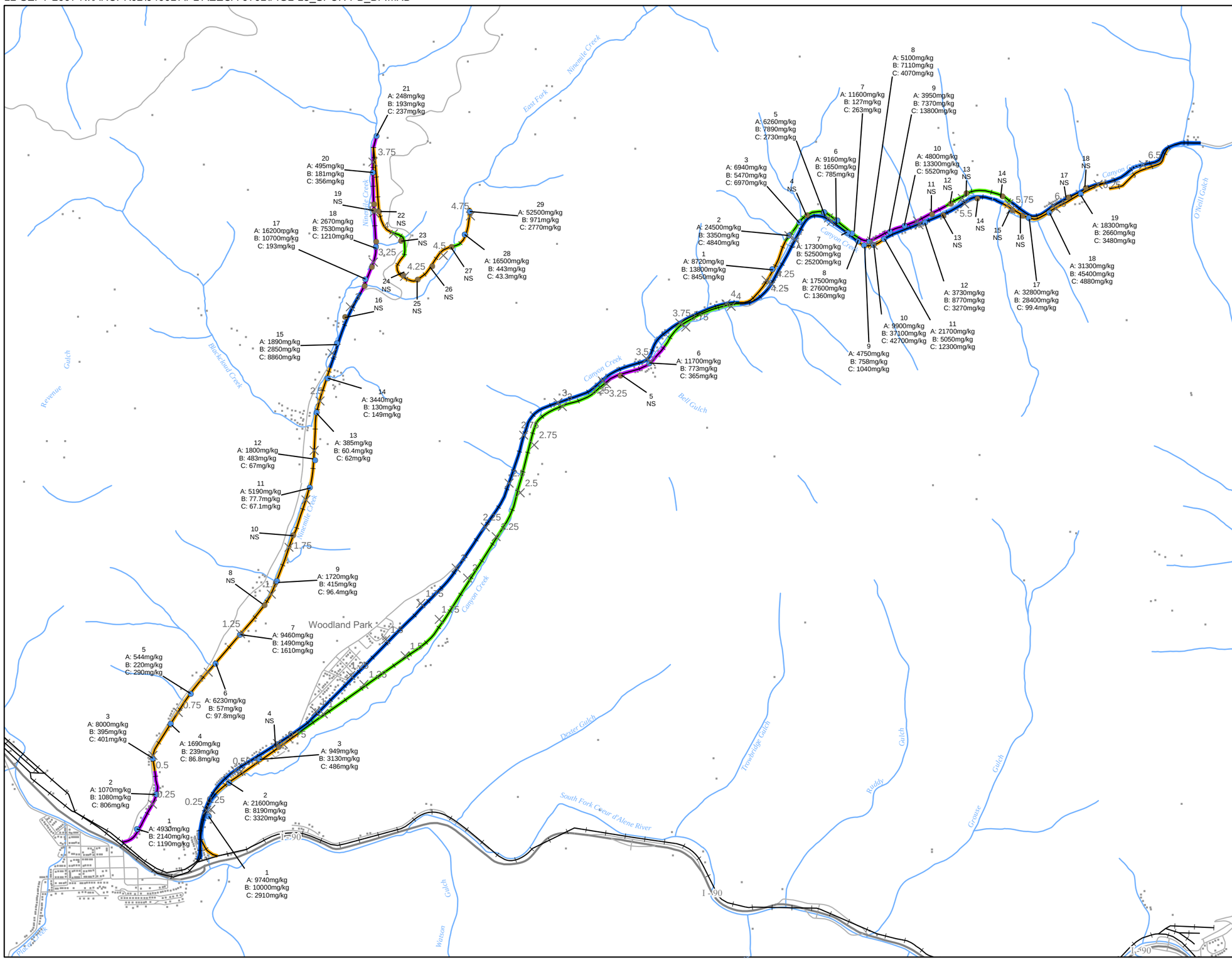
2,500 1,250 0 2,500

FIGURE 2-14

WALLACE YARD
CANYON AND NINEMILE CREEK
SPUR LINE SAMPLE ANALYTES
CADMIUM

PROJECT: 040017;040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: TM

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-15_SPUR-PB_BF.MXD



EXPLANATION

mileposts

Sample Locations

Sample Locations

Not Accessible or Access Not Granted

Railroad

Railbed Status

Railbed Visible

Railbed Removed or not visible

Railbed covered by road (Gravel)

Railbed covered by road (Paved)

Transportation

Interstate 90

Road or Street

Hydrography

River or Stream

N

1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

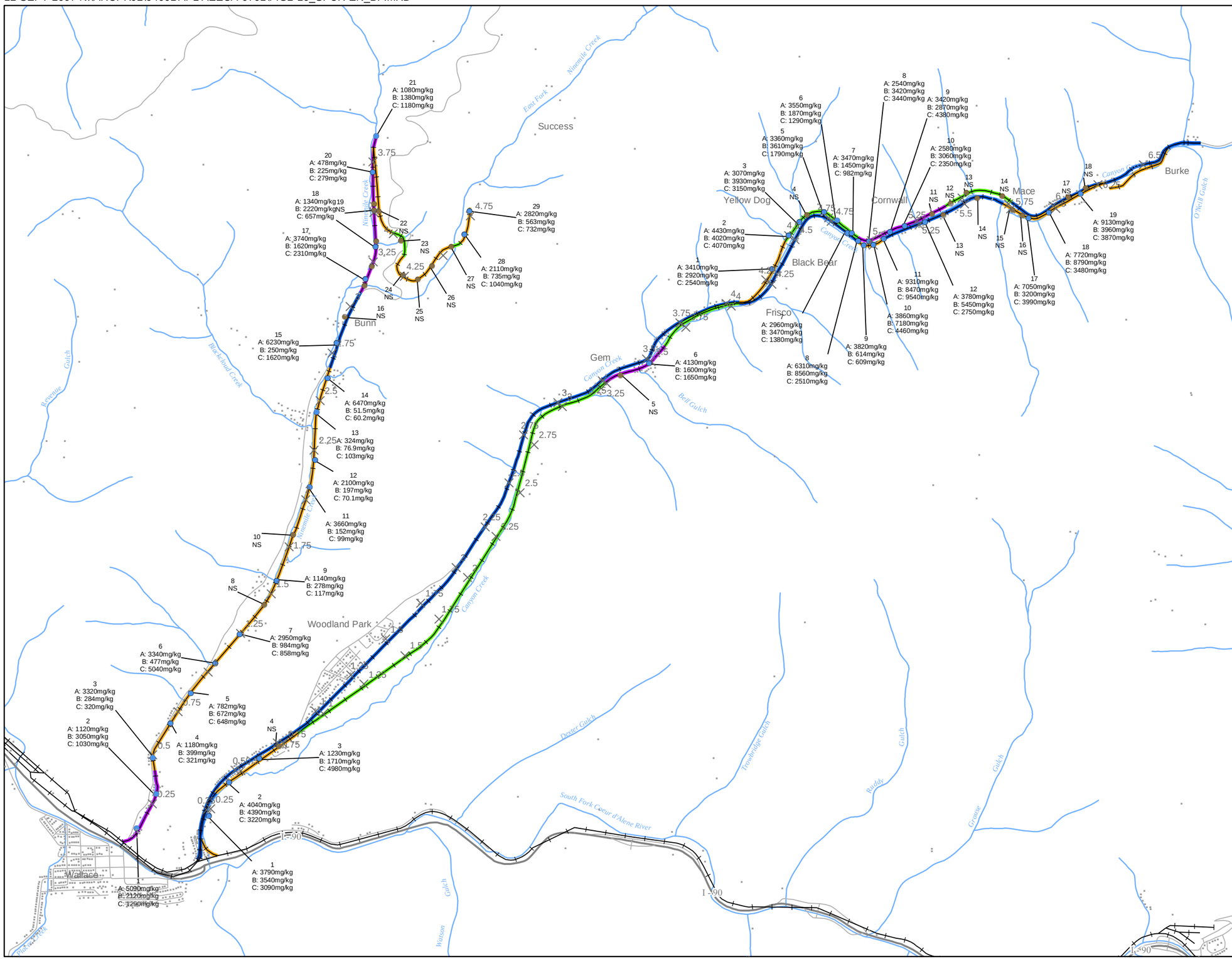
2,500 1,250 0 2,500

FIGURE 2-15

WALLACE YARD
CANYON AND NINEMILE CREEK
SPUR LINE SAMPLE ANALYTES
LEAD

PROJECT: 040017;040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: TM

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-16_SPUR-ZN_BF.MXD



EXPLANATION

mileposts

Sample Locations

Sample Locations

Not Accessible or Access Not Granted

Railroad

Railbed Status

Railbed Visible

Railbed Removed or not visible

Railbed covered by road (Gravel)

Railbed covered by road (Paved)

Transportation

Interstate 90

Road or Street

Hydrography

River or Stream

N

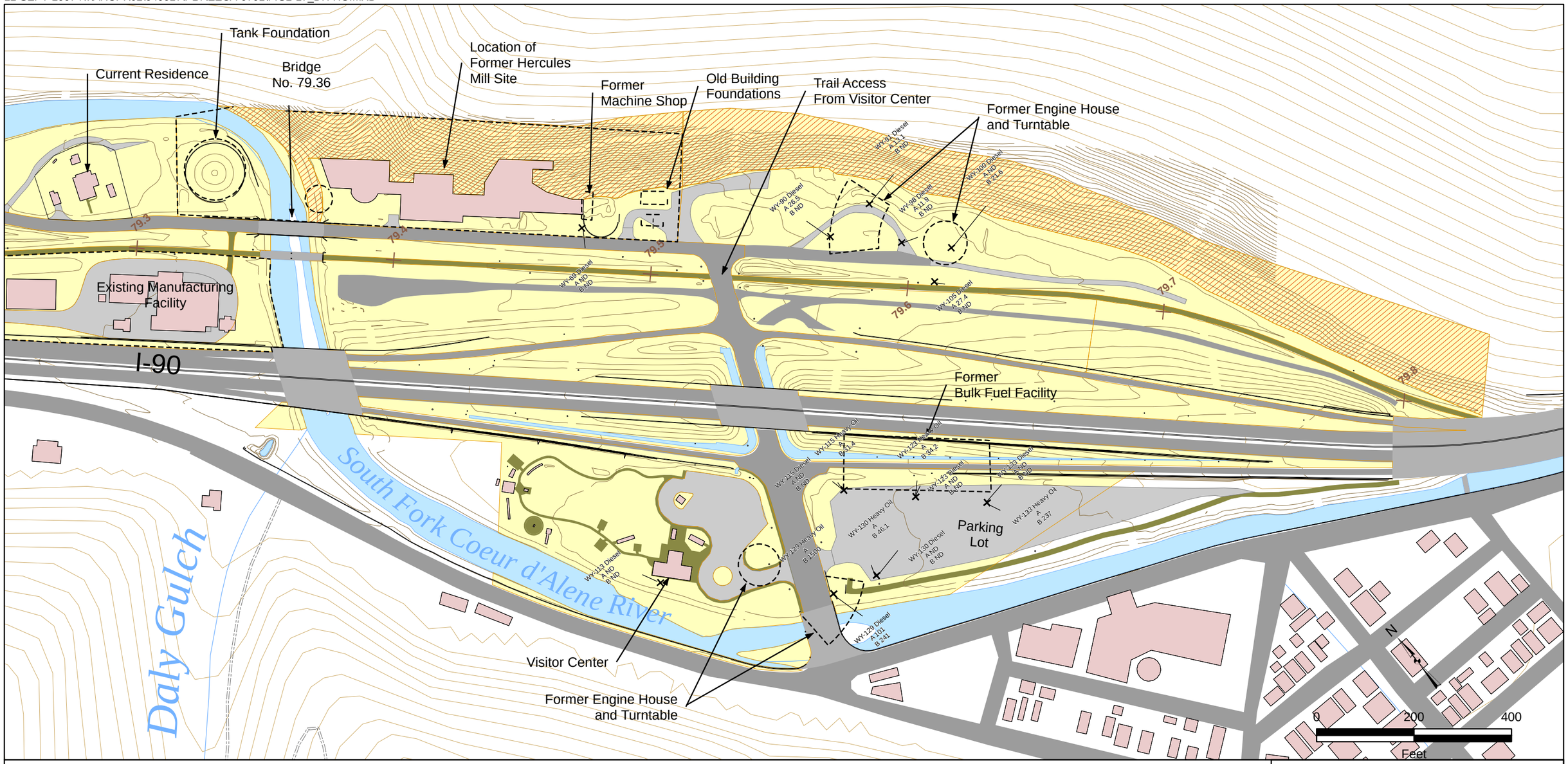
1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

2,500 1,250 0 2,500

FIGURE 2-16
WALLACE YARD
CANYON AND NINEMILE CREEK
SPUR LINE SAMPLE ANALYTES
ZINC

PROJECT: 040017;040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: TM

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG2-17_DH-HO.MXD



Legend

- Historic Structure
- Current Structure
- Test Pit Location
  - A: 0-6 inch depth
  - B: 6-14 inch depth

Railroad Right of Way

- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW
- Wallace Yard ROW
- Portion of Wallace Yard ROW Addressed by this EECA

Notes:

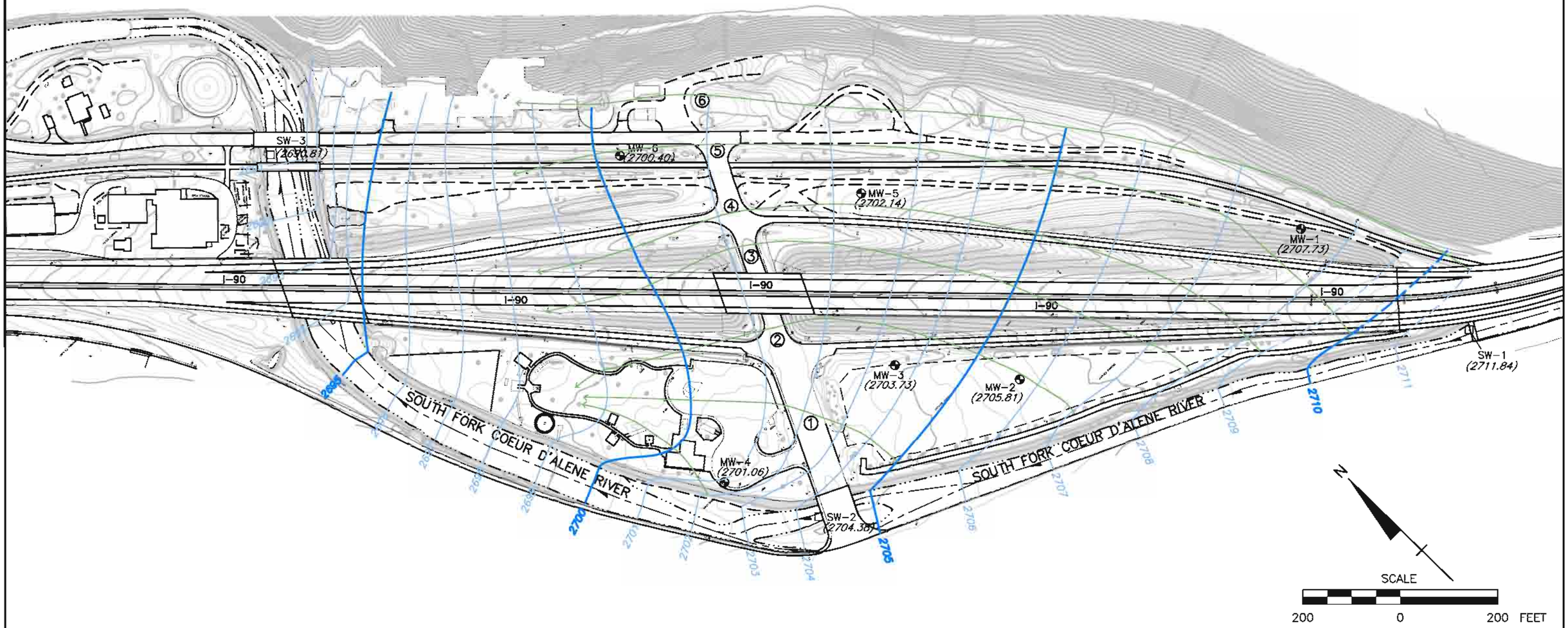
1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

2) Location of Buildings are approximate.

FIGURE 2-17

WALLACE YARD EE/CA
SOUTHEAST SECTION OF YARD
DIESEL AND HEAVY OIL RANGE
HYDROCARBONS (mg/kg)

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC



LEGEND:

MW-2 (2705.81) — MONITORING WELL LOCATION WITH GROUNDWATER ELEVATION

SW-2 (2705.81) — SURFACE WATER SAMPLE LOCATION WITH GROUNDWATER ELEVATION

2705 / 2704 — SURFACE WATER CONTOUR, MAJOR & MINOR (DASHED WHERE INFERRED); INTERVAL = 1 FOOT

FLOW LINES

NOTE:

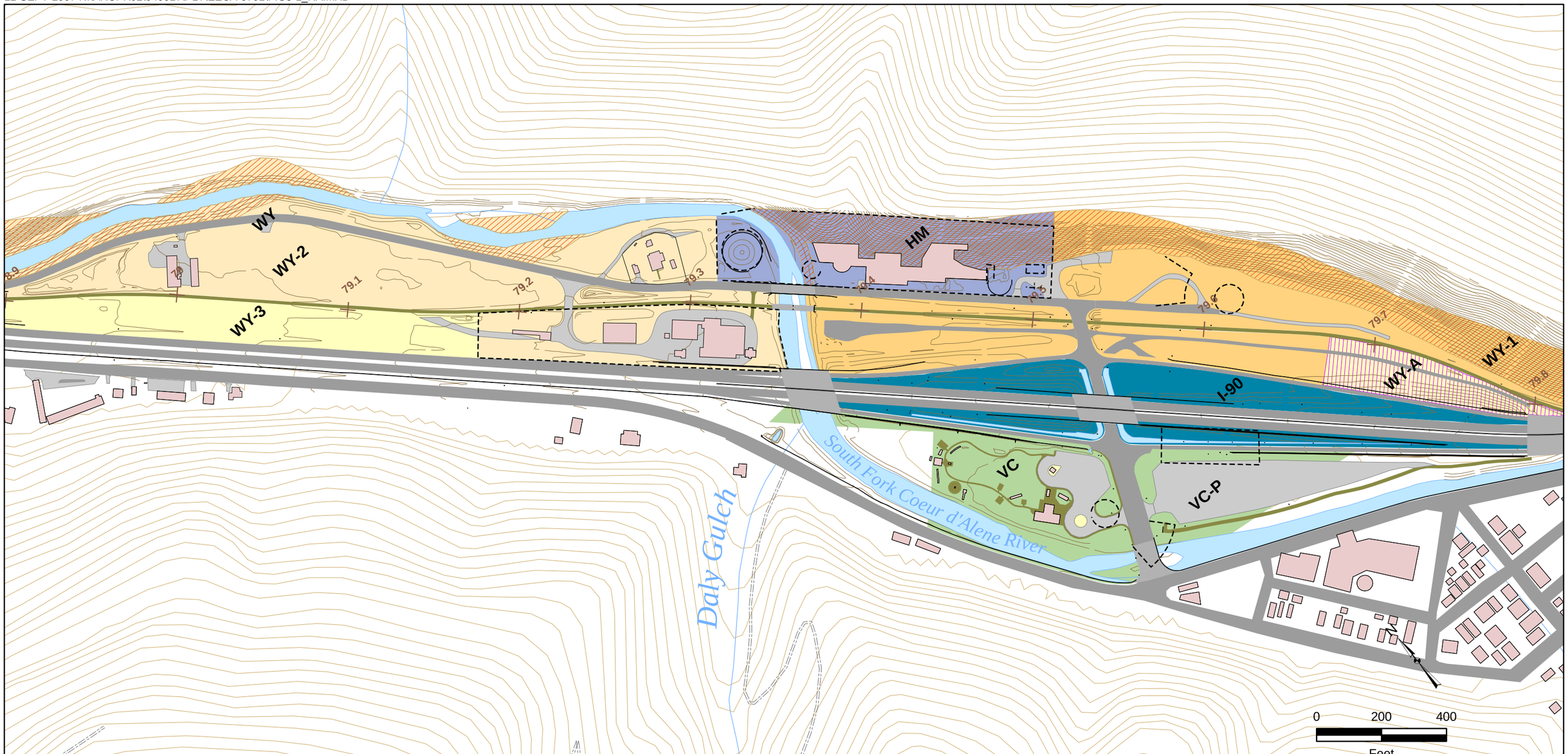
GROUNDWATER ELEVATIONS BASED ON DATA COLLECTED ON OCTOBER 28, 2004

FIGURE 2-18

POTENTIOMETRIC SURFACE CONTOUR MAP OCTOBER 28, 2004

PROJECT: 040017.2	DATE: APRIL 2005	
REV:	BY: SCG	CHECKED: MWC

12-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG3-1_RA.MXD



Legend

- Historic Structure
- Current Structure

Railroad Right of Way

- I-90 Corridor
- City of Wallace
- Hercules Mill Site

- WY-1
- WY-2
- WY-3
- Wallace Yard - A
- Portion of Wallace Yard ROW Innaccessible
- Remediated Portion of Wallace Yard ROW

Notes:

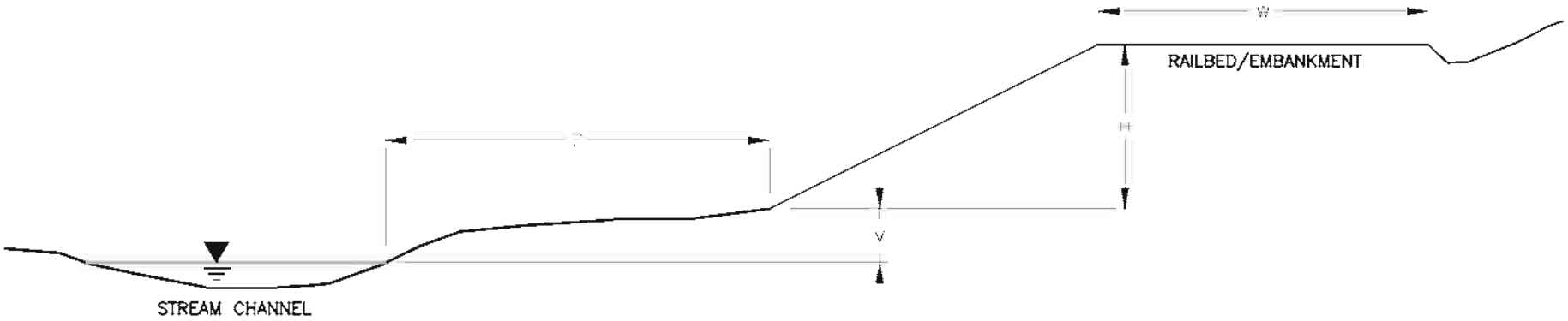
1) The Wallace Yard Response Action includes that portion of the Wallace Yard ROW approximately between MM 78.9 and MM 79.8 outside of the 26 foot wide Trail Corridor.

2) Location of Buildings are approximate.

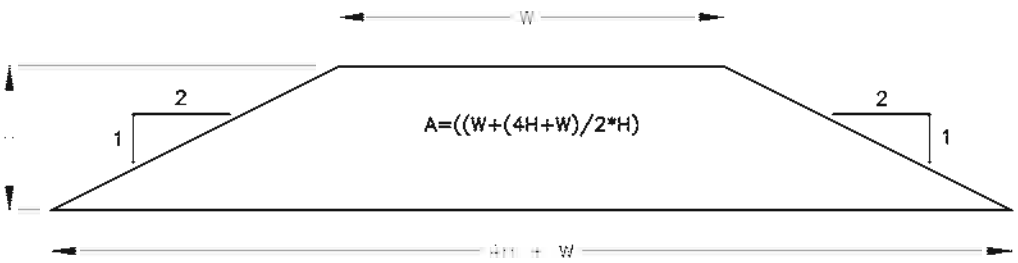
FIGURE 3-1

WALLACE YARD EE/CA SUB- AREAS

PROJECT: 040017-040024	DATE: SEPT 12, 2007	
REV: 0	BY: MW	CHECKED: MWC



TYPICAL CROSS–SECTION OF SPUR LINE
RAILBED IN RELATION TO STREAM CHANNEL
(SEE NOTES 1 AND 2)



TYPICAL SECTION FOR EMBANKMENT
VOLUME CALCULATION
(SEE NOTE 3)

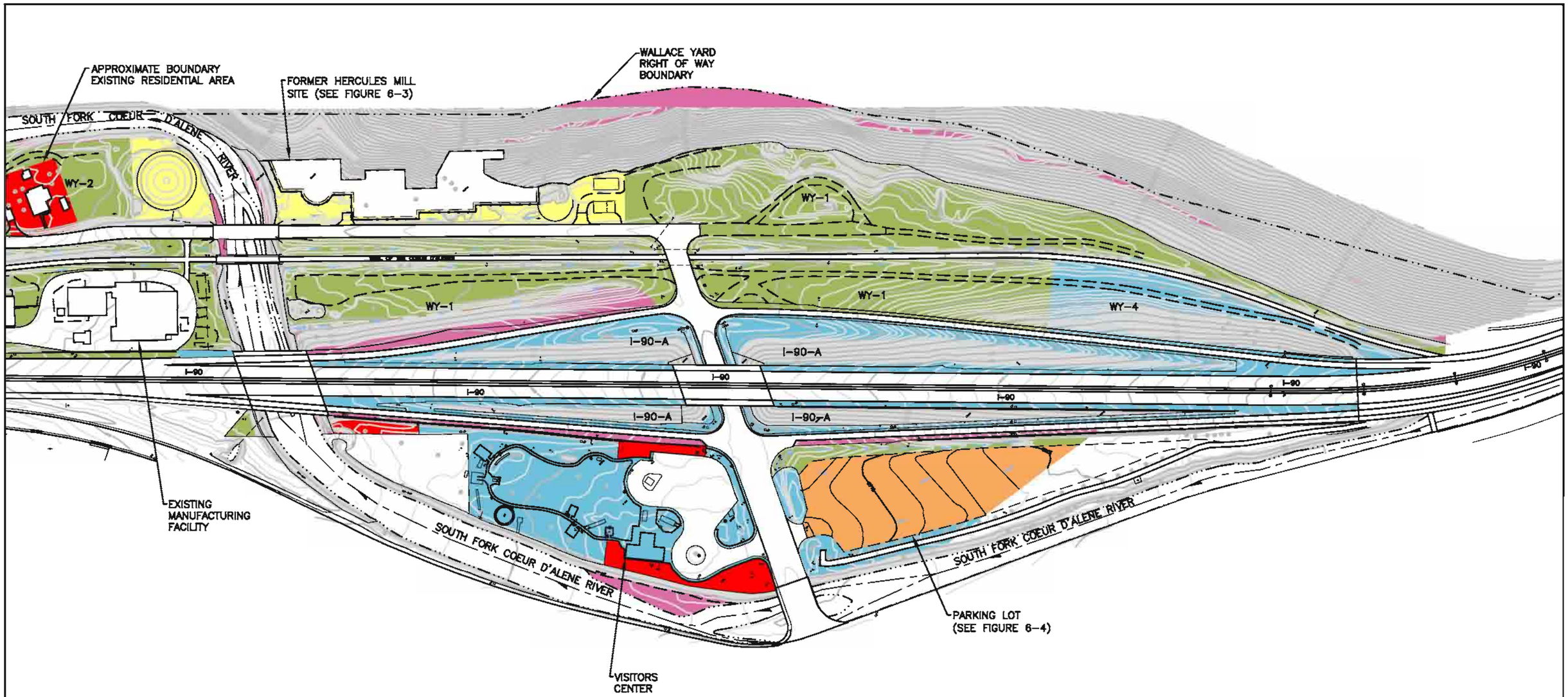
NOTES:

1. CONSIDERED AN EMBANKMENT ONLY WHERE THE RAILBED APPEARS TO HAVE BEEN CONSTRUCTED OF FILL MATERIAL.
2. MEASUREMENT OF THE IDENTIFIED DIMENSIONS FROM VARIOUS SECTIONS OF THE SPUR LINES ARE PRESENTED IN TABLES 3–1 AND 3–2.
3. FOR THE PURPOSES OF ESTIMATING THE EMBANKMENT VOLUME THE SIDE SLOPE WAS ASSUMED TO BE 2H:1V AND THE CROSS–SECTIONAL AREA WAS CALCULATED USING THE DIMENSIONS SHOWN.

