SITE INSPECTION REPORT

Bonanza Mill Site
Stevens County, Washington

Prepared for
U.S. Environmental Protection Agency – Region 10
Contract No: 68-S0-10-03
TDD: 01-12-0008

October 2002

SITE INSPECTION REPORT

Bonanza Mill Site
Stevens County, Washington

Prepared for
U.S. Environmental Protection Agency – Region 10
Contract No: 68-S0-10-03
TDD: 01-12-0008

Prepared by

Herrera Environmental Consultants, Inc.
2200 Sixth Avenue, Suite 601
Seattle, Washington 98121
Telephone: 206/441-9080

October 21, 2002

Contents

Tables

Figures

List of Acronyms

Acronym	Definition
%R	percent recovery
AATS	American Analytical and Technical Services
bgs	below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
cfs	cubic feet per second
CLP	Contract Laboratory Program
CLPAS	Contract Laboratory Program Analytical Services
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DQOs	data quality objectives
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
GPS	Global Positioning System
Herrera	Herrera Environmental Consultants, Inc.
IDW	investigation-derived waste
MCL	Maximum Contaminant Level
mg/kg	milligrams per kilogram
MS/MSD	Matrix Spike/Matrix Spike Duplicate
MS/DUP	Matrix Spike/Duplicate
MTCA	Model Toxic Control Act
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
NWI	National Wetlands Inventory
PA	Preliminary Assessment
PCB	polychlorinated biphenyl
PE	performance evaluation
PPE	probable point of entry
PRG	Preliminary Remediation Goals
QA	quality assurance
QC	quality control
RPD	relative percent difference
SI	Site Inspection
SQAP	Sampling and Quality Assurance Plan
SQL	Sample Quantitation Limit
START	Superfund Technical Assessment and Response Team
SVOC	Semivolatile Organic Compounds
TAL	Target Analyte List
TDD	Technical Direction Document

TDL	Target Distance Limit
VOC	Volatile Organic Compounds
WAC	Washington Administrative Code

1.0 Introduction

The United States Environmental Protection Agency (EPA) has tasked Herrera Environmental Consultants, Inc. (Herrera) to provide technical support and conduct a Site Inspection (SI) at the Bonanza Mill site located near Colville, Washington. Herrera conducted the SI activities under Technical Direction Document (TDD) No. 01-12-008 issued under EPA, Region 10, Superfund Technical Assessment and Response Team (START) Contract No. 68-S0-10-03. The specific goals for this SI were intended to address site inspection objectives presented below:

- Collect and analyze samples to characterize potential contaminant sources;
- Determine if offsite migration of contaminants has occurred;
- Provide the EPA with appropriate information to determine whether the site is eligible for placement on the National Priorities List (NPL); and
- Document any threat or potential threat to public health or the environment posed by the site.

Completion of this SI included reviewing site information, determining regional characteristics, collecting target information within the site's range of influence, conducting a site visit, executing a site-specific sampling plan, conducting a field sampling event, and producing this report.

2.0 Site Background

2.1. Site Description and Background

2.1.1. Project Location

Site Name:	Bonanza Mill
CERCLIS ID No.:	WASFN1002221
Location:	Stevens County, Washington
Latitude:	48°34'45" N
Longitude:	117°57'24" W
Legal Description:	Section 31, Township 36N, Range 39E of the Willamette Meridian
Site Owner/Contact:	Duane Webley and Darrel Webley Webley Mill Road, Apt. C and D Colville, WA 99114

2.1.2. Site Description and Ownership History

The Bonanza Mill is an inactive mill site located in the west half of the northwest quarter of Section 31, Township 36N, Range 39E in Stevens County, Washington. The mill processed ore from the Bonanza Mine, an inactive lead and zinc mine located in the north half of Section 11 and the south half of Section 2, Township 37N, Range 37E in Stevens County, Washington (Mills 1985). The site is located approximately 3 miles northwest of Colville (Figure 2-1), at an elevation of approximately 1,600 feet above mean sea level (USGS 1992b). The site is accessed by following Highway 395 approximately 3 miles northwest from Colville to Palmer Siding. The site is located between Highway 395 and the Colville River (Figure 2-2).

The mill site has been owned and operated by Duane Webley and Darrel Webley since June 1999 (SCA 2002). The site is currently used for timber storage and for loading and unloading timber transport trucks (Webley 2000).

2.1.3. Site Operations and Waste Characteristics

Operations at the Bonanza Mill site included a 100-ton flotation mill that processed ore transported by rail from the Bonanza Mine (Gregory 2000). Typical flotation processes can include amalgamation, leaching, and/or flocculation, all of which utilize inorganic compounds, including mercury. Tailings from the mill were discharged to a lagoon, separated from the Colville River by a gravel and sand dike (Orlob 1950). Process water discharged to the lagoon evaporated or infiltrated through the soil (Orlob 1950). Operations at the mill coincided with the mine operations, which began in 1885 and continued until the mine closed in 1952 (Mills 1985). No information has been discovered regarding operations at the site between 1952 and 1999.