FIGURE 3–2

WALLACE YARD EE/CA
TYPICAL EMBANKMENT SECTION

PROJECT: 040017–0024	DATE: MAY 2006	
REV:	BY: JMK	CHECKED: DLL



LEGEND:

- NO ACTION REQUIRED
- 12" VEGETATED OR GRAVEL BARRIER
- 12" REMOVAL & REPLACEMENT VEGETATED SOIL BARRIER
- PORTION OF WALLACE YARD ROW INACCESSIBLE
- CHAIN LINK FENCE
- FLOW DIRECTION
- 12" VEGETATED BARRIER – HERCULES MILL SITE
- PLACEMENT OF 12" COMPACTED GRAVEL SUITABLE FOR ROAD USE

NOTES:

1. MAINTAIN DRAINAGE WAYS DURING AND AFTER RESPONSE ACTIVITIES. REGRADE AS NECESSARY TO PREVENT PONDING.
2. EXCAVATION NEAR CULVERTS, CATCH BASINS AND ROADWAYS MAY BE REQUIRED TO MAINTAIN DRAINAGE AFTER RESPONSE ACTIVITIES. SPREAD EXCAVATED MATERIAL IN SUITABLE AREA PRIOR TO BARRIER PLACEMENT OR HAUL EXCAVATED MATERIAL TO CONTAMINATED AREA.
3. EXTEND BARRIER PLACEMENT TO TRAIL OF THE COEUR D'ALENES FENCELINE.
4. REGRADE CONTOURS REPRESENT GRADE PRIOR TO BARRIER PLACEMENT.
5. OBLITERATE ACCESS ROADS, PLACE BARRIER AND INSTALL ACCESS CONTROLS.
6. WITHIN ANY BARRIER AREA SMOOTH OUT DEBRIS PILES AS DIRECTED BY ENGINEER.

N

SCALE

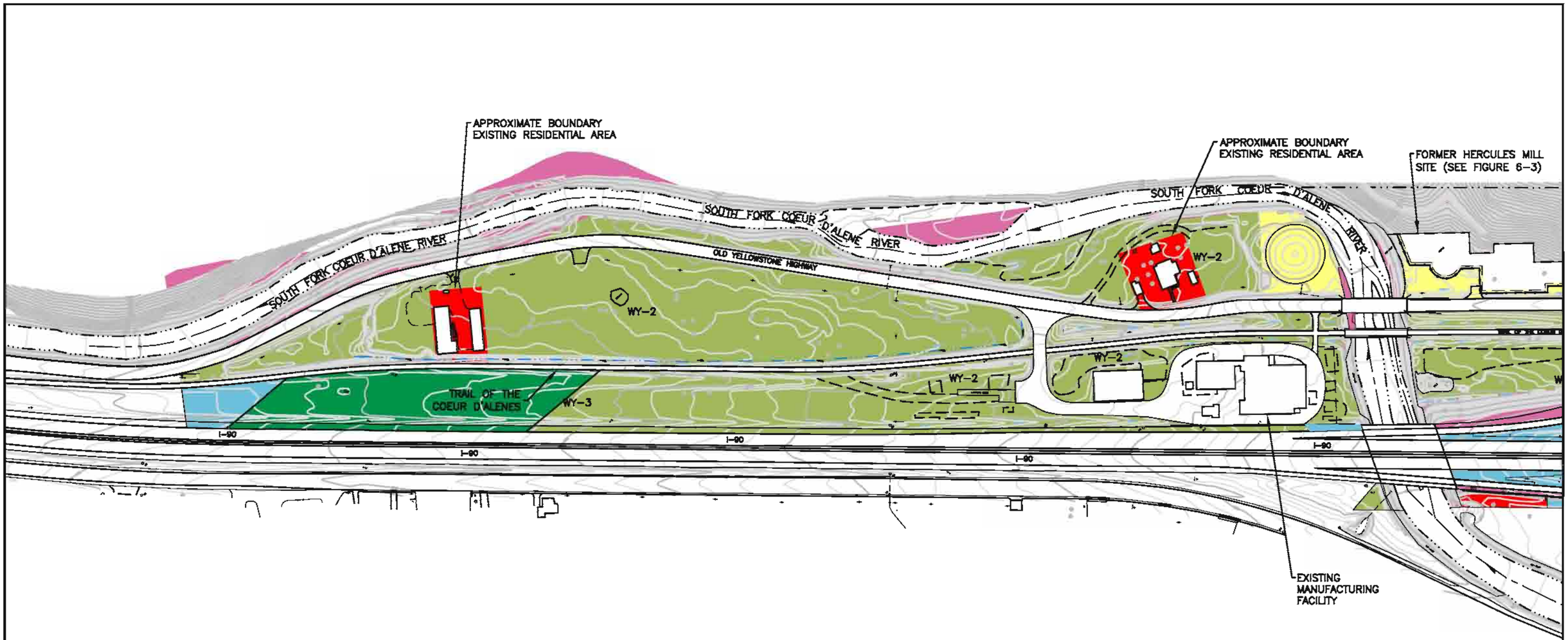
200 0 200 FEET

FIGURE 6-1

WALLACE YARD RESPONSE ACTION – EASTERN PORTION

PROJECT: 040017.2	DATE: MAY 2005	
REV:	BY: SCG	CHECKED: JMK

FILE: BR23B007P01TR001-F61
DATE: Sep 07, 2007



LEGEND:

- NO ACTION REQUIRED
- 12" VEGETATED OR GRAVEL BARRIER
- 6" VEGETATED OR GRAVEL BARRIER
- 12" REMOVAL & REPLACEMENT VEGETATED SOIL BARRIER
- PORTION OF WALLACE YARD ROW INACCESSIBLE
- CHAIN LINK FENCE
- FLOW DIRECTION
- 12" VEGETATED BARRIER – HERCULES MILL SITE
- PLACEMENT OF 12" COMPACTED GRAVEL SUITABLE FOR ROAD USE

NOTES:

1. MAINTAIN DRAINAGE WAYS DURING AND AFTER RESPONSE ACTIVITIES. REGRADE AS NECESSARY TO PREVENT PONDING.
2. EXCAVATION NEAR CULVERTS, CATCH BASINS AND ROADWAYS MAY BE REQUIRED TO MAINTAIN DRAINAGE AFTER RESPONSE ACTIVITIES. SPREAD EXCAVATED MATERIAL IN SUITABLE AREA PRIOR TO BARRIER PLACEMENT OR HAUL EXCAVATED MATERIAL TO CONTAMINATED AREA.
3. EXTEND BARRIER PLACEMENT TO TRAIL OF THE COEUR D'ALENES FENCELINE.
4. OBLITERATE ACCESS ROAD, PLACE BARRIER AND INSTALL ACCESS CONTROLS.
5. WITHIN ANY BARRIER AREA SMOOTH OUT DEBRIS PILES AS DIRECTED BY ENGINEER.

N

SCALE

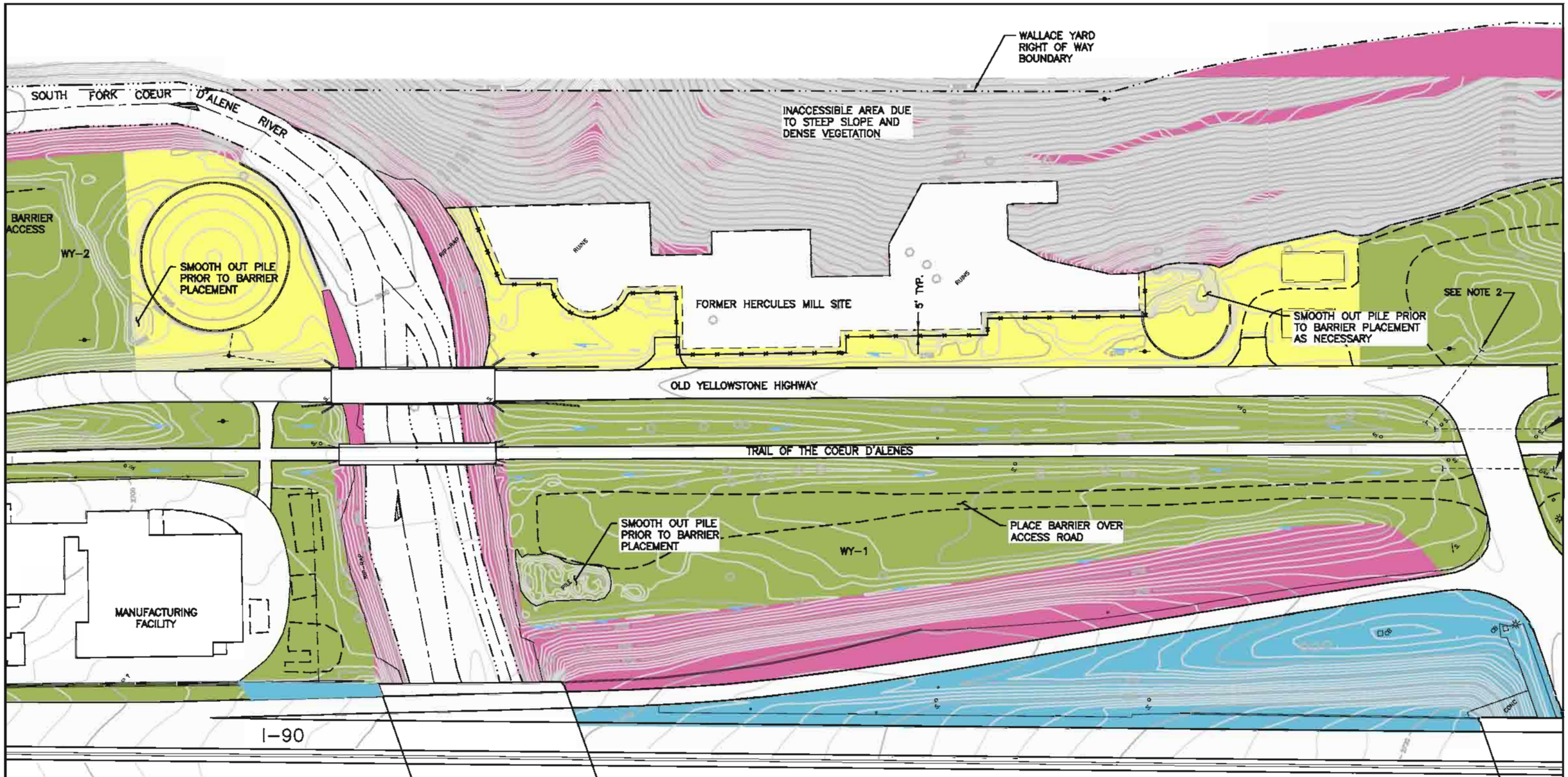
200 0 200 FEET

FIGURE 6-2

WALLACE YARD RESPONSE ACTION – WESTERN PORTION

PROJECT: 040017.2	DATE: MAY 2005	
REV:	BY: SCG	CHECKED: JMK

FILE: BR2328007P013TR001-F6-1
DATE: Sep 07, 2007



LEGEND:

- NO ACTION REQUIRED
- 12" VEGETATED OR GRAVEL BARRIER
- PORTION OF WALLACE YARD ROW INACCESSIBLE
- PLACEMENT OF 12" COMPACTED GRAVEL SUITABLE FOR ROAD USE
- CHAIN LINK FENCE
- FLOW DIRECTION
- 12" VEGETATED BARRIER – HERCULES MILL SITE

NOTES:

1. MAINTAIN DRAINAGE WAYS DURING AND AFTER RESPONSE ACTIVITIES. REGRADE AS NECESSARY TO PREVENT PONDING.
2. EXCAVATION NEAR CULVERTS, CATCH BASINS AND ROADWAYS MAY BE REQUIRED TO MAINTAIN DRAINAGE AFTER RESPONSE ACTIVITIES. SPREAD EXCAVATED MATERIAL IN SUITABLE AREA PRIOR TO BARRIER PLACEMENT OR HAUL EXCAVATED MATERIAL TO CONTAMINATED AREA.
3. EXTEND BARRIER PLACEMENT TO TRAIL OF THE COEUR D'ALENES FENCELINE.

N

SCALE

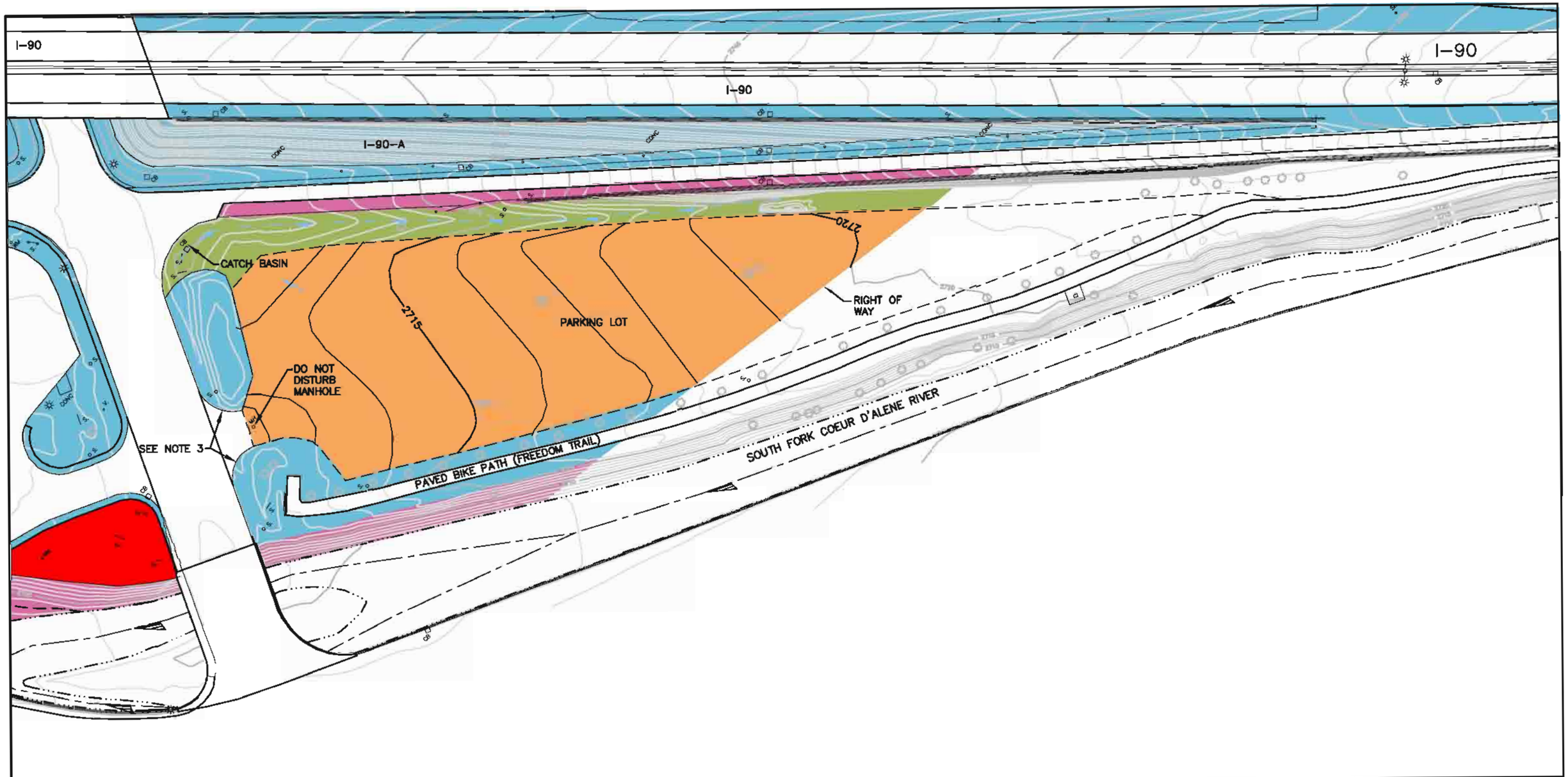
80 0 80 FEET

FIGURE 6-3

RESPONSE ACTION FORMER HERCULES MILL SITE

PROJECT: 040017.2	DATE: MAY 2005	
REV:	BY: SCG	CHECKED: JMK

FILE: BR2328007F01.3TR001-F6-1
DATE: Sep 07, 2007



LEGEND:

- NO ACTION REQUIRED
- 12" VEGETATED OR GRAVEL BARRIER
- 12" REMOVAL & REPLACEMENT VEGETATED SOIL BARRIER
- PORTION OF WALLACE YARD ROW INACCESSIBLE
- PLACEMENT OF 12" COMPACTED GRAVEL SUITABLE FOR ROAD USE
- CHAIN LINK FENCE
- FLOW DIRECTION
- 12" VEGETATED BARRIER – HERCULES MILL SITE

NOTES:

1. MAINTAIN DRAINAGE WAYS DURING AND AFTER RESPONSE ACTIVITIES. REGRADE AS NECESSARY TO PREVENT PONDING.
2. EXCAVATION NEAR CULVERTS, CATCH BASINS AND ROADWAYS MAY BE REQUIRED TO MAINTAIN DRAINAGE AFTER RESPONSE ACTIVITIES. SPREAD EXCAVATED MATERIAL IN SUITABLE AREA PRIOR TO BARRIER PLACEMENT OR HAUL EXCAVATED MATERIAL TO CONTAMINATED AREA.
3. DO NOT DISTURB EXISTING LANDSCAPED AREAS.
4. REGRADE CONTOURS FOR PARKING LOT REPRESENT GRADE PRIOR TO BARRIER PLACEMENT.

N

SCALE

80 0 80 FEET

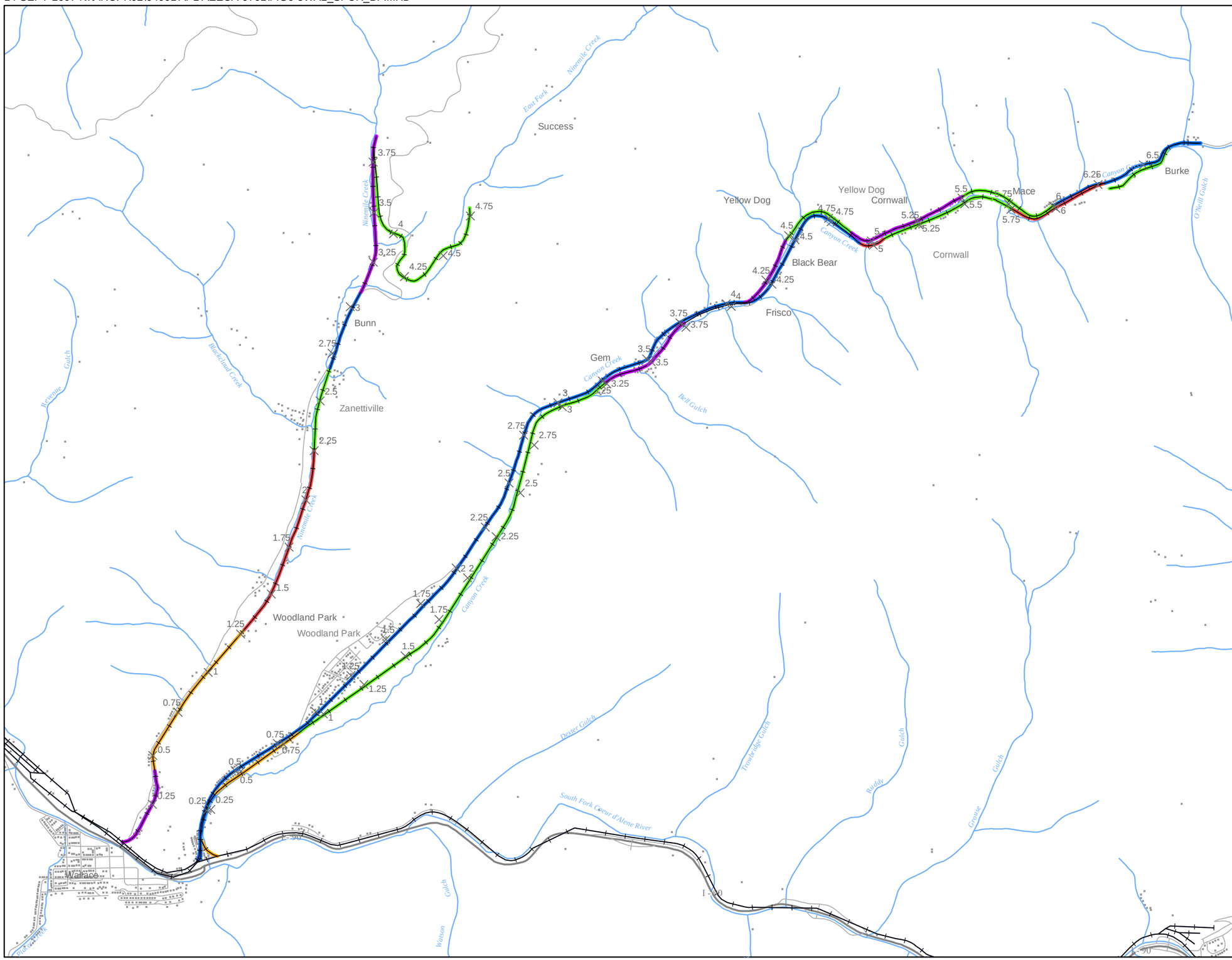
FIGURE 6-4

VISITORS CENTER PARKING LOT RESPONSE ACTION

PROJECT: 040017.2	DATE: MAY 2005
REV:	BY: SCG CHECKED: JMK

FILE: BR2328007501.STR001-F6-1
DATE: Sep 07, 2007

14-SEPT-2007 N:\ARCPRJ2\040017\PLT\EECA-0701\FIG6-5WAL_SPUR_BF.MXD



EXPLANATION

- River or Stream
- Interstate 90
- Road or Street
- Railroad_Survey
- Potential RUA Residential yard remediation, as necessary
- No Action
- 12" Gravel barrier or asphalt
- Railbed covered by paved road - Possible road shoulder remediation
- 12" Vegetated or gravel barrier
- mileposts

N

1:30,000
1 INCH = 2500 FEET
SCALE IN FEET

2,500 1,250 0 2,500

FIGURE 6-5

WALLACE YARD
CANYON AND NINEMILE CREEK
SPUR LINES RECOMMENDED
RESPONSE ACTIONS

PROJECT: 040017;040024	DATE: SEPT 14, 2007	
REV: 0	BY: MW	CHECKED: TM

APPENDIX A

Photo Record of Spur Line Reconnaissance
Ninemile Creek

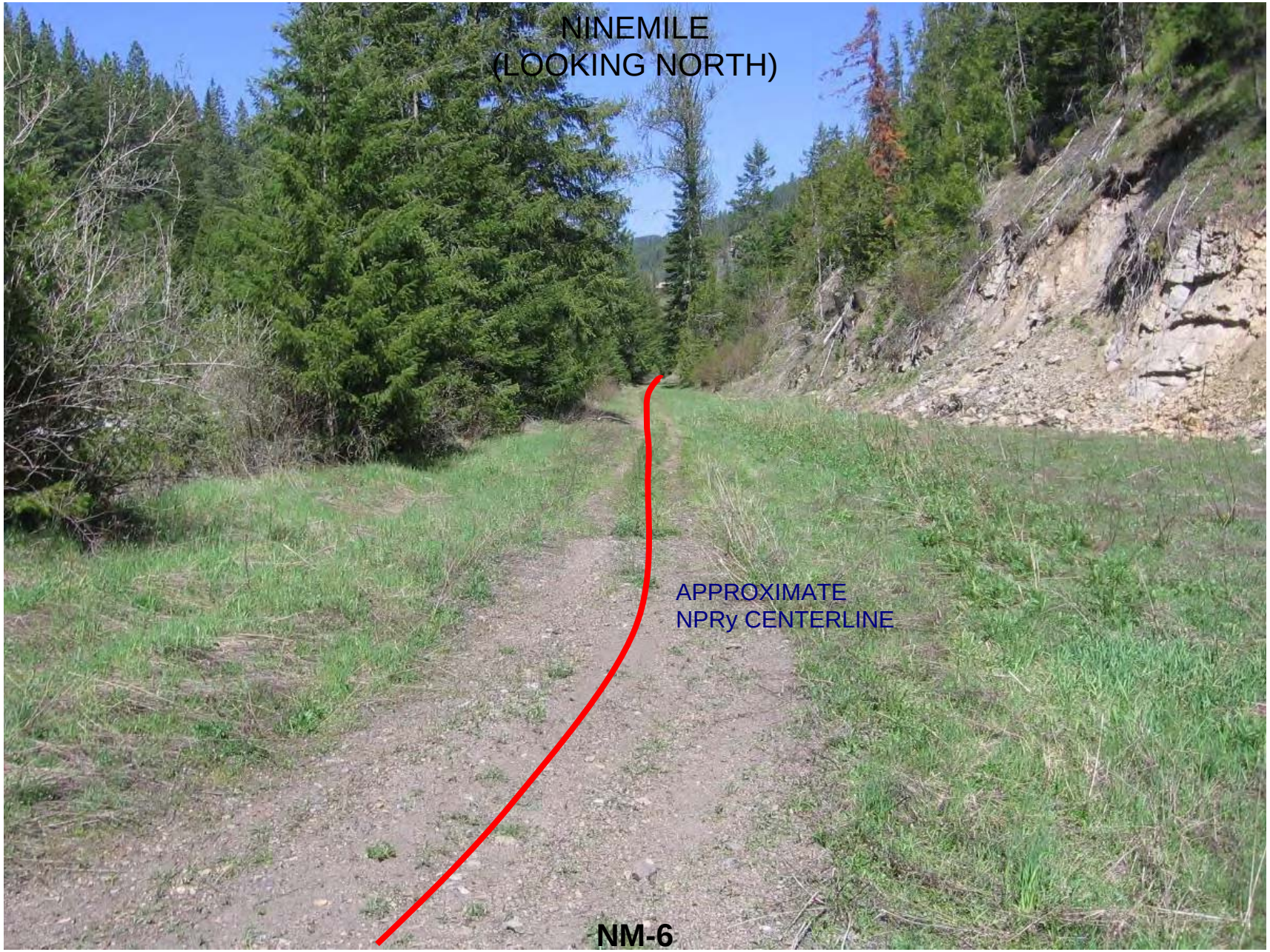
NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-1