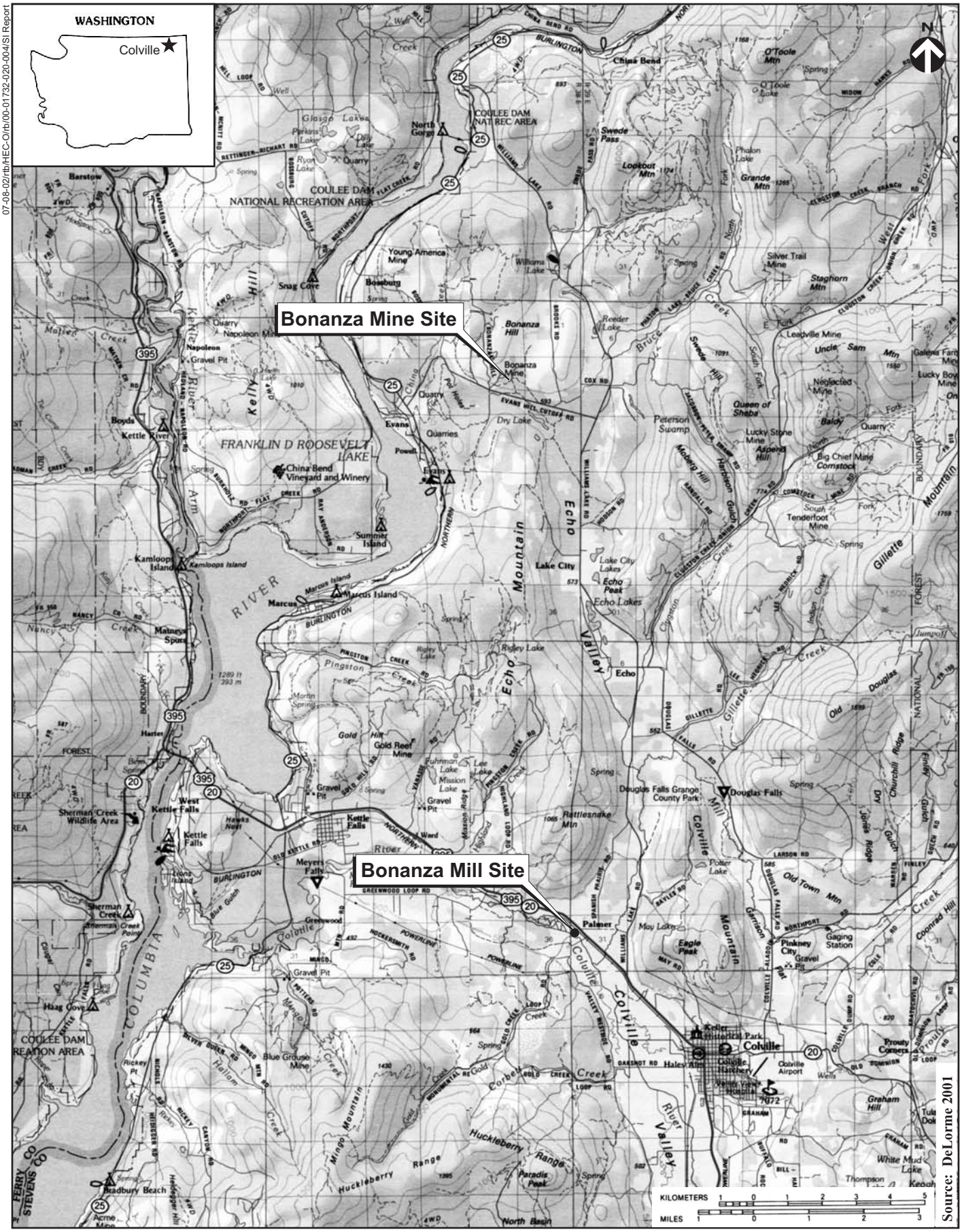

Figure 2-1. Vicinity map of the Bonanza Mill site, Stevens County, Washington.