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12 15 2004
NM-2

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM-3

NINEMILE
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
NM 4

NINEMILE
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-5



NM-6

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM 7

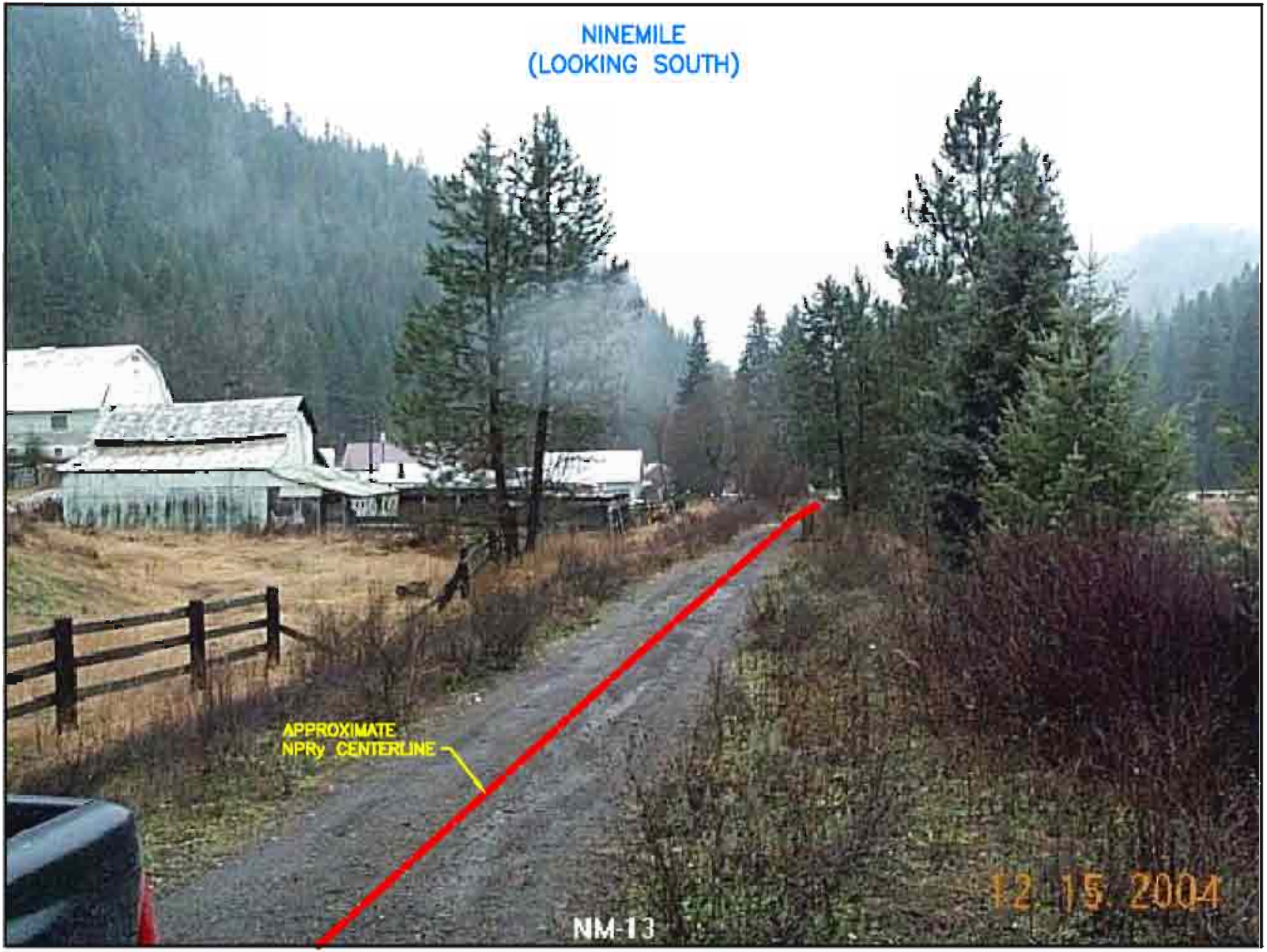
NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12 15 2004
NM-8

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM-9
12 15 2004

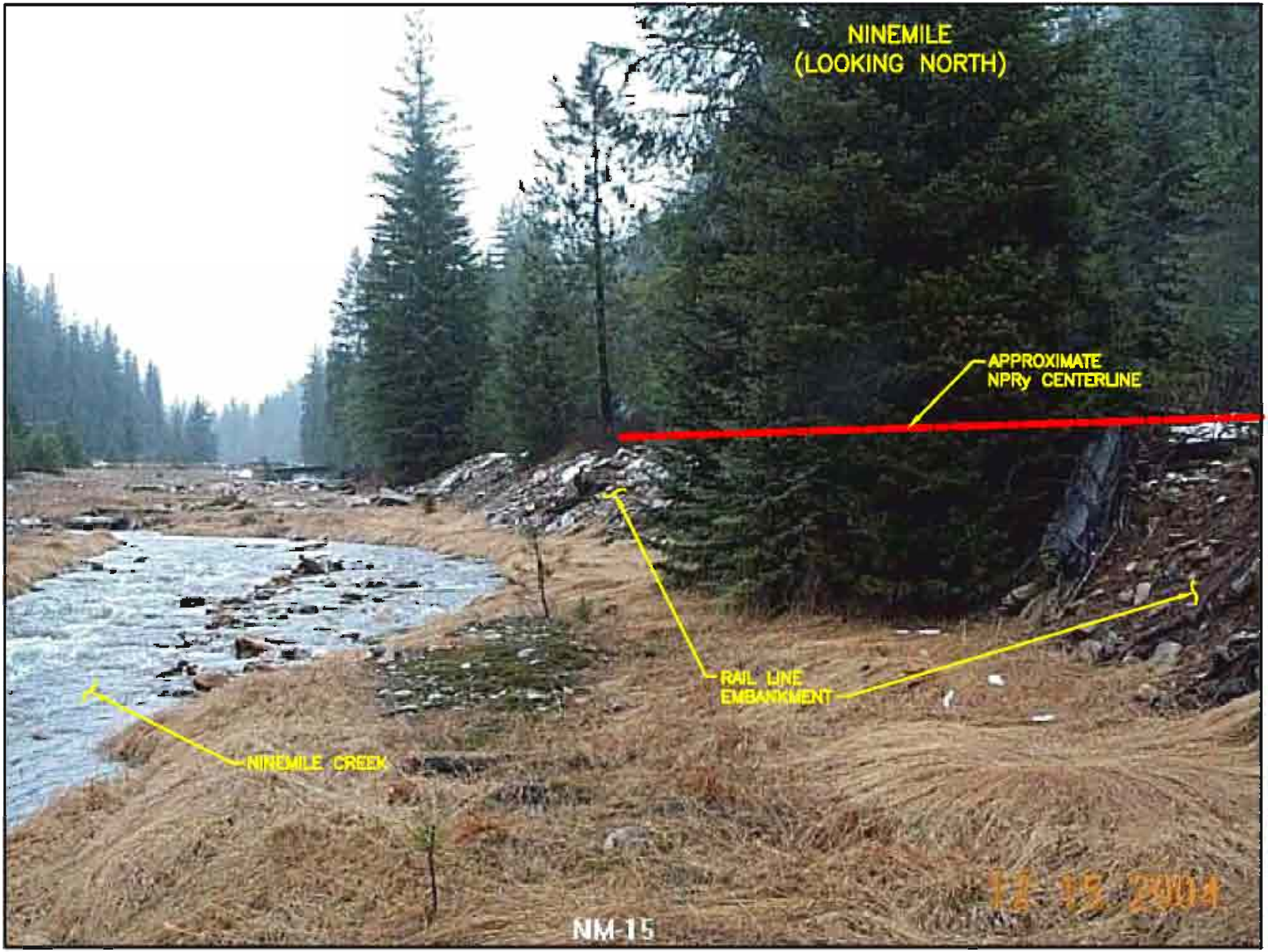
NINEMILE
(LOOKING NORTH)
NINEMILE CREEK
RAIL LINE
EMBANKMENT
12 15 2004
NM-10

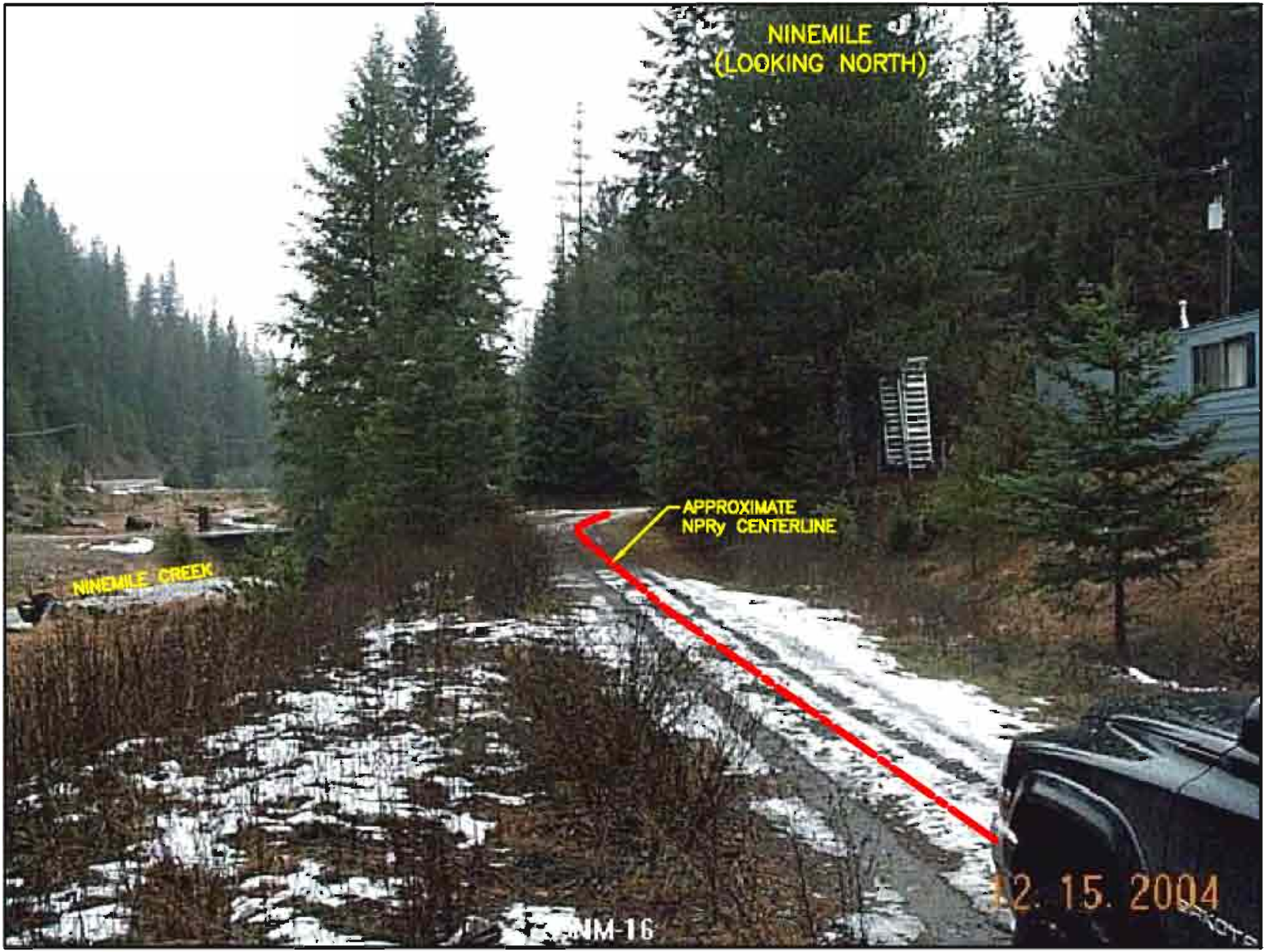
NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
M-11

NINEMILE
(LOOKING NORTH)
NINEMILE CREEK
APPROXIMATE
NPRy CENTERLINE
12 15 2004


NINEMILE
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-13

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM 14


NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
RAIL LINE
EMBANKMENT
NINEMILE CREEK
NM-15

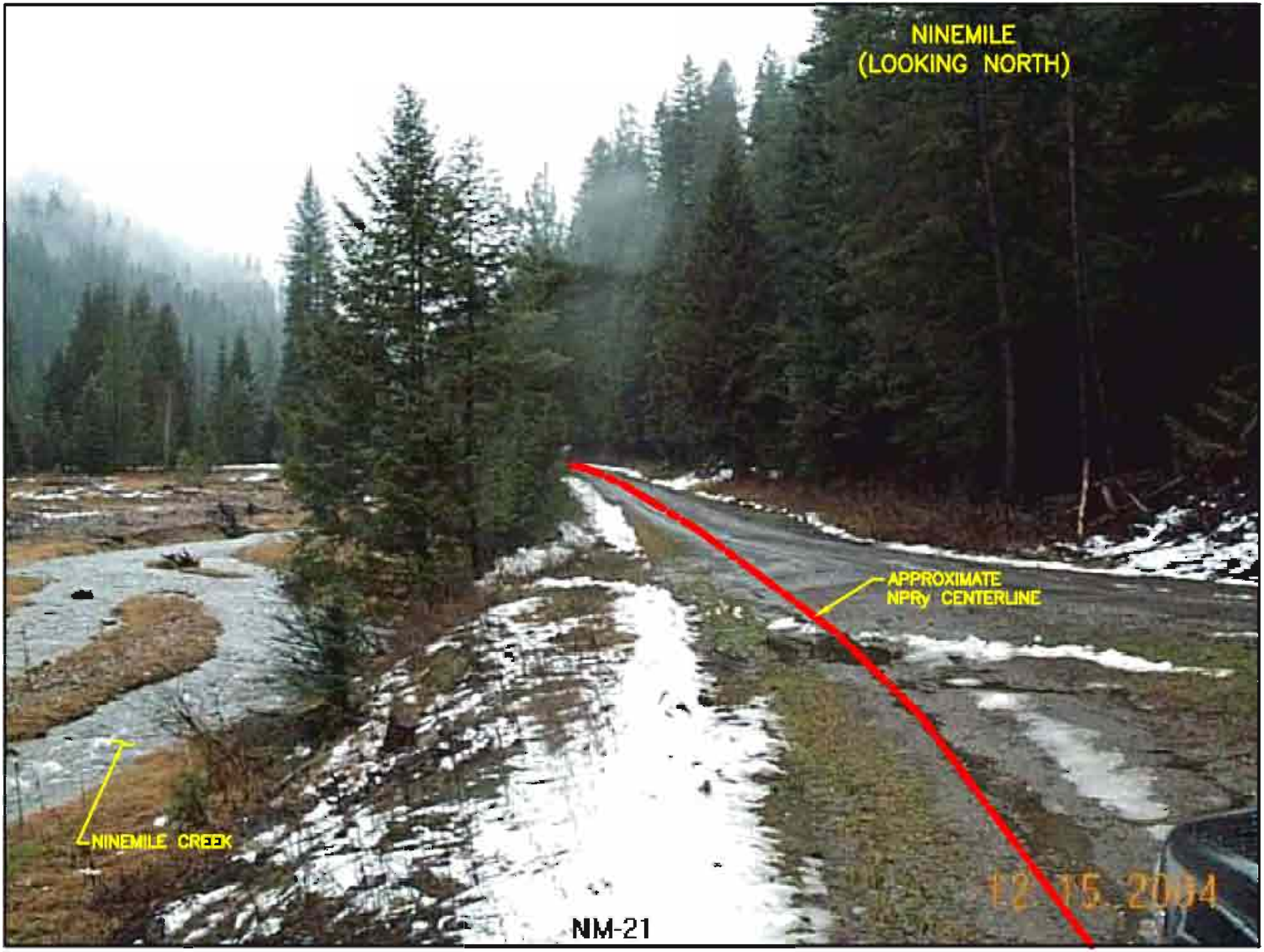

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12. 15. 2004
NM-16

NINEMILE
(LOOKING NORTH)
4X4
S 32392
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-17

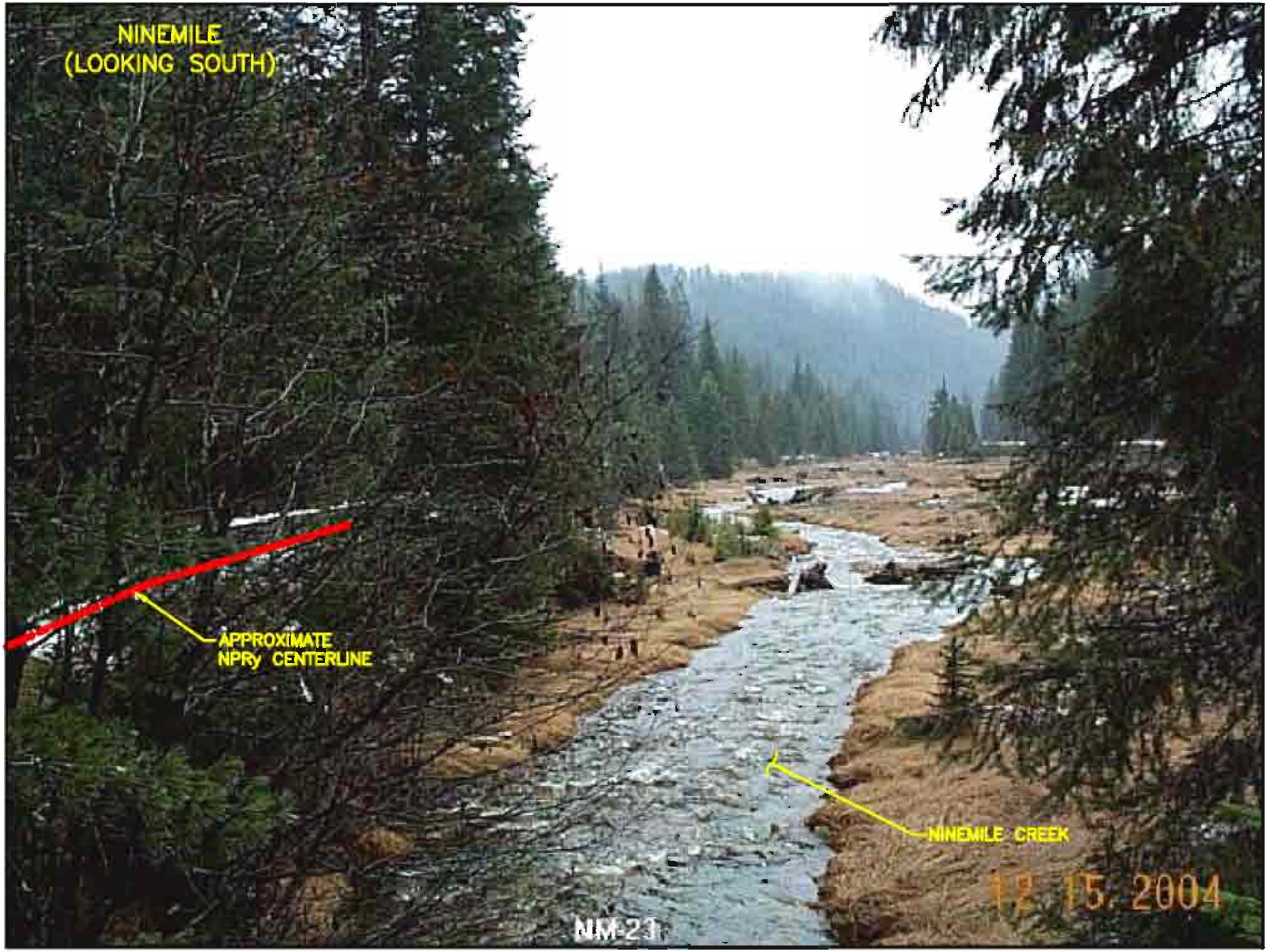
NINEMILE
(LOOKING SOUTH)
NINEMILE CREEK
12 15 2004
NM-18

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12. 15. 2004
NM-19

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-20


NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12 15 2004
NM-21

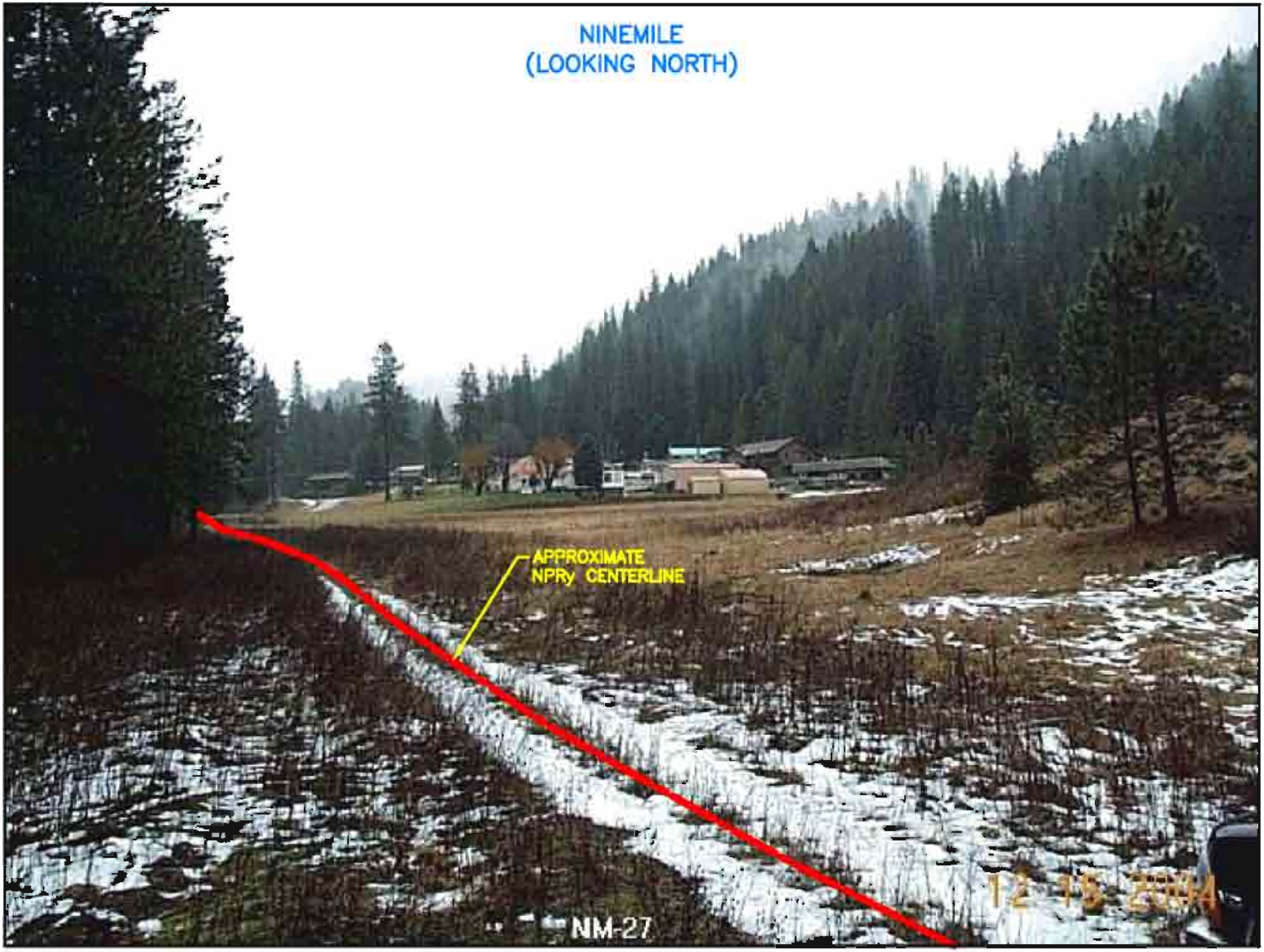
NINEMILE
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12 15 2004
NM-22

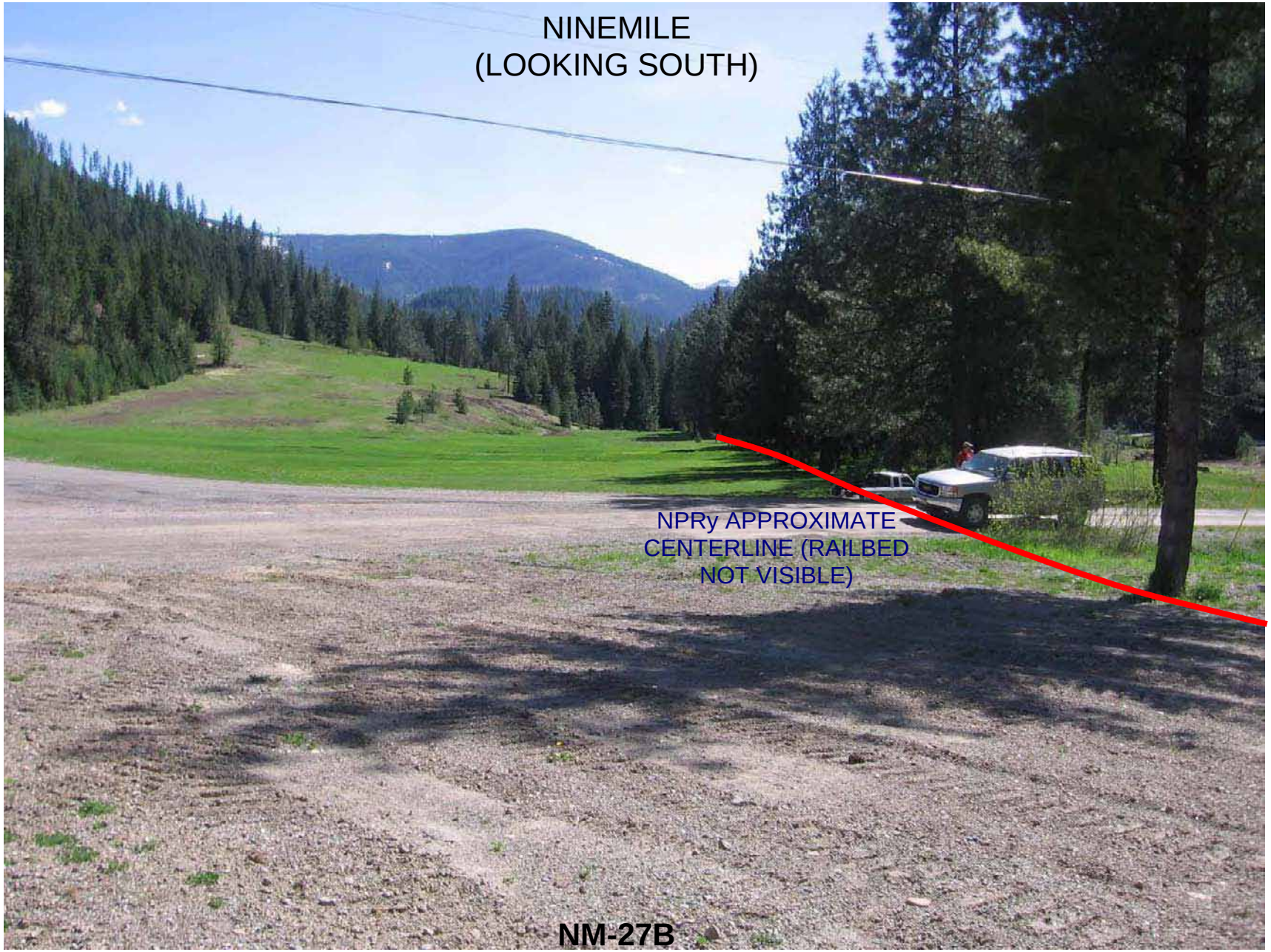

NINEMILE
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
NINEMILE CREEK
12 15 2004
NM-23

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-24

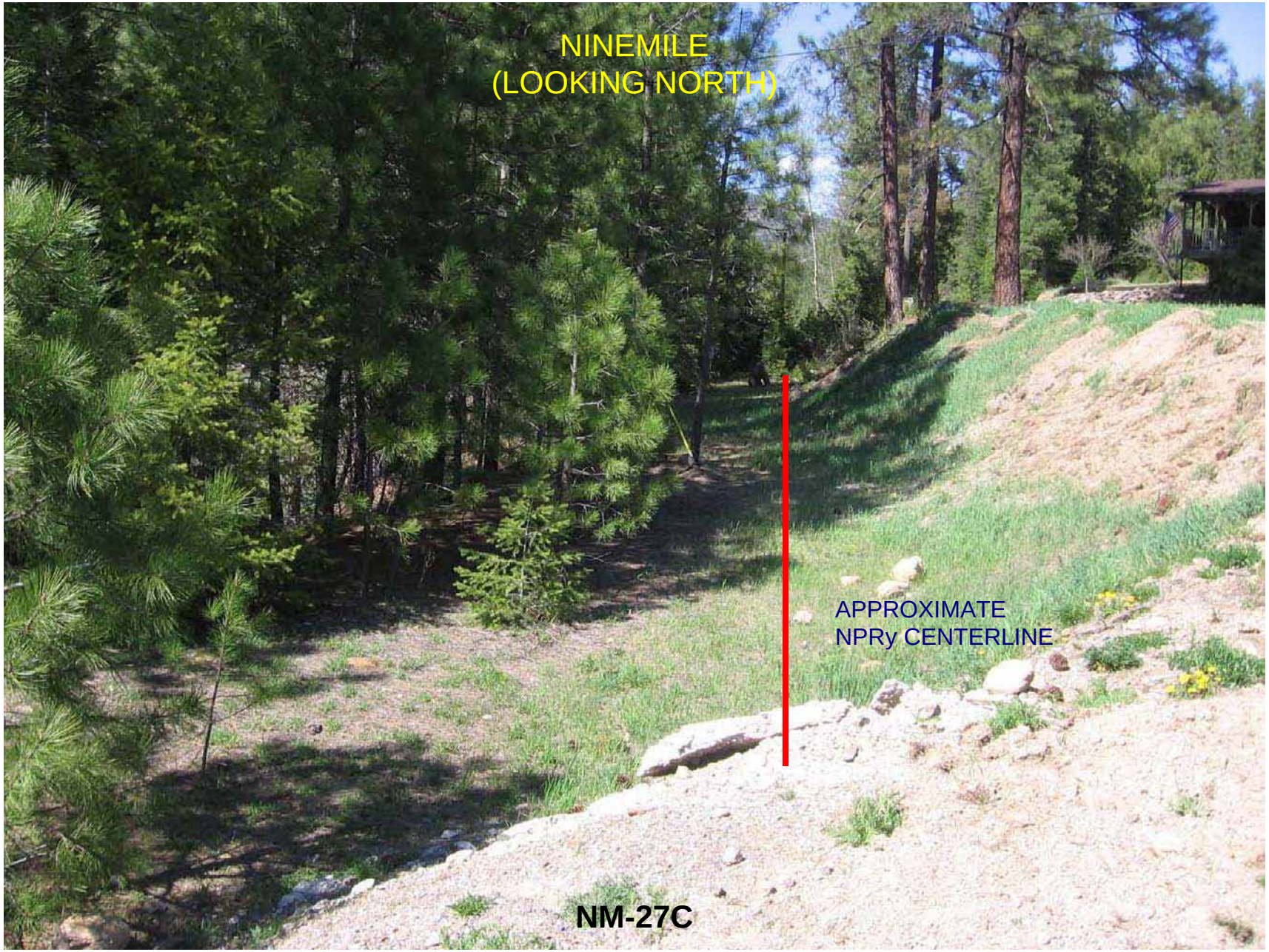
NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM-25
12 15 2004

NINEMILE
(LOOKING NORTH)
NINEMILE CREEK
NM-26


NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM-27

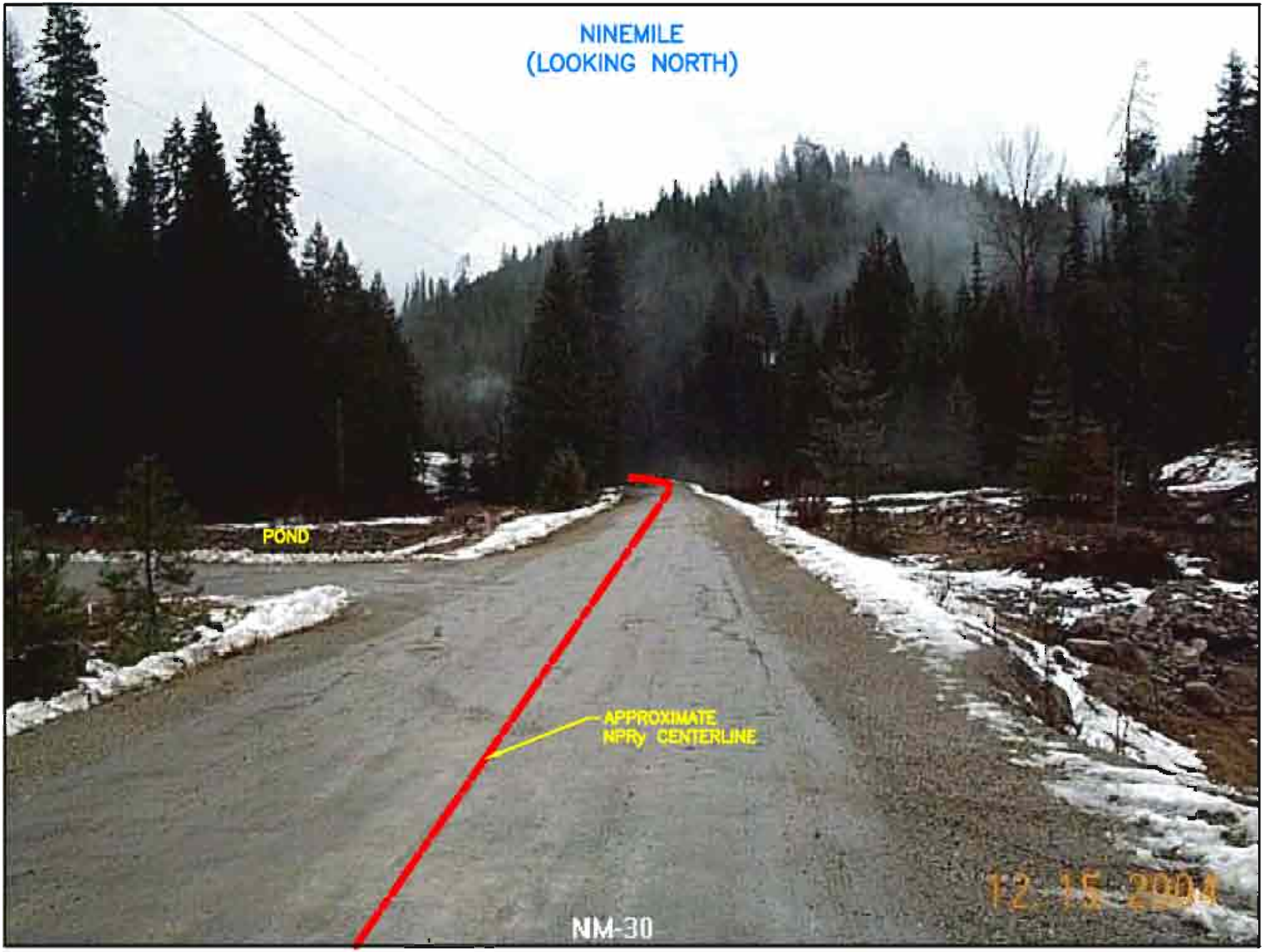

NINEMILE
(LOOKING SOUTH)
NPRy APPROXIMATE
CENTERLINE (RAILBED
NOT VISIBLE)

NM-27B


NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
NM-27C

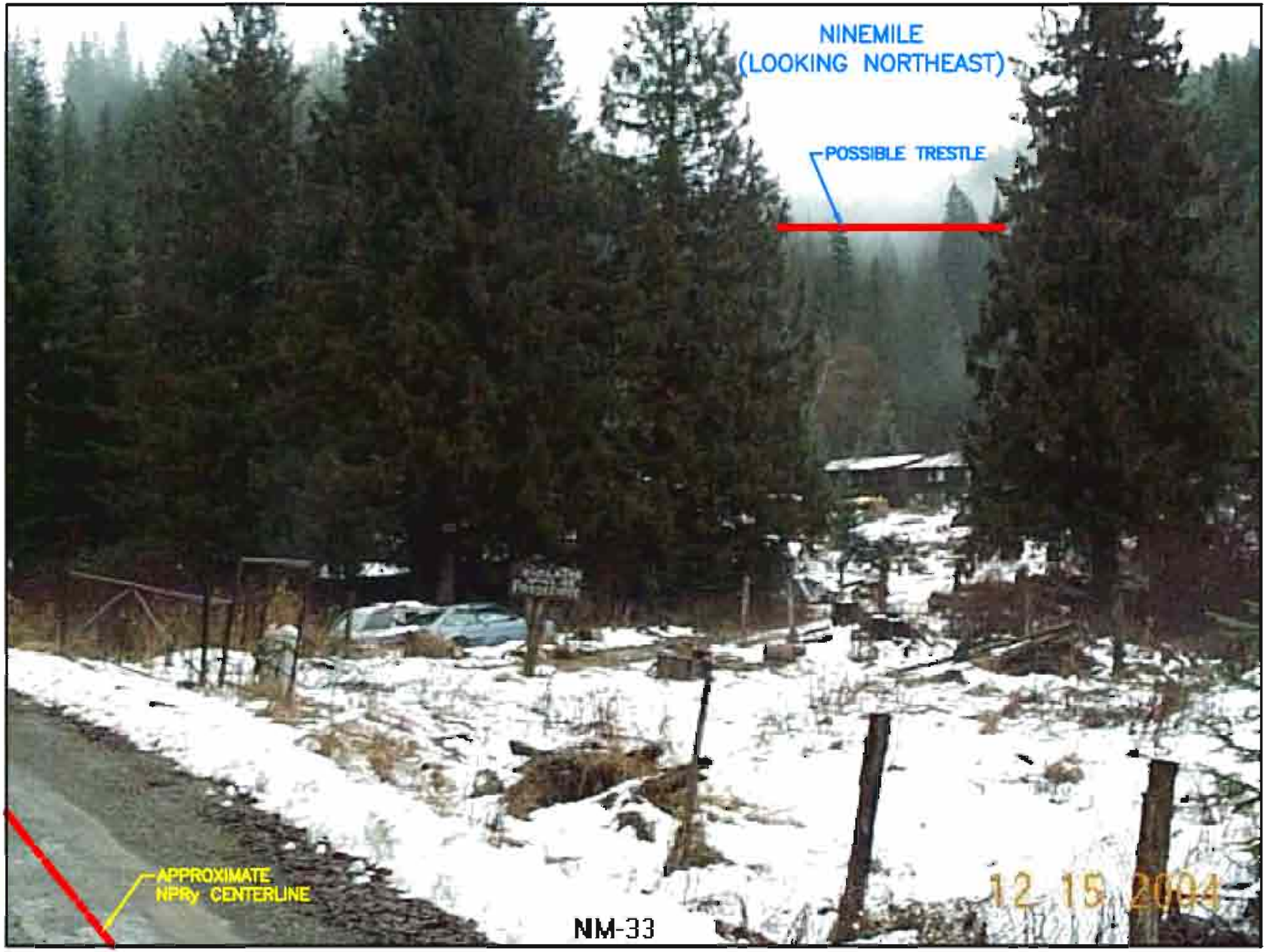
NINEMILE
(LOOKING SOUTH)
20
ZANNIVILLE
POSSIBLE NPRy
CENTERLINE
NM-28

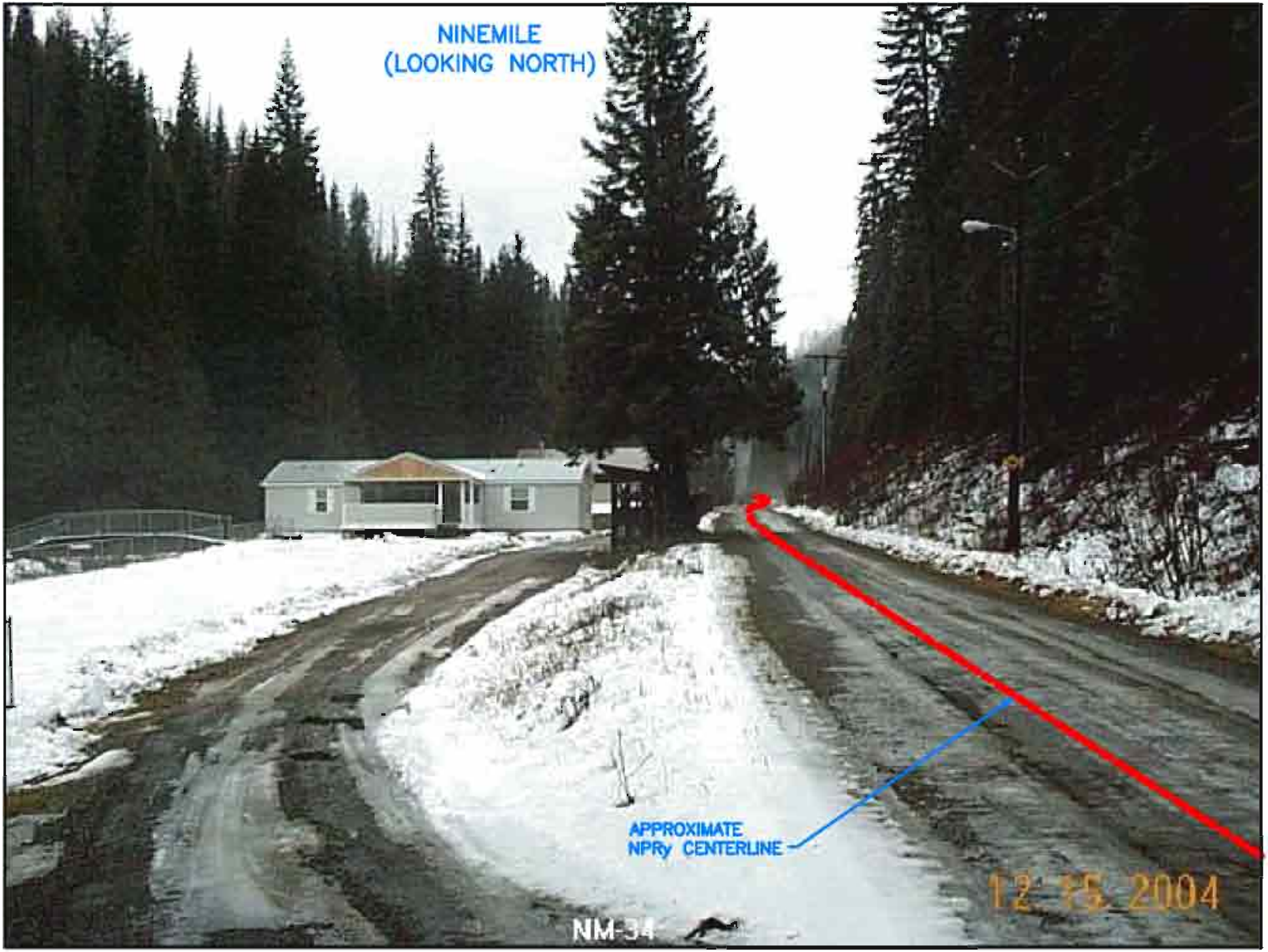
NINEMILE
(LOOKING NORTH)
POSSIBLE NPRy
CENTERLINE
NINEMILE CREEK
NM-29


NINEMILE
(LOOKING NORTH)
POND
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-30

NINEMILE
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
MM 31

NINEMILE
(LOOKING NORTH)
RESIDENCE
12 15 2004
NM 32


NINEMILE
(LOOKING NORTHEAST)
POSSIBLE TRESTLE
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-33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(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
NM-34

NINEMILE
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
12. 15. 2004
NM-35

APPENDIX B

Photo Record of Spur Line Reconnaissance
Burke Canyon

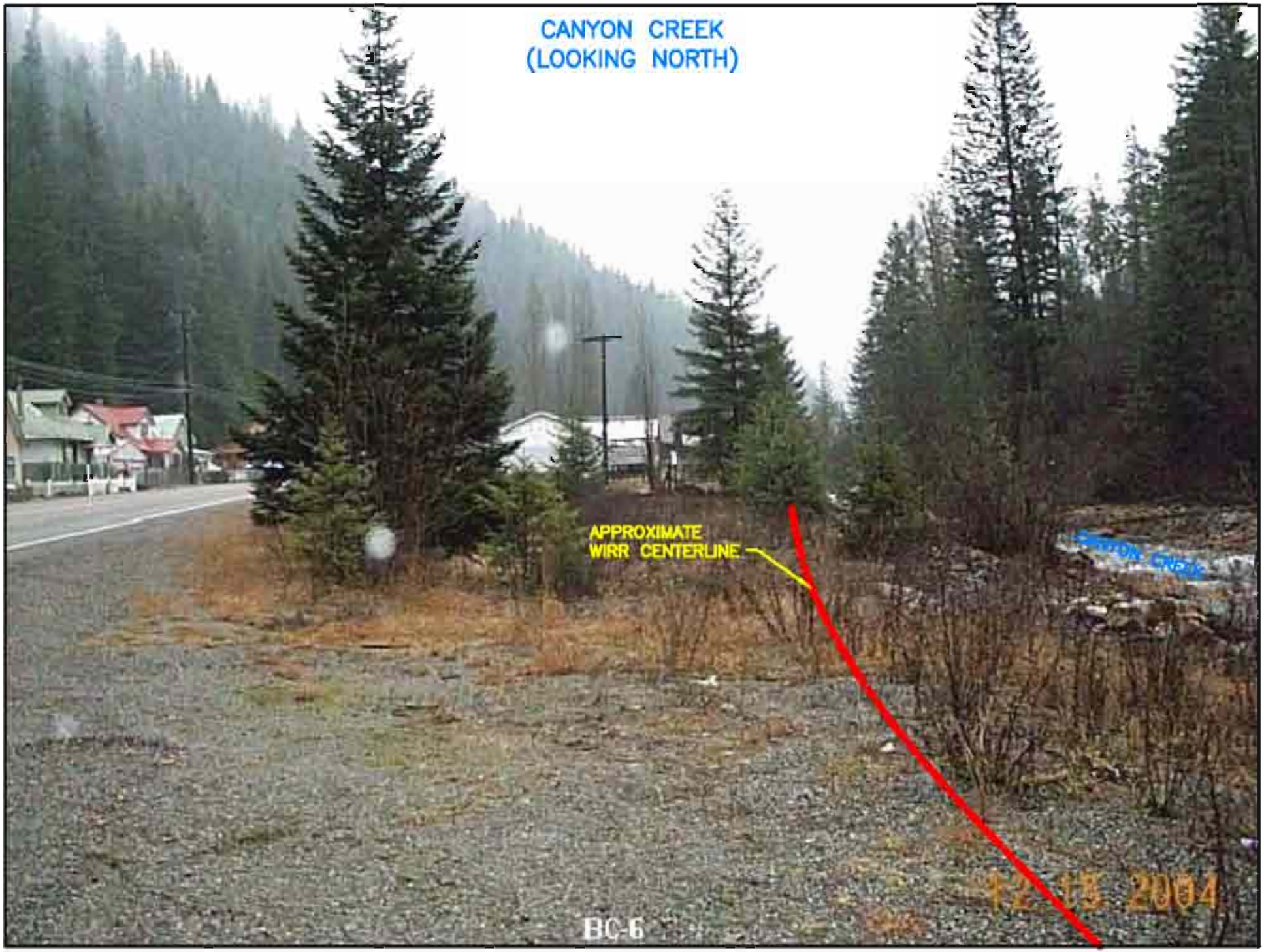
CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
BC 1

CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
CANYON CREEK
12 15 2004
DC-2

CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
12 15 2004
BC-3

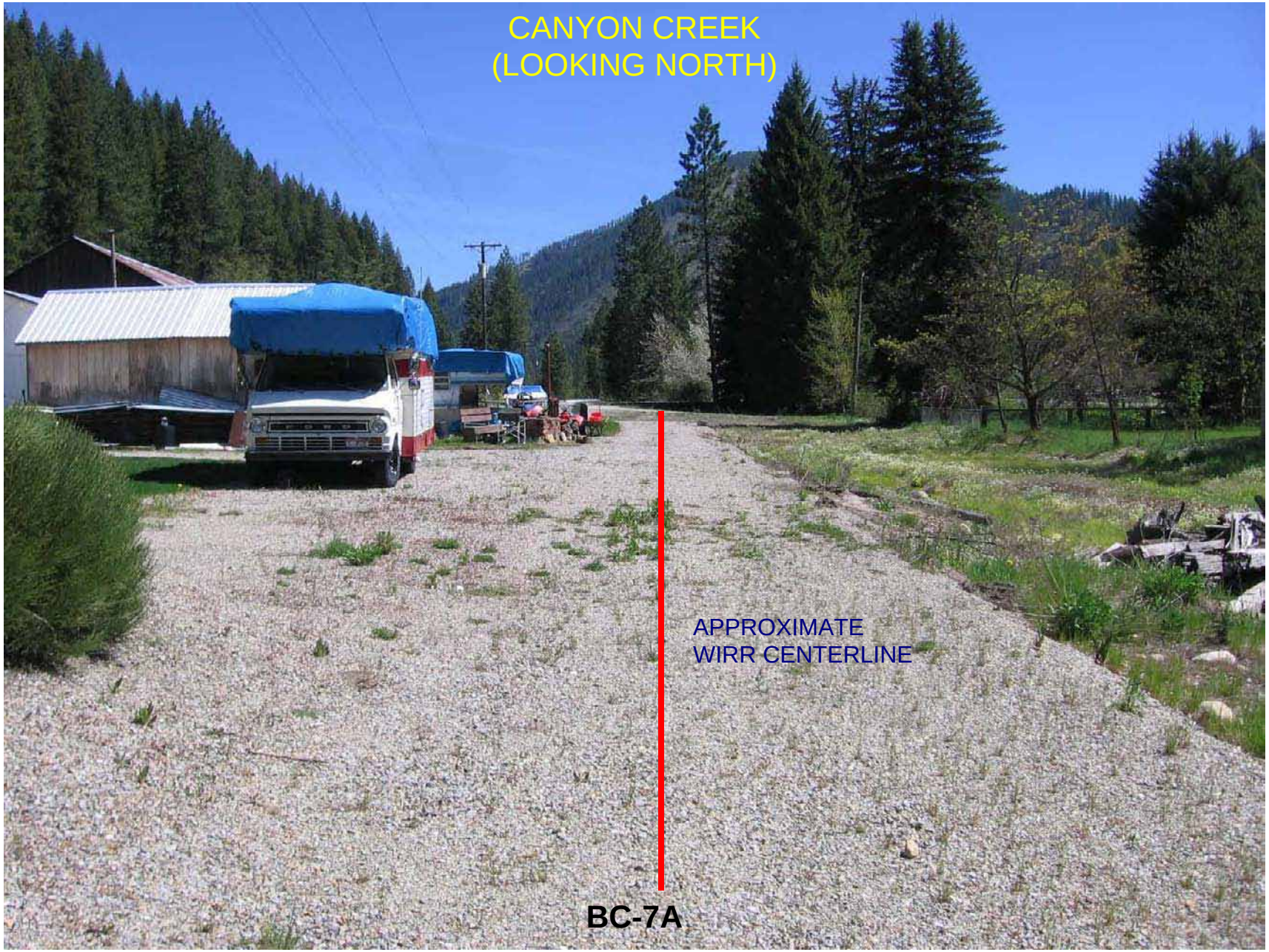
CANYON CREEK
(LOOKING SOUTH)
I-90
APPROXIMATE
WIRR BRIDGE
APPROXIMATE
WIRR CENTERLINE
CANYON CREEK
BC-4

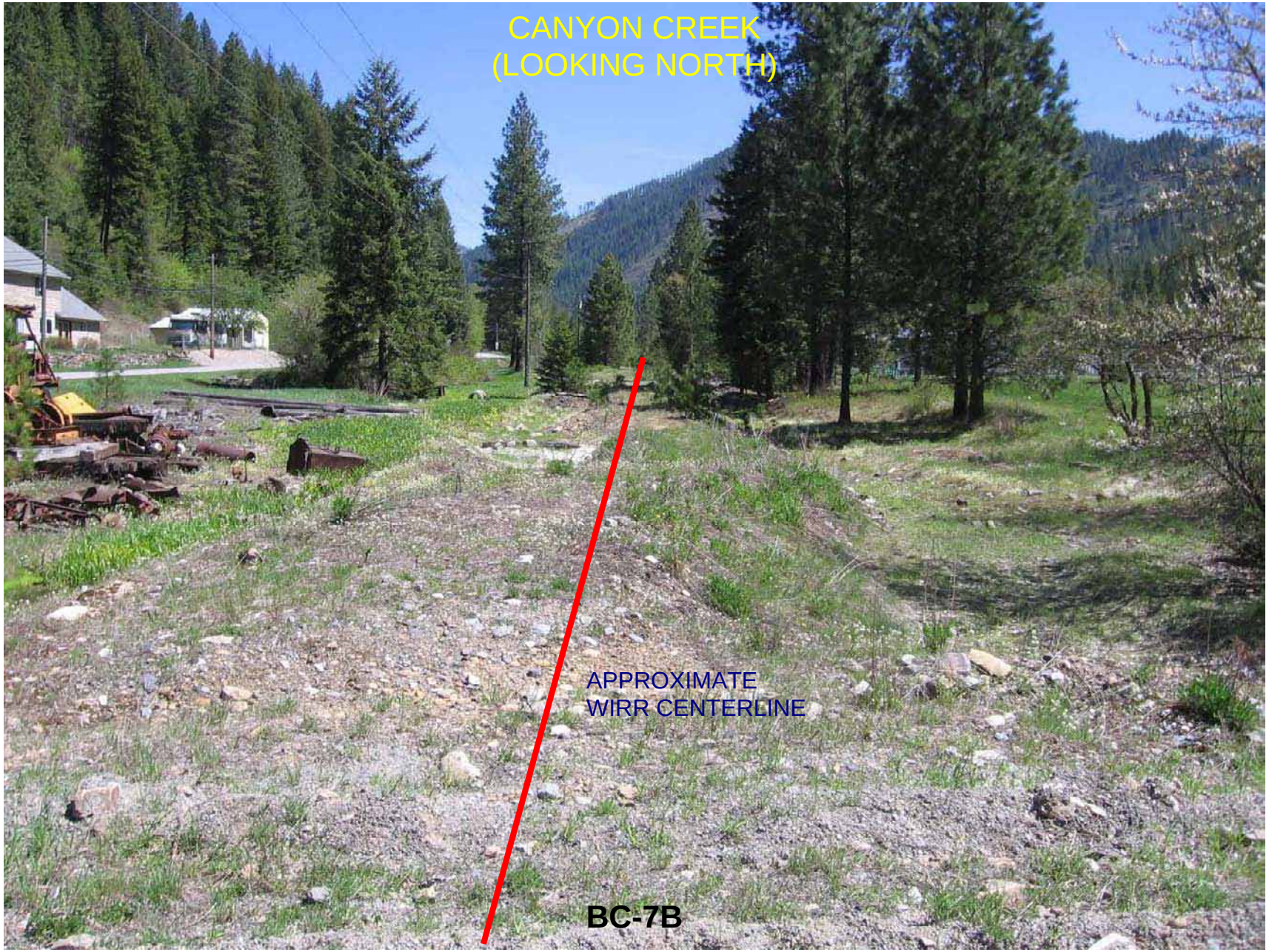
CANYON CREEK
(LOOKING SOUTH)
I-90
APPROXIMATE
WIRR CENTERLINE
BC-5


CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
12 13 2004

BC-6

CANYON CREEK
(LOOKING SOUTH)
CANYON CREEK
APPROXIMATE
WIRR CENTERLINE
BC-7
12 15 2004


CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
BC-7A


CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
BC-7B

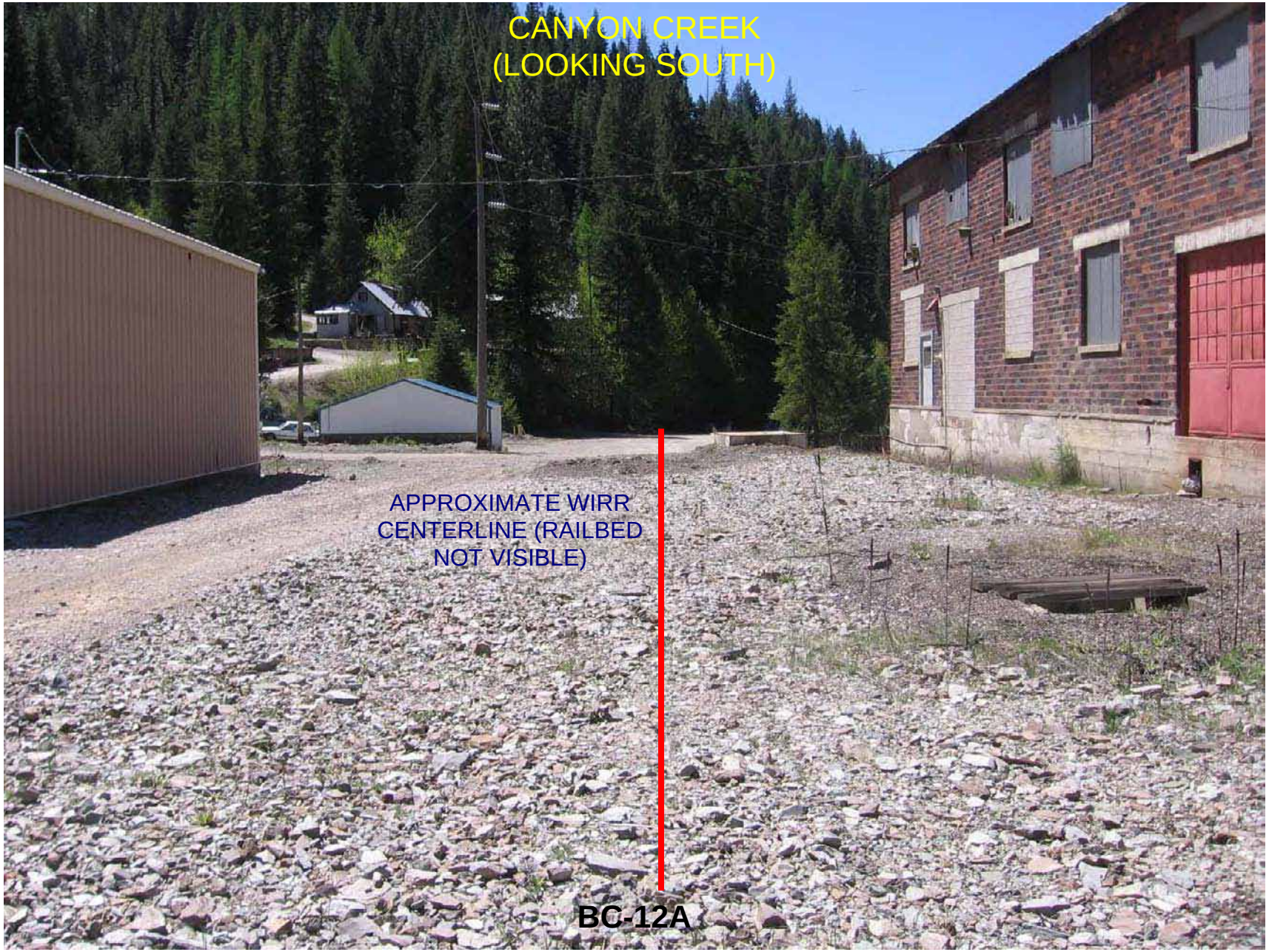
CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
CANYON CREEK
12 15 2004

BC-8

CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
CANYON CREEK
BC-9

CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
WIRR CENTERLINE
CANYON CREEK
12 16 2004
BC 10

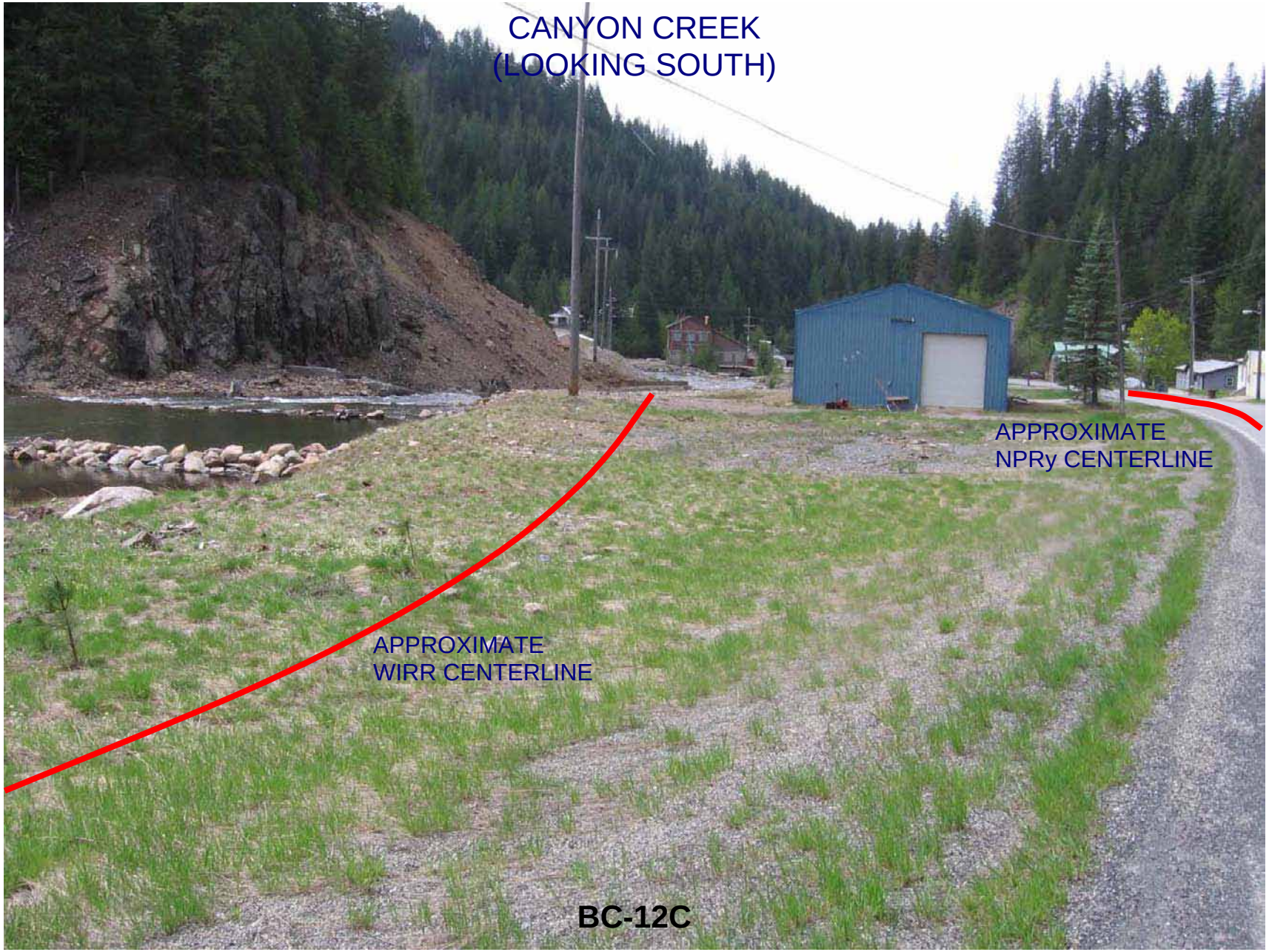
CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
WIRR CENTERLINE
12 15 2004
DC 01


CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE WIRR
CENTERLINE (RAILBED
NOT VISIBLE)

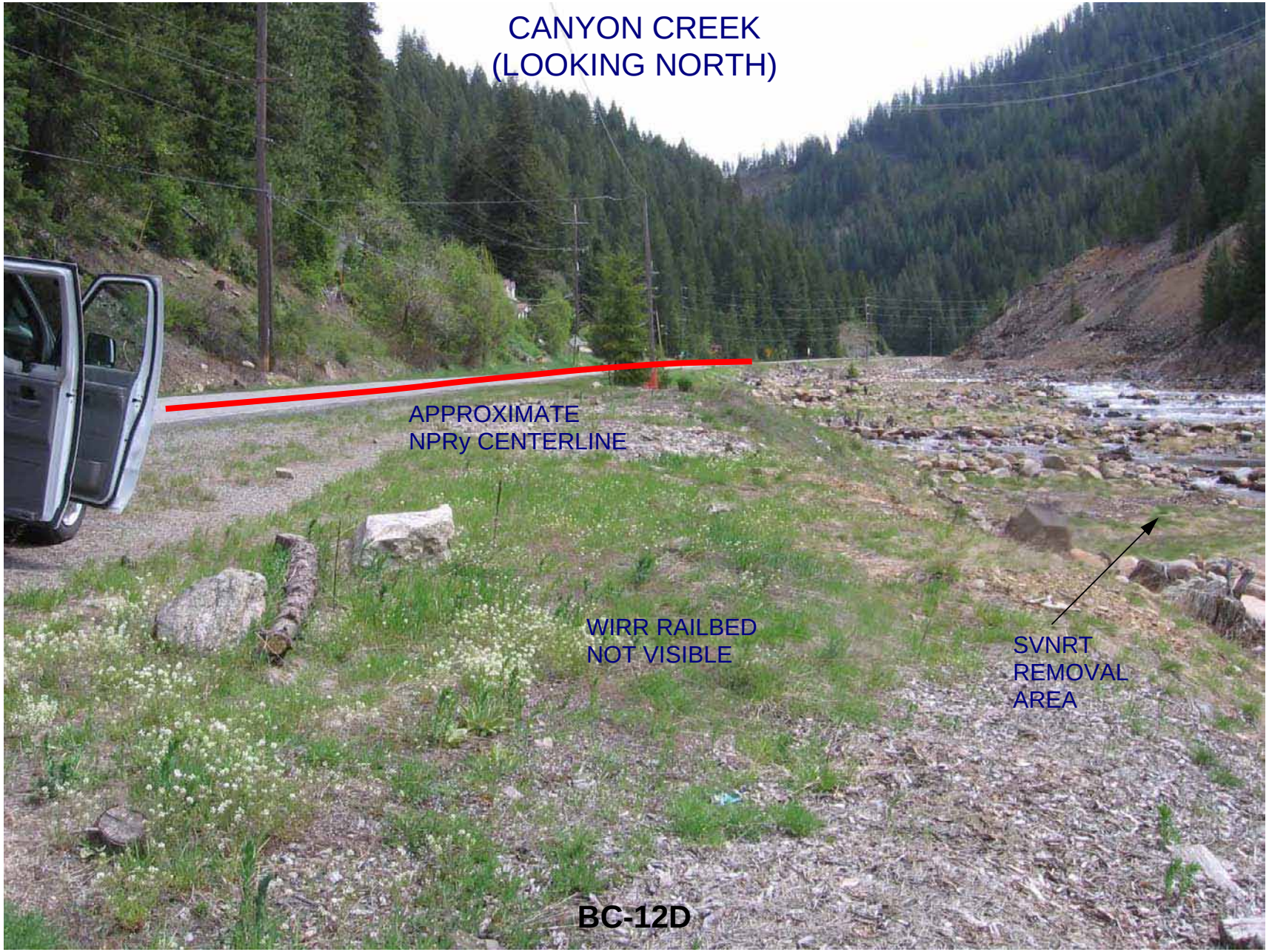
BC-12A

CANYON CREEK
(LOOKING NORTH)
FORMER WIRR
ABUTMENT (RAILBED
NOT VISIBLE)
APPROXIMATE NPRy
CENTERLINE

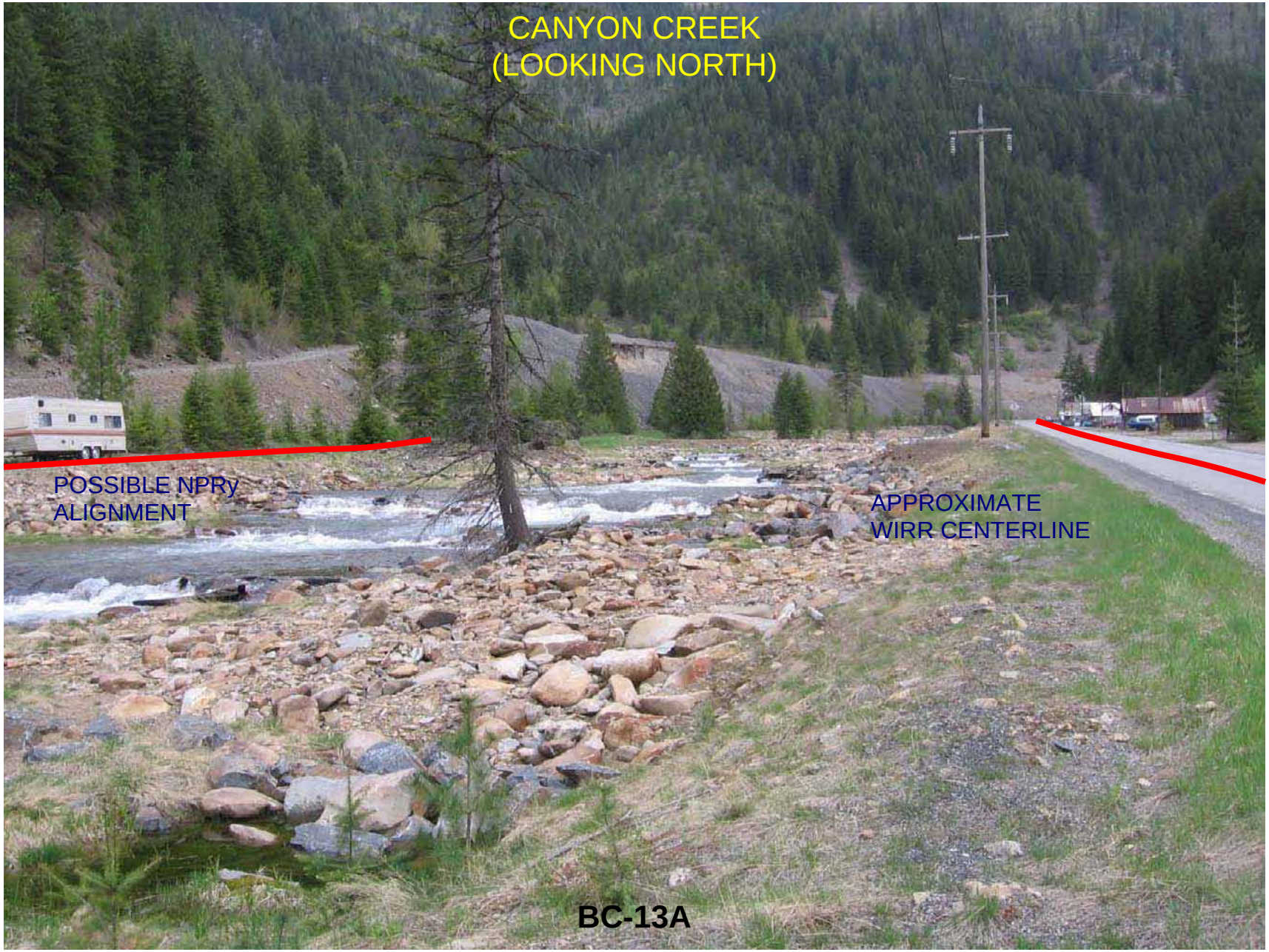
BC-12B


CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
APPROXIMATE
WIRR CENTERLINE

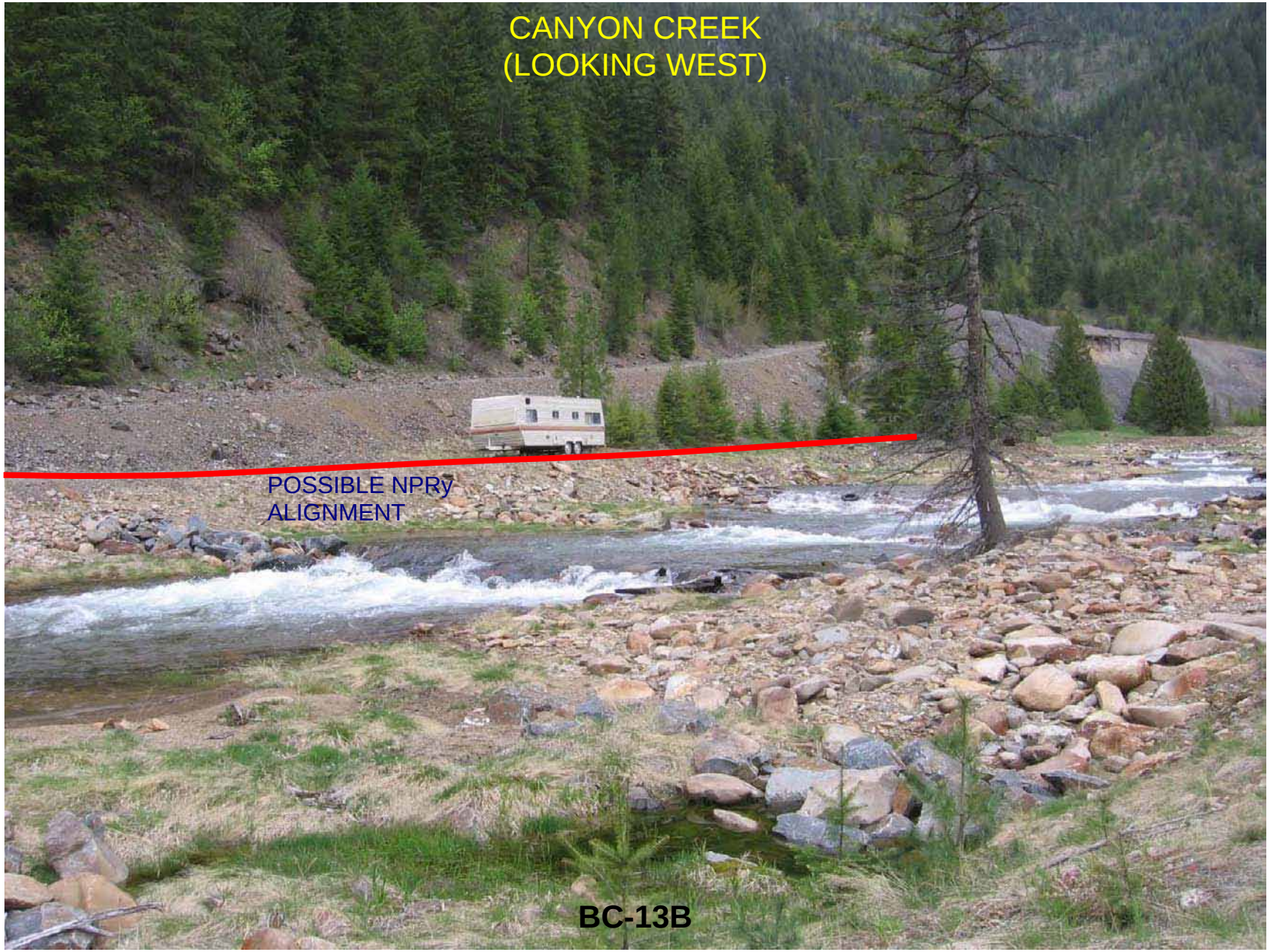
BC-12C


CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
WIRR RAILBED
NOT VISIBLE
SVNRT
REMOVAL
AREA

BC-12D


CANYON CREEK
(LOOKING NORTH)
POSSIBLE NPRy
ALIGNMENT
APPROXIMATE
WIRR CENTERLINE

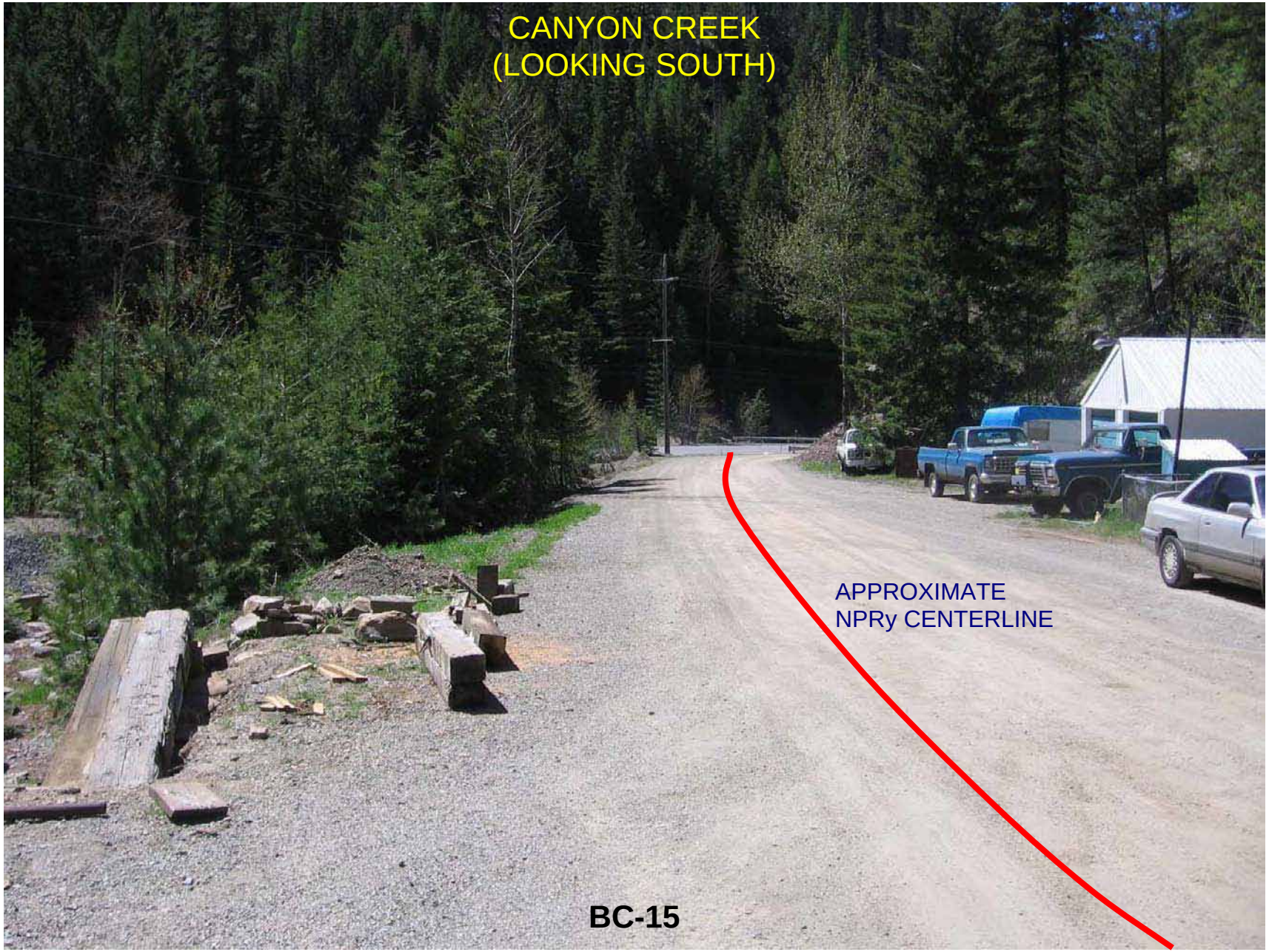
BC-13A



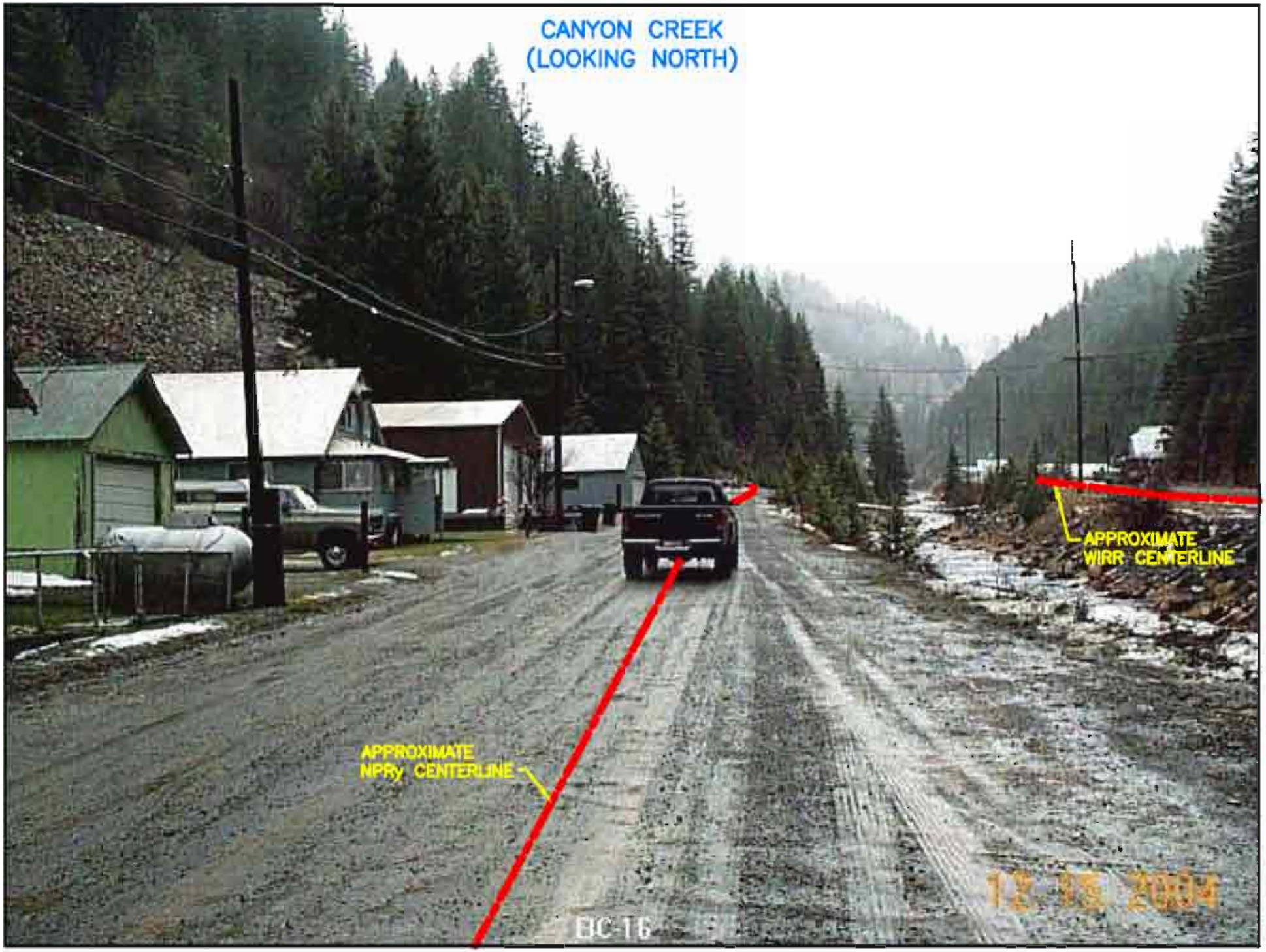
BC-13B

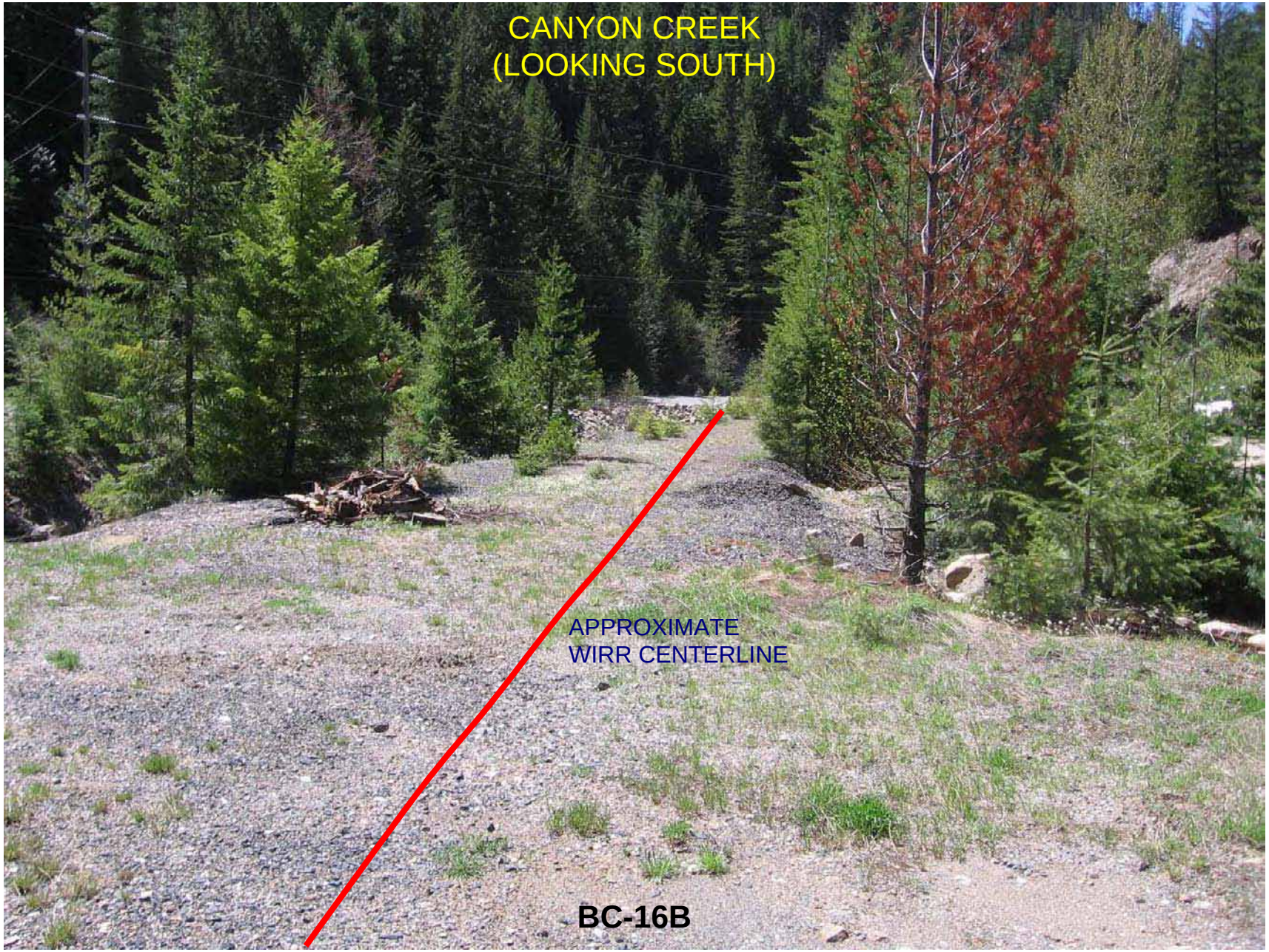
CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
APPROXIMATE
WIRR CENTERLINE
12 15 2004

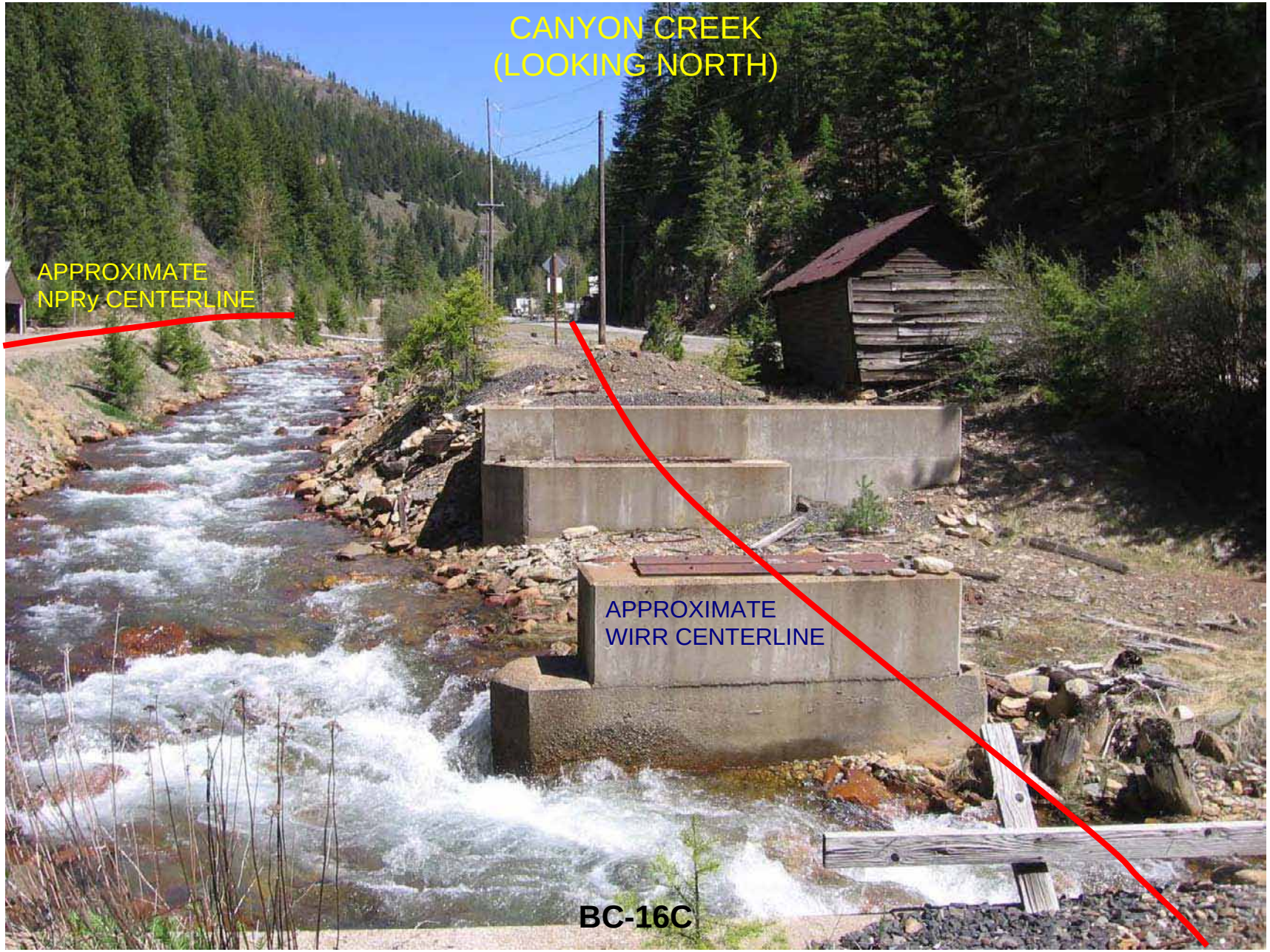
BC-14



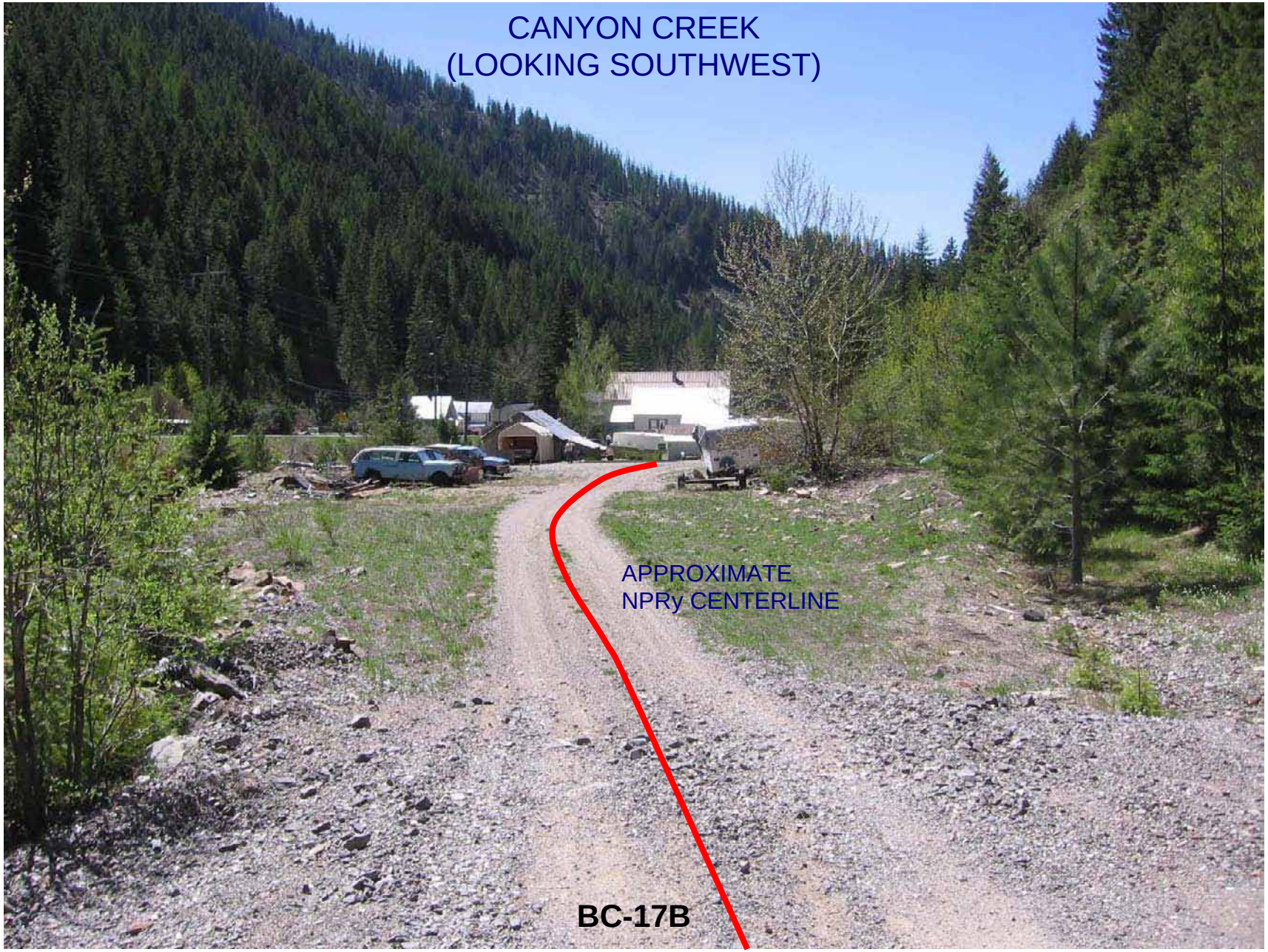
BC-15

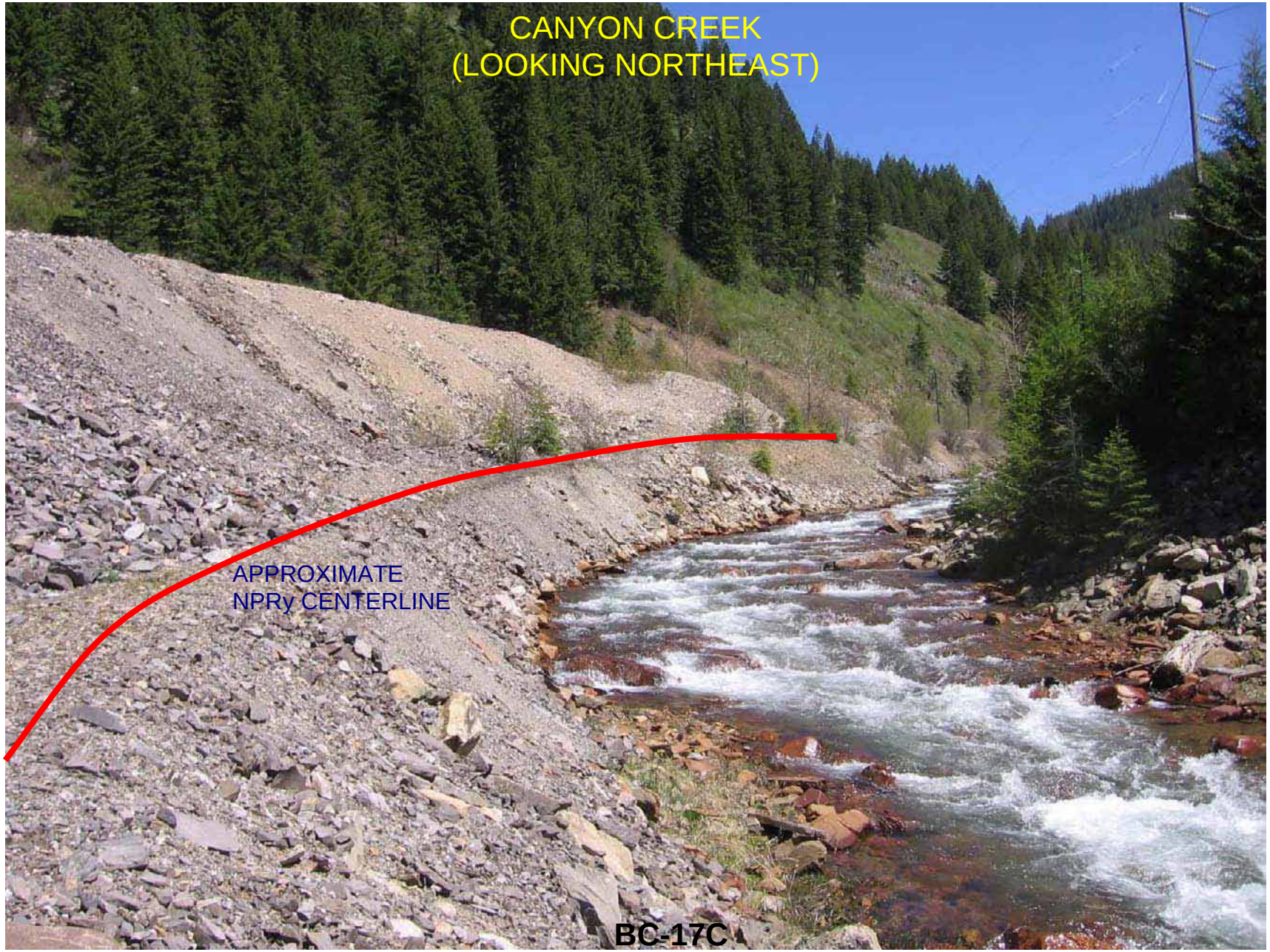

CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
APPROXIMATE
NPRy CENTERLINE
EIC-16


CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
WIRR CENTERLINE
BC-16B


CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
APPROXIMATE
WIRR CENTERLINE
BC-16C

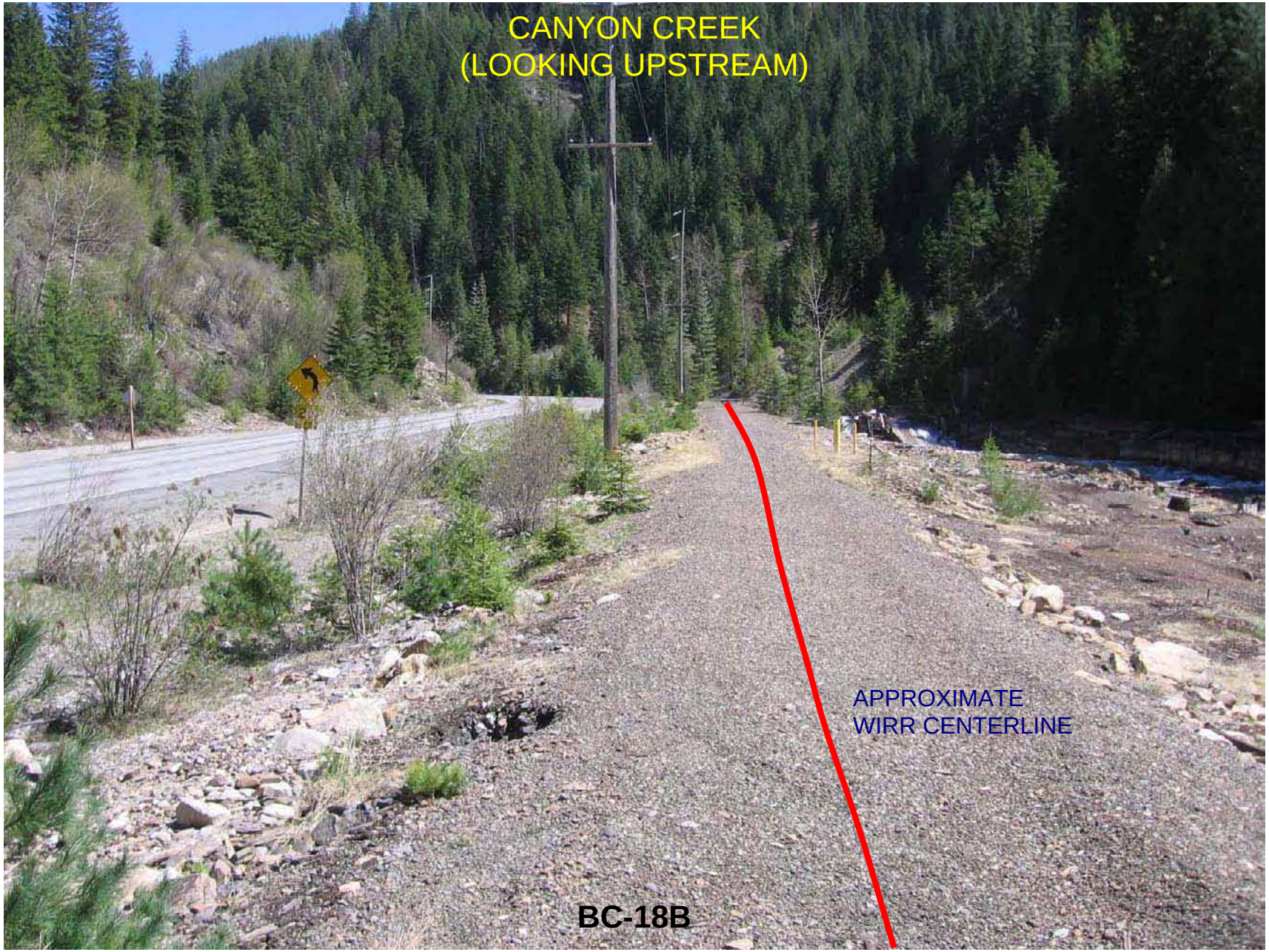
CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
12 15 2004
BC-17

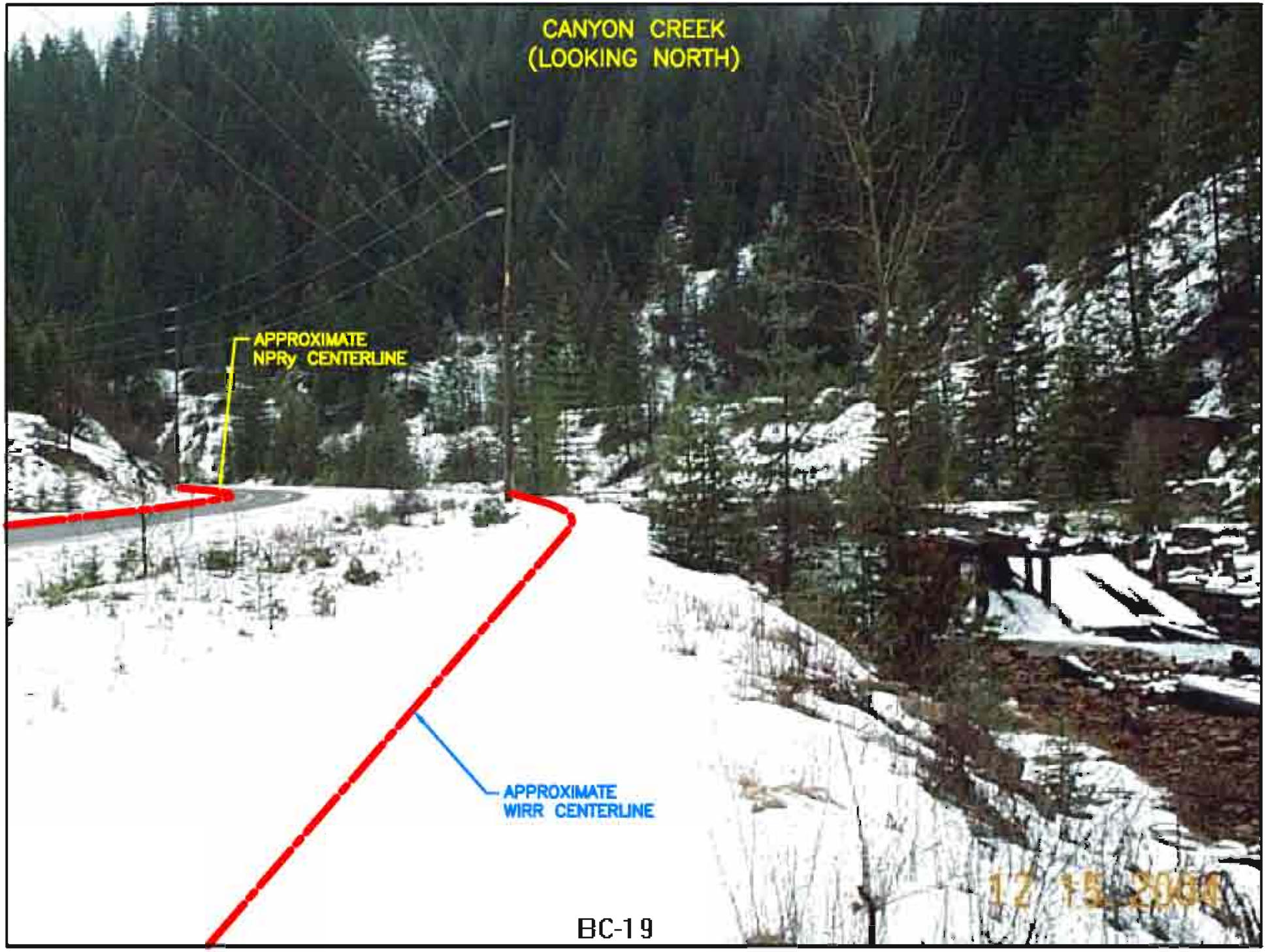

CANYON CREEK
(LOOKING SOUTHWEST)
APPROXIMATE
NPRy CENTERLINE
BC-17B


CANYON CREEK
(LOOKING NORTHEAST)
APPROXIMATE
NPRy CENTERLINE

BC-17C

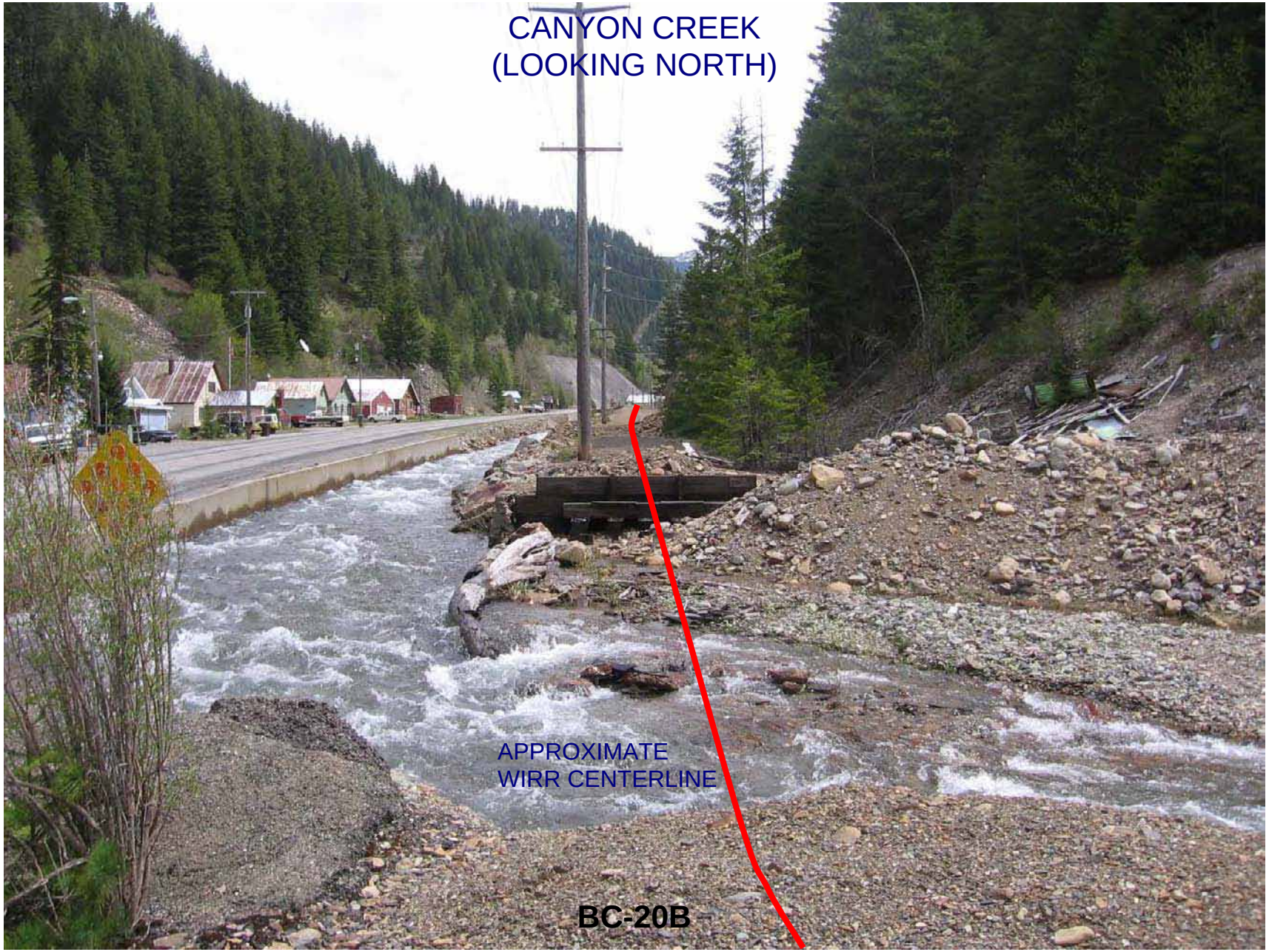
CANYON CREEK
(LOOKING DOWNSTREAM)
APPROXIMATE
WIRR CENTERLINE
BC-18A


CANYON CREEK
(LOOKING UPSTREAM)
APPROXIMATE
WIRR CENTERLINE
BC-18B


CANYON CREEK
(LOOKING NORTH)
APPROXIMATE
NPRy CENTERLINE
APPROXIMATE
WIRR CENTERLINE
12/15/2000

BC-19

CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
NPRy
CENTERLINE
APPROXIMATE
WIRR CENTERLINE
BC-20A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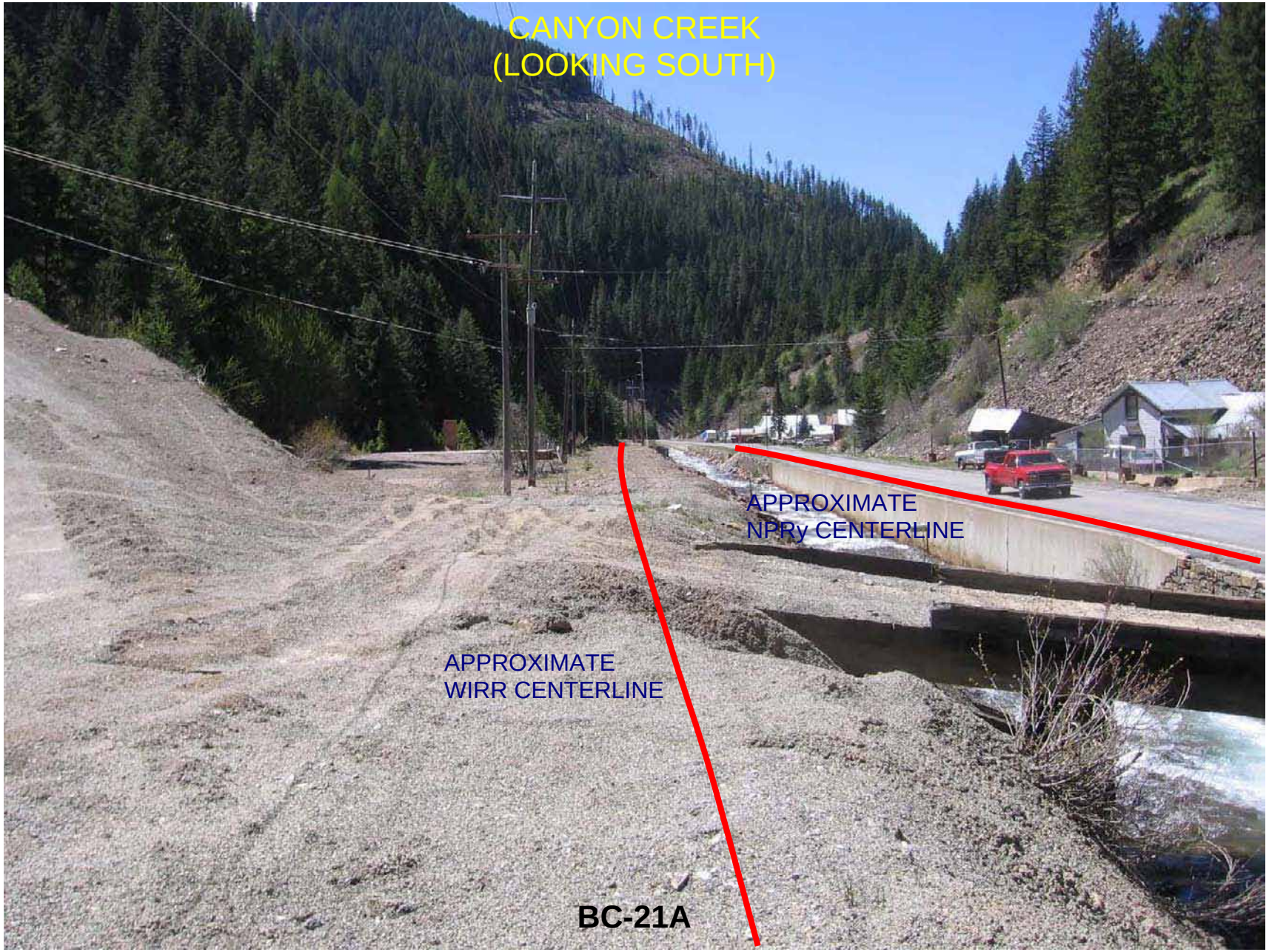
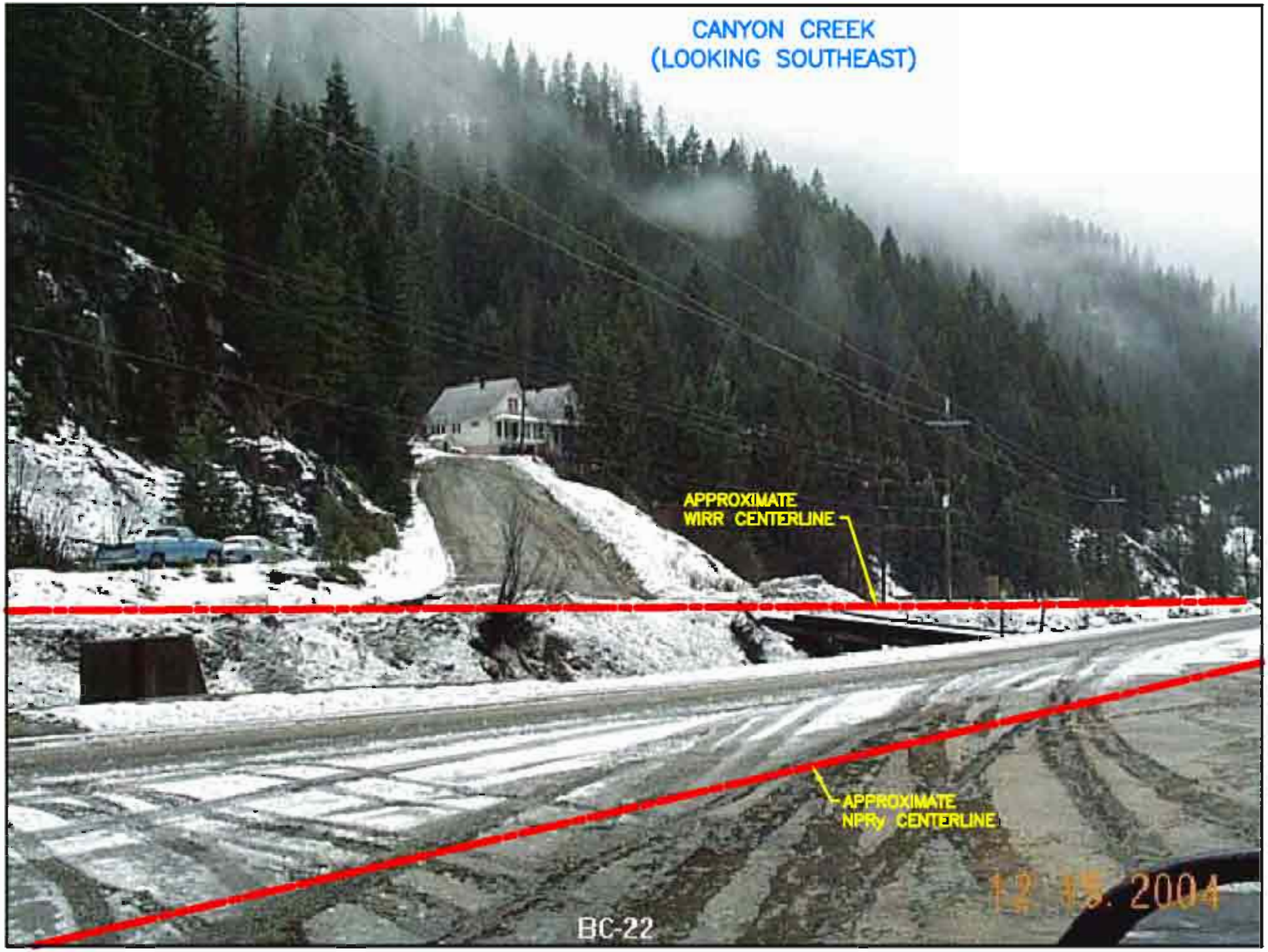
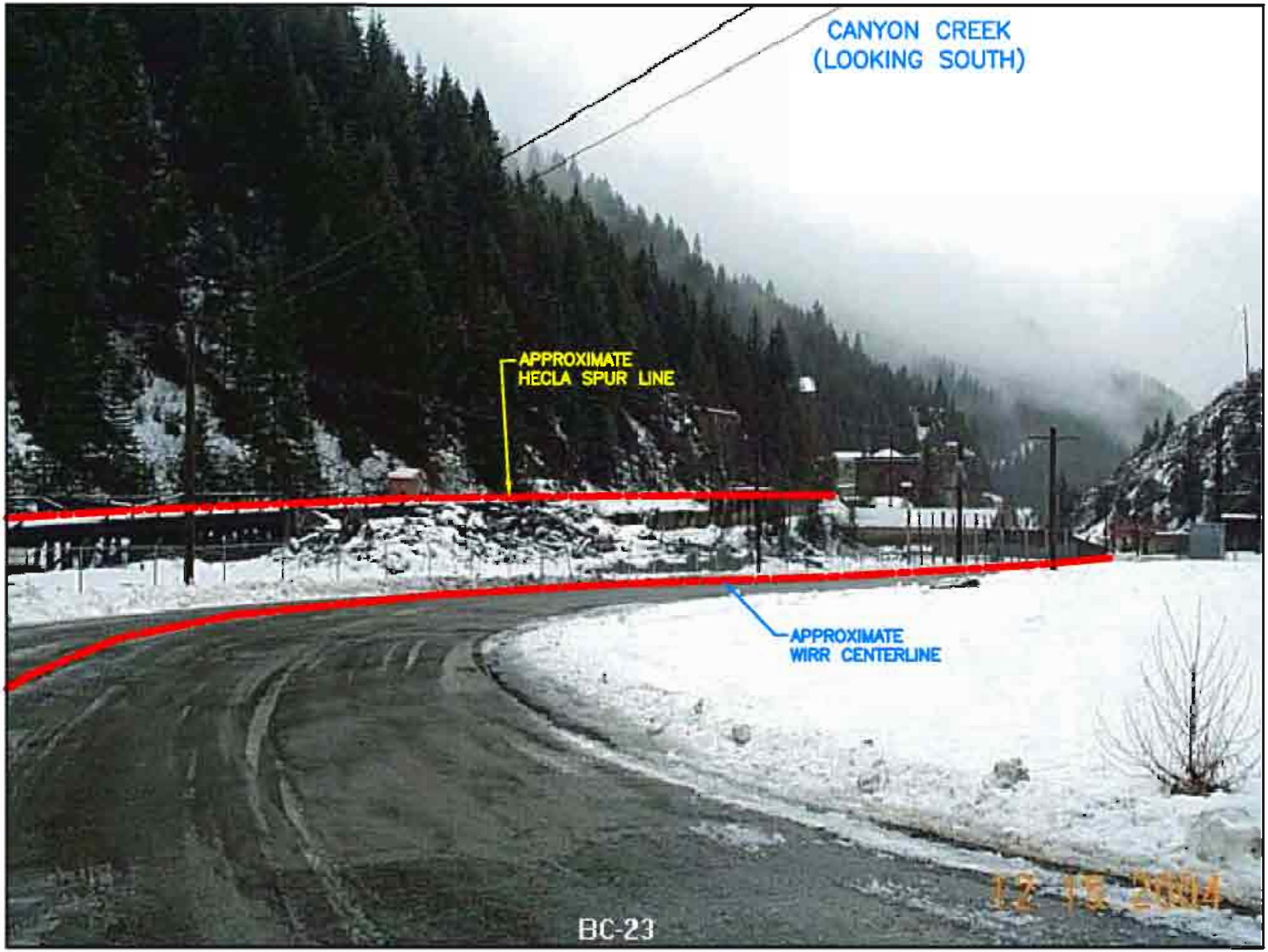
(LOOKING NORTH)
APPROXIMATE
WIRR CENTERLINE
BC-20B


CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
NPRy CENTERLINE
APPROXIMATE
WIRR CENTERLINE
BC-21A

BC-21B


CANYON CREEK
(LOOKING SOUTHEAST)
APPROXIMATE
WIRR CENTERLINE
APPROXIMATE
NPRy CENTERLINE
12 15 2004
BC-22


CANYON CREEK
(LOOKING SOUTH)
APPROXIMATE
HECLA SPUR LINE
APPROXIMATE
WIRR CENTERLINE
BC-23

APPENDIX C

Risk Calculations

CONCENTRATION TERM FOR SOIL DATA

Actual and Potential Common Areas - Child Recreational

COMPOUND	SUB-AREA	Soil Concentration (mg/kg) Average
Arsenic	VC: Visitors Center	17
Cadmium		2
Zinc		400
Arsenic	VC-P: Visitors Center Parking	37
Cadmium		10
Zinc		1,629
Arsenic	I-90 Corridor	22
Cadmium		2
Zinc		320
Arsenic	WY-1	56
Cadmium		16
Zinc		2,176
Arsenic	WY-2	215
Cadmium		20
Zinc		3,333
Arsenic	WY-3	22
Cadmium		7
Zinc		1,263
Arsenic	WY-4	11
Cadmium		2
Zinc		382
Arsenic	Current Residential	NA
Cadmium		NA
Zinc		NA
Arsenic	Former NPRy Ninemile Creek	51
Cadmium		13
Zinc		2,593
Arsenic	NPRy Canyon Creek	40
Cadmium		20
Zinc		3,314
Arsenic	WIRR Canyon Creek	65
Cadmium		40
Zinc		5,164

CHEMICAL SPECIFIC PROPERTIES

Actual and Potential Common Areas - Child Recreational

Compound	EPA weight-of-evidence classification	Oral RfD mg/kg-day	Oral Slope Factor (mg/kg-day)-1	Ref	ABSgi	Ref
INORGANICS						
Arsenic	A	3.00E-04	1.5	IRIS	6.00E-01	Basin HHRA
Cadmium	not yet rated	1.00E-03	NV	IRIS	1.00E+00	
Zinc	D	3.00E-01	NV	IRIS	1.00E+00	

NV - No value is available since compound is not classified as a carcinogen

INTAKE CALCULATIONS FOR SOIL INGESTION PATHWAY FOR CHILD PUBLIC RECREATIONAL -- Actual & Potential Common Areas

INTAKE = (Sc * IR * EF * ED * CF*ABSgi) /(BW * AT)

Parameter	Definition	Default	Ref	
Intake	Intake of chemical (mg/kg-day)			
Sc	Soil concentration (mg/kg)	see data summary pg.		
IR	Ingestion rate of soil (mg/day)	300	Basin HHRA	
EF	Exposure frequency (day/yr)	34	Basin HHRA	
ED	Exposure duration (yr)	6	Basin HHRA	
CF	Conversion factor (kg/mg)	0.000001		
ABSgi	Absorption Factor (unitless)	0.6	Basin HHRA	for arsenic only
BW	Body weight (kg)	15	Basin HHRA	
ATc	Averaging time for carcinogens (days)	25550	EPA, 1989	
ATnc	Averaging time for noncarcinogens (days)	2190	EPA, 1989	

Chemical	Sub-Area	Sc	Intake for Carcinogens	Intake for Noncarcinogens
Arsenic	**VC: Visitors Center**	17	1.63E-06	1.90E-05
Cadmium		2	3.19E-07	3.73E-06
Zinc		400	6.39E-05	7.45E-04
Arsenic	**VC-P: Visitors Center Parking**	37	3.55E-06	4.14E-05
Cadmium		10	1.60E-06	1.86E-05
Zinc		1629	2.60E-04	3.03E-03
Arsenic	**I-90 Corridor**	22	2.11E-06	2.46E-05
Cadmium		2	3.19E-07	3.73E-06
Zinc		320	5.11E-05	5.96E-04
Arsenic	**WY-1**	56	5.37E-06	6.26E-05
Cadmium		16	2.55E-06	2.98E-05
Zinc		2176	3.47E-04	4.05E-03
Arsenic	**WY-2**	215	2.06E-05	2.40E-04
Cadmium		20	3.19E-06	3.73E-05
Zinc		3333	5.32E-04	6.21E-03
Arsenic	**WY-3**	22	2.11E-06	2.46E-05
Cadmium		7	1.12E-06	1.30E-05
Zinc		1263	2.02E-04	2.35E-03
Arsenic	**WY-4**	11	1.05E-06	1.23E-05
Cadmium		2	3.19E-07	3.73E-06
Zinc		382	6.10E-05	7.12E-04
Arsenic	**Current Residential**	NA	NA	NA
Cadmium		NA	NA	NA
Zinc		NA	NA	NA
Arsenic	**Former NPRy Ninemile Creek**	51	4.89E-06	5.70E-05
Cadmium		13	2.08E-06	2.42E-05
Zinc		2593	4.14E-04	4.83E-03
Arsenic	**NPRy Canyon Creek**	40	3.83E-06	4.47E-05
Cadmium		20	3.19E-06	3.73E-05
Zinc		3314	5.29E-04	6.17E-03
Arsenic	**WIRR Canyon Creek**	65	6.23E-06	7.27E-05
Cadmium		40	6.39E-06	7.45E-05
Zinc		5164	8.25E-04	9.62E-03

RISK CALCULATIONS FOR SOIL INGESTION FOR ON-SITE CHILD PUBLIC RECREATIONAL -- Actual & Potential Common Areas

Oral Cancer Risk = Intake*CSF **Oral HQ = Intake/RfD**

Parameter	Definition	Default
Intake	Daily intake (mg/kg-day)	see intake
CSF	Oral cancer slope factor (mg/kg-day)-1	see prop
RfD	Oral reference dose (mg/kg-day)	see prop

Chemical	Sub-Area	Oral Slope Factor	RfD	Total Intake Carc	Total Intake Noncarc	Cancer Risk	Hazard Quotient
Arsenic	**VC: Visitors Center**	1.50E+00	3.00E-04	1.63E-06	1.90E-05	2.44E-06	6.33E-02
Cadmium		NV	1.00E-03	3.19E-07	3.73E-06	NC	3.73E-03
Zinc		NV	3.00E-01	6.39E-05	7.45E-04	NC	2.48E-03
					ORAL TOTAL	**2.4E-06**	**7.0E-02**
Arsenic	**VC-P: Visitors Center Parking**	1.50E+00	3.00E-04	3.55E-06	4.14E-05	5.32E-06	1.38E-01
Cadmium		NV	1.00E-03	1.60E-06	1.86E-05	NC	1.86E-02
Zinc		NV	3.00E-01	2.60E-04	3.03E-03	NC	1.01E-02
					ORAL TOTAL	**5.3E-06**	**1.7E-01**
Arsenic	**I-90 Corridor**	1.50E+00	3.00E-04	2.11E-06	2.46E-05	3.16E-06	8.20E-02
Cadmium		NV	1.00E-03	3.19E-07	3.73E-06	NC	3.73E-03
Zinc		NV	3.00E-01	5.11E-05	5.96E-04	NC	1.99E-03
					ORAL TOTAL	**3.2E-06**	**8.8E-02**
Arsenic	**WY-1**	1.50E+00	3.00E-04	5.37E-06	6.26E-05	8.05E-06	2.09E-01
Cadmium		NV	1.00E-03	2.55E-06	2.98E-05	NC	2.98E-02
Zinc		NV	3.00E-01	3.47E-04	4.05E-03	NC	1.35E-02
					ORAL TOTAL	**8.0E-06**	**2.5E-01**
Arsenic	**WY-2**	1.50E+00	3.00E-04	2.06E-05	2.40E-04	3.09E-05	8.01E-01
Cadmium		NV	1.00E-03	3.19E-06	3.73E-05	NC	3.73E-02
Zinc		NV	3.00E-01	5.32E-04	6.21E-03	NC	2.07E-02
					ORAL TOTAL	**3.1E-05**	**8.6E-01**
Arsenic	**WY-3**	1.50E+00	3.00E-04	2.11E-06	2.46E-05	3.16E-06	8.20E-02
Cadmium		NV	1.00E-03	1.12E-06	1.30E-05	NC	1.30E-02
Zinc		NV	3.00E-01	2.02E-04	2.35E-03	NC	7.84E-03
					ORAL TOTAL	**3.2E-06**	**1.0E-01**
Arsenic	**WY-4**	1.50E+00	3.00E-04	1.05E-06	1.23E-05	1.58E-06	4.10E-02
Cadmium		NV	1.00E-03	3.19E-07	3.73E-06	NC	3.73E-03
Zinc		NV	3.00E-01	6.10E-05	7.12E-04	NC	2.37E-03
					ORAL TOTAL	**1.6E-06**	**4.7E-02**
Arsenic	**Current Residential**	1.50E+00	3.00E-04	NA	NA	NA	NA
Cadmium		NV	1.00E-03	NA	NA	NC	NA
Zinc		NV	3.00E-01	NA	NA	NC	NA
					ORAL TOTAL	**NA**	**NA**
Arsenic	**Former NPRy Ninemile Creek**	1.50E+00	3.00E-04	4.89E-06	5.70E-05	7.33E-06	1.90E-01
Cadmium		NV	1.00E-03	2.08E-06	2.42E-05	NC	2.42E-02
Zinc		NV	3.00E-01	4.14E-04	4.83E-03	NC	1.61E-02
					ORAL TOTAL	**7.3E-06**	**2.3E-01**
Arsenic	**NPRy Canyon Creek**	1.50E+00	3.00E-04	3.83E-06	4.47E-05	5.75E-06	1.49E-01
Cadmium		NV	1.00E-03	3.19E-06	3.73E-05	NC	3.73E-02
Zinc		NV	3.00E-01	5.29E-04	6.17E-03	NC	2.06E-02
					ORAL TOTAL	**5.7E-06**	**2.1E-01**
Arsenic	**WIRR Canyon Creek**	1.50E+00	3.00E-04	6.23E-06	7.27E-05	9.34E-06	2.42E-01
Cadmium		NV	1.00E-03	6.39E-06	7.45E-05	NC	7.45E-02
Zinc		NV	3.00E-01	8.25E-04	9.62E-03	NC	3.21E-02
					ORAL TOTAL	**9.3E-06**	**3.5E-01**

NV = No Value. Not considered a human carcinogen
NC = Not calculated

APPENDIX D

Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Appendix D
Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Citation	Summary of Requirement and Relevance to Project	Evaluation
CHEMICAL SPECIFIC		
Centers for Disease Control (CDC) Statement on Preventing Lead Poisoning in Young Children (CDC 1991)	New data indicate significant adverse effects of lead exposure in children at blood levels lower than previously believed to be safe.	Potential TBC.
EPA Strategy for Reducing Lead Exposures (USEPA 1991b)	Presents a strategy to reduce lead exposure, particularly to young children, to the greatest extent possible. Goals of the strategy are to 1) significantly reduce blood lead level incidents above 10 µg/dL in children, and 2) reduce the amount of lead introduced into the environment.	Potential TBC.
IEUBK Model (PB 93 9635121.7-15-2)	Integrated Exposure Uptake Biokinetic Model (IEUBK) for Lead in Children. The screening level for lead in OSWER Directive 9355.4-12 (see below) was developed using the IEUBK model.	Potential TBC.
Revised Interim Lead Guidance for CERCLA Sites (EPA OSWER Directive 9355.4-12, August 1994)	Establishes a streamlined approach for determining protective levels for lead in soil. Recommends a 400-ppm screening level, describes how to develop site-specific remediation goals, and describes a strategy for management of lead contamination at sites that have multiple lead sources. A previous soil lead OSWER Directive (September 1989) recommended a soil lead cleanup level of 500 to 1,000 mg/kg for protection of human health at residential CERCLA sites (OSWER Directive #9355.4-02). The current recommended residential screening level for lead of 400 mg/kg is calculated with the IEUBK model (Pub #9285.7-15-2, PB93-963511), using default parameters. EPA recommends that residential PRGs for CERCLA sites can be developed using the IEUBK model on a site-specific basis, where site data support modification of model default parameters. In developing lead PRGs for CERCLA sites, EPA recommends that a soil lead concentration be determined so that a typical child or group of children exposed to lead at this level would have an estimated risk of no more than 5 percent of exceeding a blood lead level of 10µg/dL, which corresponds to a soil lead level of 400 mg/kg using the default parameters in the IEUBK model. The 1994 interim directive superseded all previous directives on soil lead cleanup for CERCLA and RCRA programs.	Potential TBC.

Appendix D
Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Citation	Summary of Requirement and Relevance to Project	Evaluation
Clarification to 1994 Revised Interim Soil Lead Guidance for CERCLA Sites (EPA OSWER Directive 9200.4-27P, August 1998)	This directive clarified OSWER 1994 policy in four areas: (1) Using the IEUBK and blood lead level studies. OSWER recommends that the IEUBK model be used as the primary tool to generate risk-based soil cleanup levels at lead sites for current or future residential land use. Furthermore, response actions can be taken using IEUBK predictions alone; blood lead studies are not required. In addition, OSWER recommends that blood lead studies not be used for establishing long-term remedial or non-time-critical removal cleanup levels at lead sites. (2) Determining the geographic area to use in evaluating human exposure to lead contamination. OSWER recommends that cleanup levels at lead sites be designed to reduce risk to a typical or individual child receiving exposures at the residence to have no more than a 5 percent chance of exceeding a 10 µg/dL blood lead level for a full-time child resident. Therefore, it is recommended that risk assessments conducted at lead-contaminated residential sites use the individual residence as the primary exposure unit of concern. Soil lead contamination data from yards and other residential media (e.g., interior dust and drinking water) should be input into the IEUBK model to provide a PRG for the residential setting. (3) Addressing multimedia lead contamination. OSWER recommends that EPA regions should promote addressing interior paint risks through actions by others as a component of an overall site management strategy. OSWER also recommends that EPA's regions avoid using the Superfund Trust Fund for removing exterior lead-based paint and soil contaminated from lead-based paint. Rather, EPA's regions should promote remediation of interior and exterior lead-based paint by others such as potentially responsible parties, local governments, or individual homeowners. (4) Determining appropriate response actions at lead sites. In selecting site management strategies, it is OSWER's preference to seek early risk reduction with a combination of engineering controls (e.g., permanent removal of treat contaminants) and non-engineering response actions (e.g., education and health intervention programs). As a given project progresses, OSWER's goal should be to reduce the reliance on education and intervention programs to mitigate risk. The purpose for clarifying the existing 1994 directive is to promote national consistency in decision-making at CERCLA and RCRA lead sites across the country.	Potential TBC.

Appendix D
Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Citation	Summary of Requirement and Relevance to Project	Evaluation
LOCATION SPECIFIC		
Endangered Species Act, 16 U.S.C. §1531 et seq., 50 CFR Parts 17, 402	The ESA and implementing regulations make it unlawful to "harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" any federally designated threatened or endangered species. The ESA and implementing regulations are applicable to activities of the selected response action (for example, soil excavation) that could affect federally designated threatened or endangered species that may be present within the Site. Such species may include bull trout, or bald eagle. Consistent with ESA Section 7, if any federally designated threatened or endangered species are identified in the vicinity of remediation work, EPA will consult with the U.S. Fish and Wildlife Service to ensure that response actions are conducted in a manner to avoid adverse habitat modification and jeopardy to the continued existence of such species.	Potentially applicable.
Migratory Bird Treaty Act, 16 U.S.C. §703 et seq.	The MBTA makes it unlawful to "hunt, take, capture, kill" or take various other actions adversely affecting a broad range of migratory birds, including tundra swans, hawks, falcons, songbirds, without prior approval by the U.S. Fish and Wildlife Service. (See 50 CFR 10.13 for the list of birds protected under the MBTA.). The mortality of migratory birds due to building demolition or construction activities is not a permitted take under the MBTA. The MBTA and its implementing regulations are relevant and appropriate for protecting migratory bird species identified within the Site. The selected removal action will be carried out in a manner that avoids the taking or killing of protected migratory bird species, including individual birds or their nests or eggs.	Potentially relevant and appropriate.
National Historic Preservation Act, 16 U.S.C. §470f et seq.; 36 CFR Parts 60, 63, 800	Federal agencies must identify possible effects of proposed remedial activities on historic properties (cultural resources). Historic sites or structures are those eligible for, or included in, the National Register of Historic Places, generally older than 50 years. If an agency finds a potential adverse effect on historic sites or structures, such agency must evaluate alternatives to "avoid, minimize, or mitigate" the impact, in consultation with the State Historic Preservation Office. Substantive requirements of the NHPA may be applicable to selected response actions including demolition of the Hercules Mill and any historic railroad structures.	Potentially applicable.
Idaho Preservation of Historical Sites (Idaho Statute 67-4601 et seq.) and Idaho State Historical Society (Idaho Statute 67-4101 et seq.)	Covers historical sites and historical districts within the state of Idaho and the excavation of archeological resources. The State Historical Society publishes the National Register of Historic Places for Idaho.	Potentially relevant and appropriate.

Appendix D
Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Citation	Summary of Requirement and Relevance to Project	Evaluation
RCRA Subtitle C – Management and Disposal of Hazardous Waste, 40 CFR Parts 261, 264, 268; IDAPA 58.01.05	Solid waste from the extraction, beneficiation, and processing of some ores and minerals are generally exempt from compliance with RCRA Land Disposal Restrictions (LDRs). Other wastes that are not exempted by the Bevill Amendment (42 U.S.C. §6921(b)(3)()A)) may still be exempt from LDRs if managed within a designated Area of Contamination. However, LDRs may be relevant and appropriate for wastes constituting Principal Threat Materials, such as metal concentrates. Wastes constituting "hazardous debris" may include contaminated railroad tracks and ties, and may be subject to applicable requirements of RCRA, 40 CFR Parts 261.3(f)(2) and 268.45, that provide standards for decontamination.	Potentially applicable or relevant and appropriate.
RCRA Subtitle D–Disposal of Nonhazardous Solid Waste, 42 U.S.C. §6901 et seq.; 40 CFR 257 and 258	Subtitle D provides standards for management and disposal of solid waste, including: • Facility or practices in floodplains will not restrict flow of basic flood, reduce the temporary water storage capacity of the floodplain, or otherwise result in a washout of solid waste. • Facility or practices shall not cause or contribute to taking of any endangered or threatened species. • Facility or practices shall not result in the destruction or abuse of critical habitat. • Facility or practice shall not cause discharge of pollutants into waters of the U.S. in violation of a NPDES permit. • Facility or practices shall not cause discharge of dredged or fill material into waters of the United States. • Facility or practices shall not contaminate underground drinking source beyond the boundary of the facilities. • Facility or practice shall not allow uncontrolled public access that exposes the public to potential health and safety hazards. • Facility or practice includes groundwater monitoring and corrective action requirements under Subpart E and closure and postclosure care under Subpart F.	Potentially relevant and appropriate.

Appendix D
Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Citation	Summary of Requirement and Relevance to Project	Evaluation
ACTION SPECIFIC		
Off-Site Transfer, 42 U.S.C. §9621(d)(3); 40 CFR §300.440	Hazardous substances may only be transferred off-site to facilities in compliance with specified requirements.	Potentially applicable.
Federal Clean Air Act, 42 U.S.C. §7401 et seq.; 40 CFR Part 50	National Ambient Air Quality Standards (NAAQS) regulations are potentially relevant and appropriate to soil removal activities which may generate fugitive dust. NAAQS standards have been promulgated for lead and for fine and coarse particulate matter.	Potentially relevant and appropriate.
Idaho Air Pollution Control Rules, IDAPA 58.01.01	Remedial activities will be designed to take all reasonable precautions to prevent particulate matter from becoming airborne including, but not limited to, as appropriate, the use of water or chemical as dust suppressants, the covering of trucks, and the prompt removal and handling of excavated materials.	Potentially applicable.
Clean Water Act Storm Water Multi-Sector General Permit for Industrial Activities, 40 CFR 122.6	These regulations apply to discharges of stormwater associated with "industrial activities," which include inactive mining facilities and hazardous waste landfills. The substantive requirements of the Storm Water Multi-Sector General Permit for Industrial Activities (October 30, 2000) apply to elements of the removal action that may result in discharges of stormwater to surface waters including the adjacent Canyon Creek, Nine-Mile Creek, or South Fork of the Coeur d'Alene River. Best Management Practices (BMPs) must be used, and appropriate monitoring performed, to ensure that stormwater runoff does not exceed state water quality standards.	Potentially applicable
Management of Solid Waste: IDAPA §§16.01.5000 et seq.	The response action will be designed for management of solid waste to prevent health hazards, public nuisances, and pollution to the environment in accordance with the applicable solid waste management requirements. No permit is required for onsite actions.	Potentially applicable.
Activities Generating Non-point Discharges to Surface Waters: IDAPA §§16.01.2050, 06 and 16.01.2300, 04 Entity: State	The response action will be designed to utilize best management practices or knowledgeable and reasonable efforts in construction activities to minimize adverse water quality impacts and provide full protection or maintenance of beneficial uses of surface waters.	Potentially applicable.

Appendix D
Summary of Potential Chemical-Specific, Location-Specific, and Action-Specific ARARs and TBCs for Proposed Response Action

Citation	Summary of Requirement and Relevance to Project	Evaluation
Idaho Solid Waste Management Rules and Standards (IDAPA 58.01.06)	Rules establish requirements for solid waste management. Solid waste must be managed to prevent human health hazards, public nuisances, or pollution of the environment. Landfills shall conform to standards listed under Section 005 including location, operation, depth of cover, grading, seeding, and closure.	Potentially relevant and appropriate.
Hazardous Materials Regulations (49 CFR Parts 171 to 180)	The movement of hazardous materials on public roadways must follow the placarding, packaging, documentation, and other requirements of this regulation.	Potentially applicable.

ARAR = applicable or relevant and appropriate requirement
CDC = Centers for Disease Control
CERCLA = Comprehensive Environmental Response, Compensation, and Liability Act
CFR = Code of Federal Regulations
EPA = U.S. Environmental Protection Agency
IDAPA = Idaho Administrative Procedure Act
IEUBK = Integrated Exposure Uptake Biokinetic (Model)
µg/dL = microgram(s) per deciliter
mg/kg = milligram(s) per kilogram
NPDES = National Pollutant Discharge Elimination System
OSWER = Office of Solid Waste and Emergency Response
ppm = part(s) per million
PRG = preliminary remediation goal
RCRA = Resource Conservation and Recovery Act
TBC = (factor) to be considered
U.S.C. = United States Code

APPENDIX E

Comparative Analysis of Alternatives from Basin FS

Table 6-1
Comparative Evaluation of Soil Alternatives

Alternative	Overall Protectiveness	Compliance with ARARs	Long-Term Effectiveness	Reduction of Toxicity, Mobility, etc.	Short-Term Effectiveness	Implementability	Cost
Recreational Areas							
Alternative S1	⊘	⊘	⊘	⊘	⊘	●	$0
Alternative S2	◗	⊘	◗	⊘	◗	●	$243,000
Alternative S3	◗	⊘	◗	⊘	●	○	$692,000
Alternative S4	◗	◗	◗	◗	●	◗	$2,020,000
Residential Yards							
Alternative S1	⊘	⊘	⊘	⊘	⊘	●	$0
Alternative S2	○	⊘	○	⊘	○	●	$4,850,000
Alternative S4	◗	◗	◗	◗	●	◗	$43,800,000
Alternative S5	●	●	●	●	●	◗	$70,900,000
Other Areas							
Alternative S1	⊘	⊘	⊘	⊘	⊘	●	$0
Alternative S2	○	⊘	○	⊘	○	●	$312,000
Alternative S3	◗	⊘	◗	⊘	●	○	$2,210,000
Alternative S4	◗	◗	◗	◗	●	◗	$35,200,000
Alternative S5	○	●	●	●	●	◗	$52,500,000

For residential yards, Alternatives S2, S4, and S5 do not include access modifications and do include relocation, if necessary. For recreational areas, Alternative S4 includes site improvements, if necessary, and Alternative S5, complete removal, is not included.

All costs are rounded to three significant digits.

Rating system:
- ● High
- ◗ Medium
- ○ Low
- ⊘ Lowest

Alternative S1 = No Action
Alternative S2 = Information and Intervention
Alternative S3 = Information and Intervention and Access Modifications
Alternative S4 = Information and Intervention, Access Modifications, and Partial Removal and Barriers
Alternative S5 = Information and Intervention and Complete Removal

APPENDIX F

Boring Logs and Well Completion Details
Wallace Yard

MFG, Inc.
Consulting Scientists and Engineers

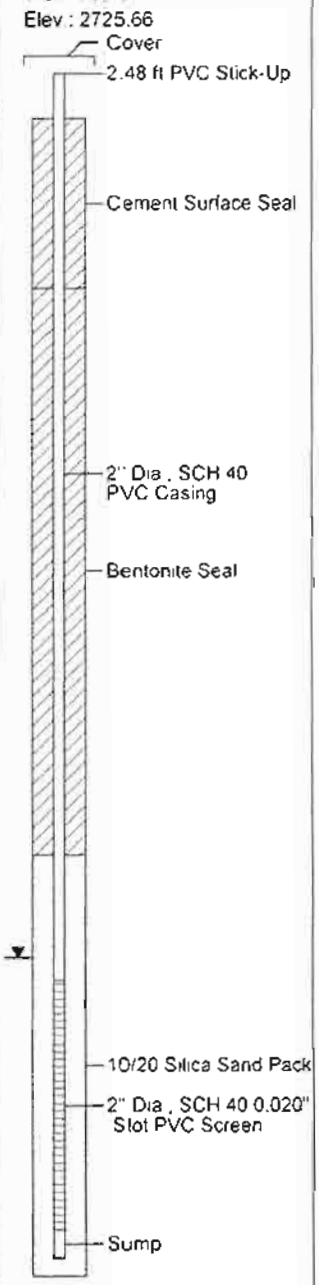
LOG OF BORING MW-1

Wallace Yard
Wallace, Idaho

Project No. 040017/040024

Drilling Agency	Env West Exploration	Start/Complete Date	1/8/03
Drilling Method	Schramm T300 DHH	Northing Coord	2117966.808
Drill Bit Size	6.5"	Easting Coord	2580423.657
Sampler Type	3" Split Spoon	Ground Elevation	2723.18
Sampling Method	Tubex - Air	Logged By	T. Mullen

Depth in Feet	DESCRIPTION	USCS	GRAPHIC	REMARKS	Recovery (ft)/ Run (ft)	Blow Count
0	SILTY GRAVEL (GP), light gray to tan, dry, angular, and up to 2" diameter.	GP				
	SILT (ML), medium brown, loose, soft consistancy, and slightly moist.	ML				
5					1/1.5	12 6 /4"
	SANDY GRAVEL (GP) with cobbles, medium to coarse sand, angular gravel and cobble fragments up to 2" diameter comprised of quartzite. Dry to moist			Driller reports harder drilling.		
10					0.8/1.0	18 50/5.5"
		GP				
15				Hit Water SWL = 14.8'		
					0.5/0.8	20 50/4"
20	Total Depth = 20.3 ft					



MFG, Inc.
Consulting Scientists and Engineers

LOG OF BORING MW-2

Wallace Yard
Wallace, Idaho

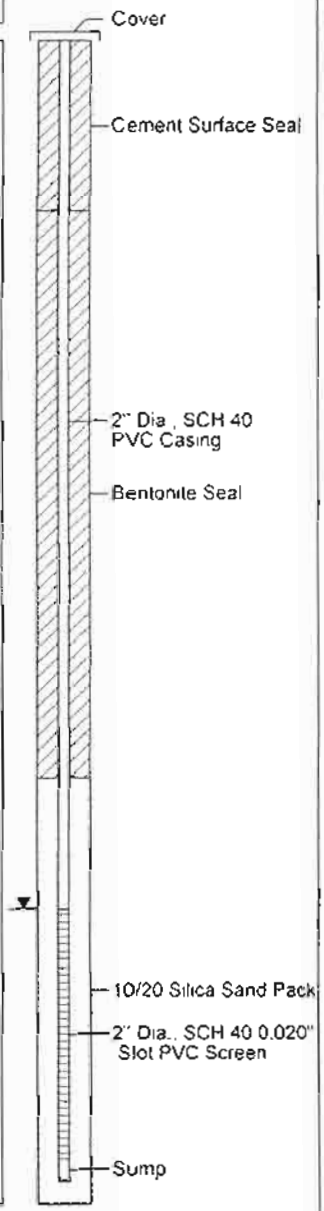
Project No. 040017/040024

Drilling Agency	Env West Exploration	Start/Complete Date	1/8/03
Drilling Method	Schramm T300 DHH	Northing Coord	2116145.632
Drill Bit Size	6.5"	Easting Coord	2579794.145
Sampler Type	3" Split Spoon	Ground Elevation	2718.44
Sampling Method	Tubex - Air	Logged By	T Mullen

Depth in Feet	DESCRIPTION	USCS	GRAPHIC	REMARKS	Recovery (ft)/ Run (ft)	Blow Count
0	FILL SANDY GRAVEL (GP), with rock, angular, dry, and medium grey	GP				
	SILTY GRAVEL (GP), fill, brick, broken cobbles-angular. Fine to coarse sand, medium brown to dark smokey brown, and dry					
5		GP			0/2	14/4"
					0.6/1.5	8 6 16
	SAND (SW), medium brown fine to coarse sand, subrounded to subangular, loose and dry Trace gravel and decomposed wood					
10		SW			1.0/1.5	8 8 8
				SWL = 12.8'		
	SANDY GRAVEL (GP) with cobbles. Dark reddish brown to medium brown. Predominant angular broken cobble fragments Some silt and fine sand, greater medium to coarse sand fraction.					
15					1.0/1.5	15 25 43
		GP				
20					0.7/0.9	24 50/5"

Total Depth = 20.4 ft

Well: MW-2
Elev.: 2717.99



MFG, Inc.
Consulting Scientists and Engineers

LOG OF BORING MW-3

Wallace Yard
Wallace, Idaho

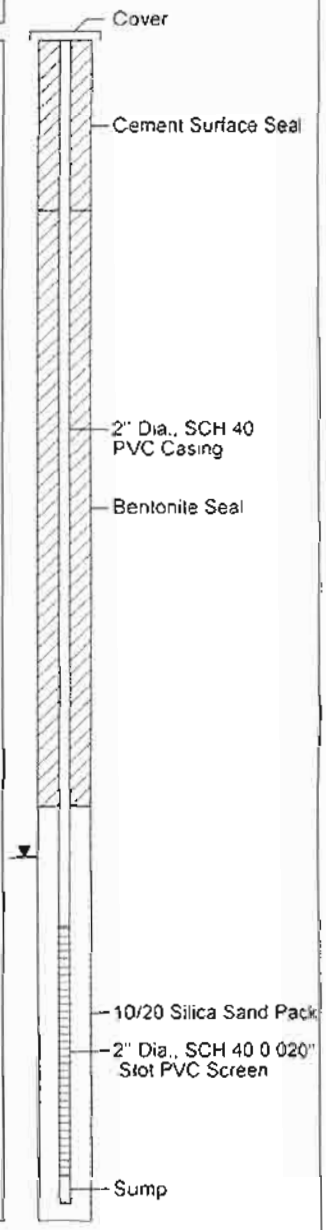
Project No. 040017/040024

Drilling Agency	Env. West Exploration	Start/Complete Date	1/8/03
Drilling Method	Schramm T300 DHH	Northing Coord	2118344.482
Drill Bit Size	6.5"	Easting Coord	2579630.056
Sampler Type	3" Split Spoon	Ground Elevation	2714.62
Sampling Method	Tubex - Air	Logged By	T. Mullen

Depth in Feet	DESCRIPTION	USCS	GRAPHIC	REMARKS	Recovery (ft)/ Run (ft)	Blow Count
0	SANDY GRAVEL (GP), with rock fill. Subrounded to subangular gravel up to 1" diameter and angular rock fragments up to 2" long. Medium to coarse sand, dry, and grayish brown.	GP			0.9/1.5	9 10 8
5						
10	SILT (ML), dark brown, loose, dry, with trace very fine sand.	ML			1.3/1.5	1 1 2
	SAND (SW), medium brown fine to coarse sand, subrounded to subangular, loose and dry. Trace gravel and decomposed wood.	SW		SWL = 11.9'		
15	SILTY SANDY GRAVEL (GP) with cobbles. Broken cobble fragments up to 2" in diameter with coarse sand and gravel. Medium brown silt saturated	GP			0/0.5	17/6"
20					1.0/1.5	20 33 49

Total Depth = 20.7 ft

Well. MW-3
Elev : 2714.22



MFG, Inc.
Consulting Scientists and Engineers

LOG OF BORING MW-4

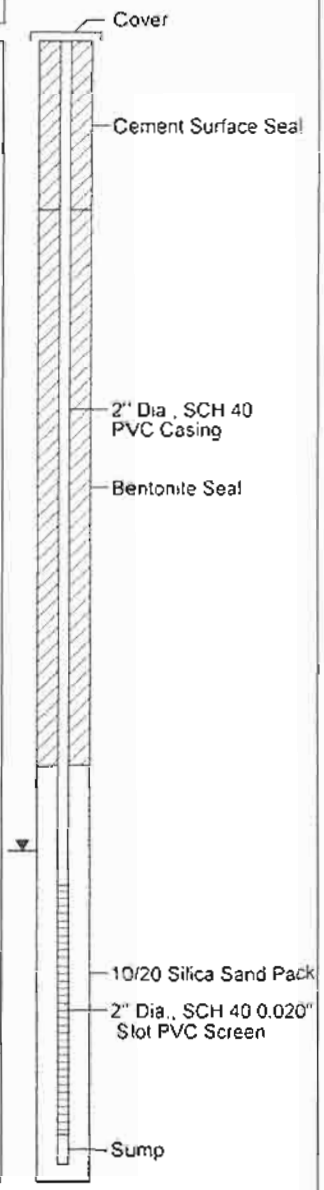
Wallace Yard
Wallace, Idaho

Project No. 040017/040024

Drilling Agency	Env West Exploration	Start/Complete Date	1/9/03
Drilling Method	Schramm T300 DHH	Northing Coord	2118414 862
Drill Bit Size	6 5"	Easting Coord	2579211 518
Sampler Type	3" Split Spoon	Ground Elevation	2712 94
Sampling Method	Tubex - Air	Logged By	T Mullen

Depth in Feet	DESCRIPTION	USCS	GRAPHIC	REMARKS	Recovery (ft)/ Run (ft)	Blow Count
0	Asphalt					
	SANDY GRAVEL (GP) and rock fill	GP				
	SILTY SANDY GRAVEL (GP), with brick fill Dusky brown to light tan, angular gravel fragments up to 1" in diameter Medium to coarse sand, wet with minor medium brown silt.	GP			1 1/1.5	11 24 22
5						
10					1 2/1.5	9 8 2
	SILTY SANDY GRAVEL (GP), with cobbles medium brown, angular cobble fragments with subrounded to subangular gravel and fine to medium sand.	GP		SWL = 11 8'		
15					0 5/1 0	27 50/6"
20	Total Depth = 20.0 ft				1 0/1 5	12 25 38

Well MW-4
Elev : 2712 61



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LOG OF BORING MW-5

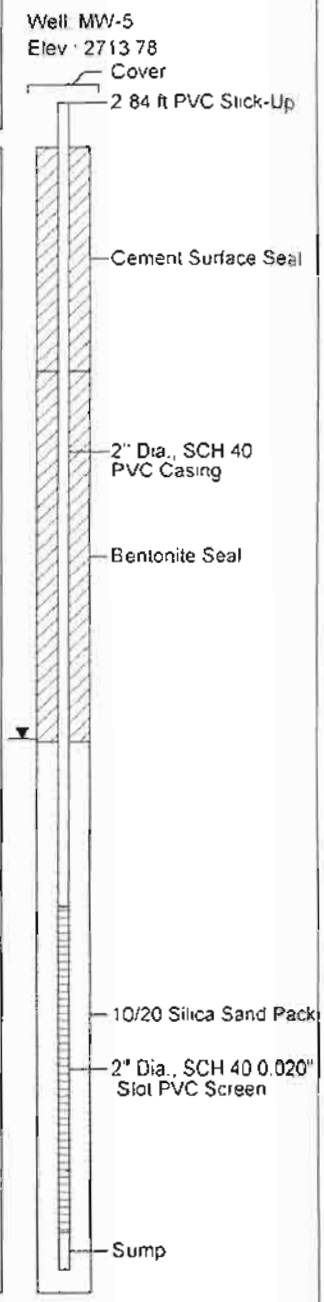
Wallace Yard
Wallace, Idaho

Project No. 040017/040024

Drilling Agency	Env West Exploration	Start/Complete Date	1/8/03
Drilling Method	Schramm T300 DHH	Northing Coord	2118646.389
Drill Bit Size	6.5"	Easting Coord	2579825.168
Sampler Type	3" Split Spoon	Ground Elevation	2710.94
Sampling Method	Tubex - Air	Logged By	T. Mullen

Depth in Feet	DESCRIPTION	USCS	GRAPHIC	REMARKS	Recovery (ft)/ Run (ft)	Blow Count
0	SILT (ML), medium brown, soft consistancy, moist and no plasticity					
		ML				
5	Mottled reddish brown, trace round gravel up to 1/4" diameter				1.3/1.5	3 15 15
	SANDY GRAVEL (GP) with cobbles and fine to coarse sand. Subrounded to angular gravel and broken cobbles composed of quartzite and argillite.			SWL = 8.3'		
10					0.8/1.4	17 42 50/5.5"
		GP				
15					0.6/0.9	15 50/5.5"

Total Depth = 15.3 ft



MFG, Inc.
Consulting Scientists and Engineers

LOG OF BORING MW-6

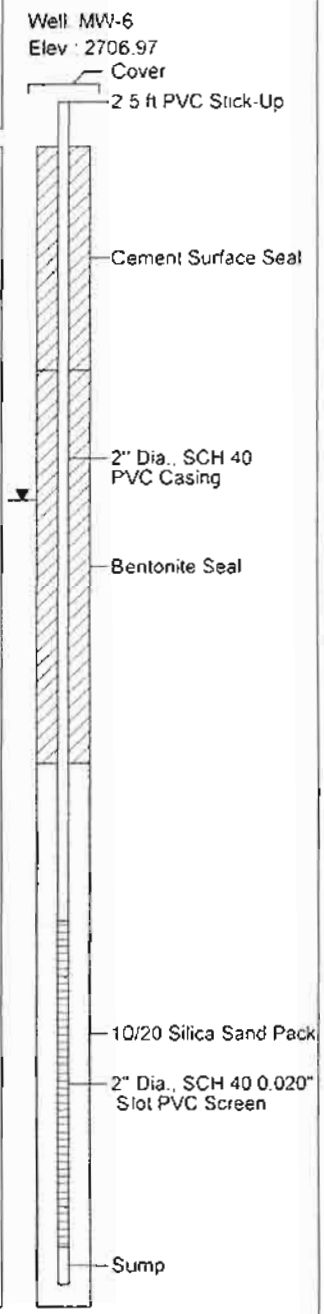
Wallace Yard
Wallace, Idaho

Project No. 040017/040024

Drilling Agency	Env. West Exploration	Start/Complete Date	1/8/03
Drilling Method	Schramm T300 DHH	Northing Coord	2119046.011
Drill Bit Size	6.5"	Easting Coord	2579522.745
Sampler Type	3" Split Spoon	Ground Elevation	2704.47
Sampling Method	Tubex - Air	Logged By	T. Mullen

Depth in Feet	DESCRIPTION	USCS	GRAPHIC	REMARKS	Recovery (ft)/ Run (ft)	Blow Count
0	SILT (ML), medium dark gray, minor plasticity, slow dilatancy, and slightly moist.	ML		SWL = 4.75'		
5	SANDY GRAVEL (GP) with cobbles. Abundant silt with fine to medium sand. Trace subrounded gravels up to 1" in diameter with cobbles up to 2" in diameter, hard consistancy.	GP			1.0/1.5	5 15 28
10				Hit cobble - refusal	0/2	23/2"
15					0.6/1.0	22 50/6"

Total Depth = 15.5 ft.



APPENDIX G

Groundwater Flux Calculations

Table G-1
Cross Sectional Area Calculations

Flow Path	Measured Width (in)	Scaled Width (ft)	Saturated Thickness, b (ft)	Area (sf)	Representative wells used to calculate b
1	0.52	104	10	1040	MW-4
2	0.60	120	10	1200	MW-3
3	0.56	112	10	1120	MW-3/MW-5
4	0.76	152	10	1520	MW-5
5	0.85	170	10	1700	MW-5/MW-6
6	1.00	200	10	2000	MW-6
			Total saturated area	8580	

Notes:
Width measured from 1"=200' scale map
Width measured along 2701-ft contour
Saturated thicknesses based on 10/28/2004 groundwater levels

Table G-2
Hydraulic Gradient Calculations

Flow Path	Measured Flow Length (in)	Scaled Flow Length (ft)	Average Flow Length (ft)	ΔHead (ft)	Flow Path Hydraulic Gradient, dh/dl
	0.5	100			
1			150	2	0.0133
	1	200			
2			250	2	0.0080
	1.5	300			
3			330	2	0.0061
	1.8	360			
4			380	2	0.0053
	2	400			
5			430	2	0.0047
	2.3	460			
6			460	2	0.0043
	2.3	460			
				Average dh/dl	**0.0069**

Notes:
Width measured from 1"=200' scale map
Head drop (Δhead) from 2702-ft to 2700-ft contours
Flow lengths measured along sides of flow paths
Hydraulic gradients based on 10/28/2004 potentiometric surface

Table G-3
Groundwater Flux Calculations

For Hydraulic Conductivity, K (ft/day) = 28.4 (Silty sandy gravel: 10^{-2} cm/s)

Flow Path	K (ft/day)	dh/dl	Area (sf)	Discharge, Q (cfd)	Discharge, Q (cfs)
1	28.4	0.0133	1040	394	0.0046
2	28.4	0.0080	1200	273	0.0032
3	28.4	0.0061	1120	193	0.0022
4	28.4	0.0053	1520	227	0.0026
5	28.4	0.0047	1700	225	0.0026
6	28.4	0.0043	2000	247	0.0029
			ΣQ =	**1,558**	**0.018**

For Hydraulic Conductivity, K (ft/day) = 284 (Sandy gravel: 10^{-1} cm/s)

Flow Path	K (ft/day)	dh/dl	Area (sf)	Discharge, Q (cfd)	Discharge, Q (cfs)
1	284	0.0133	1040	3,938	0.046
2	284	0.0080	1200	2,726	0.032
3	284	0.0061	1120	1,928	0.022
4	284	0.0053	1520	2,272	0.026
5	284	0.0047	1700	2,246	0.026
6	284	0.0043	2000	2,470	0.029
			ΣQ =	**15,579**	**0.18**

Notes:
Ranges in K based on hydraulic conductivities presented in Freeze & Cherry, 1978, p. 29 for sandy gravel and silty sandy gravel as described in the site boring logs.

Table G-4
Metals Concentrations

Well No.	Dissolved Arsenic (µg/L)	Dissolved Cadmium (µg/L)	Dissolved Lead (µg/L)	Dissolved Zinc (µg/L)
MW-1	**0.5**	**2**	**0.5**	668
MW-2	**0.5**	28.5	8	4320
MW-3	**0.5**	101	**0.5**	25300
MW-4	**0.5**	85.4	**0.5**	18000
MW-5	**0.5**	18.7	**0.5**	3800
MW-6	**0.5**	**2**	**0.5**	815
Mean Concentrations	0.5	39.6	1.75	8817
Reporting Limits	1	4	1	10

Notes
Analytical results for 10/28/2004 sampling event
Bold values are 1/2 reporting limit for nondetects

Table G-5
Metals Loading Calculations

For Hydraulic Conductivity, K (ft/day) = 28.4 (Silty sandy gravel: 10-2 cm/s)

Flow Path	Discharge, Q (cfs)	Representative Wells	Dissolved Cadmium (µg/L)	Dissolved Zinc (µg/L)	Dissolved Cadmium Load (lb/day)	Dissolved Zinc Load (lb/day)
1	0.0046	MW-4	85.4	18000	0.002	0.4
2	0.0032	MW-3	101	25300	0.002	0.4
3	0.0022	MW-3/MW-5	59.85	14550	0.001	0.17
4	0.0026	MW-5	18.7	3800	0.000	0.05
5	0.0026	MW-5/MW-6	10.35	2307.5	0.0001	0.03
6	0.0029	MW-6	2	815	0.0000	0.013
				Total Loads	**0.005**	**1.15**

For Hydraulic Conductivity, K (ft/day) = 284 (Sandy gravel: 10-1 cm/s)

Flow Path	Discharge, Q (cfs)	Representative Wells	Dissolved Cadmium (µg/L)	Dissolved Zinc (µg/L)	Dissolved Cadmium Load (lb/day)	Dissolved Zinc Load (lb/day)
1	0.046	MW-4	85.4	18000	0.021	4.4
2	0.032	MW-3	101	25300	0.017	4.3
3	0.022	MW-3/MW-5	59.85	14550	0.007	1.75
4	0.026	MW-5	18.7	3800	0.003	0.54
5	0.026	MW-5/MW-6	10.35	2307.5	0.0014	0.32
6	0.029	MW-6	2	815	0.0003	0.125
				Total Loads	**0.050**	**11.5**