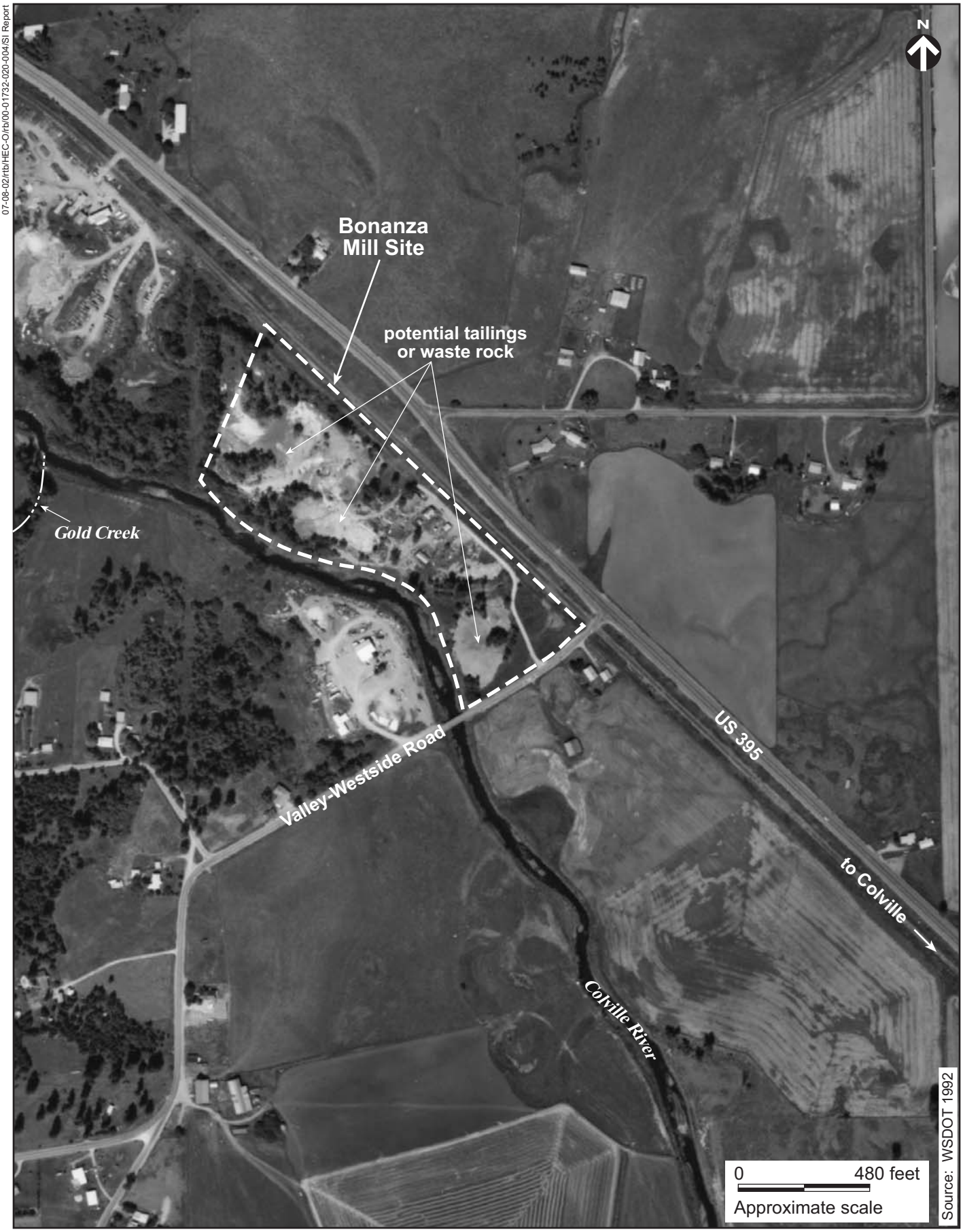

Figure 2-2. Site map of the Bonanza Mill site, Stevens County, Washington.

An estimated 17,500 cubic yards of tailings and waste rock have been spread across the site, ranging between 10 to 50 feet from the Colville River. Contaminants of concern at the site consist of heavy metals (including mercury), volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and polychlorinated biphenyls (PCBs).

2.2. Site Characterization

2.2.1. Previous Investigations

The EPA conducted a Preliminary Assessment (PA) of the site in 2000 as part of a multi-site assessment of numerous mines and mills in the Upper Columbia River basin. The owners of the site did not grant access at the time, so a drive-by inspection was conducted on May 3, 2000. Tailings and waste rock piles covering an estimated 400,000 square feet were observed; in some areas piles were located within 10 feet of the Colville River. The site was not fenced and was accessible to the public. No evidence of buildings or other structures associated with the mill was observed. At the conclusion of the PA, further action under CERCLA was recommended.

2.2.2. START Site Visit

The START conducted an initial visit to the Bonanza Mill site, at the onset of the field-sampling event on April 9, 2002. During the site visit, the START observed tailings and waste rock (2 to 6 inch diameter) spread on the native soil surface throughout the property (Figure 2-2). The tailings were observed as fine orange silt overlying native soil. An estimated 17,500 cubic yards of tailings and waste rock have been spread across the site, ranging between 10 to 50 feet from the Colville River. Waste rock appeared to contain varying amounts of the orange material, along with larger amounts of gray parent rock. Imported fill material not associated with mine tailings was observed distributed across the site. This fill material consisted primarily of road construction waste, such as old asphalt, road material, and rocks. Fill covered the potential tailings at depths ranging from 1 to 6 feet.

A berm or dike was observed along the northwest, north, and northeast sides of the property (Figure 2-3). This berm was constructed of mine tailings and fill material, and appeared to be used historically to either prevent Colville River flood water from entering the site or to maintain a tailings pond on the site.

Two houses were observed on the east side of the property (Figure 2-3). These residences were permanently occupied, housing families of four and three, including small children. Subsequent to the field-sampling event, the two families vacated their residences. These two homes are served by a ground water well. In addition to the two homes, a storage building and an old garage or service building were observed. The storage building appeared to be used by the residents of the homes; the garage appeared to be unused. An old surface water pump house was observed on the property, which was observed to be dilapidated and unusable.

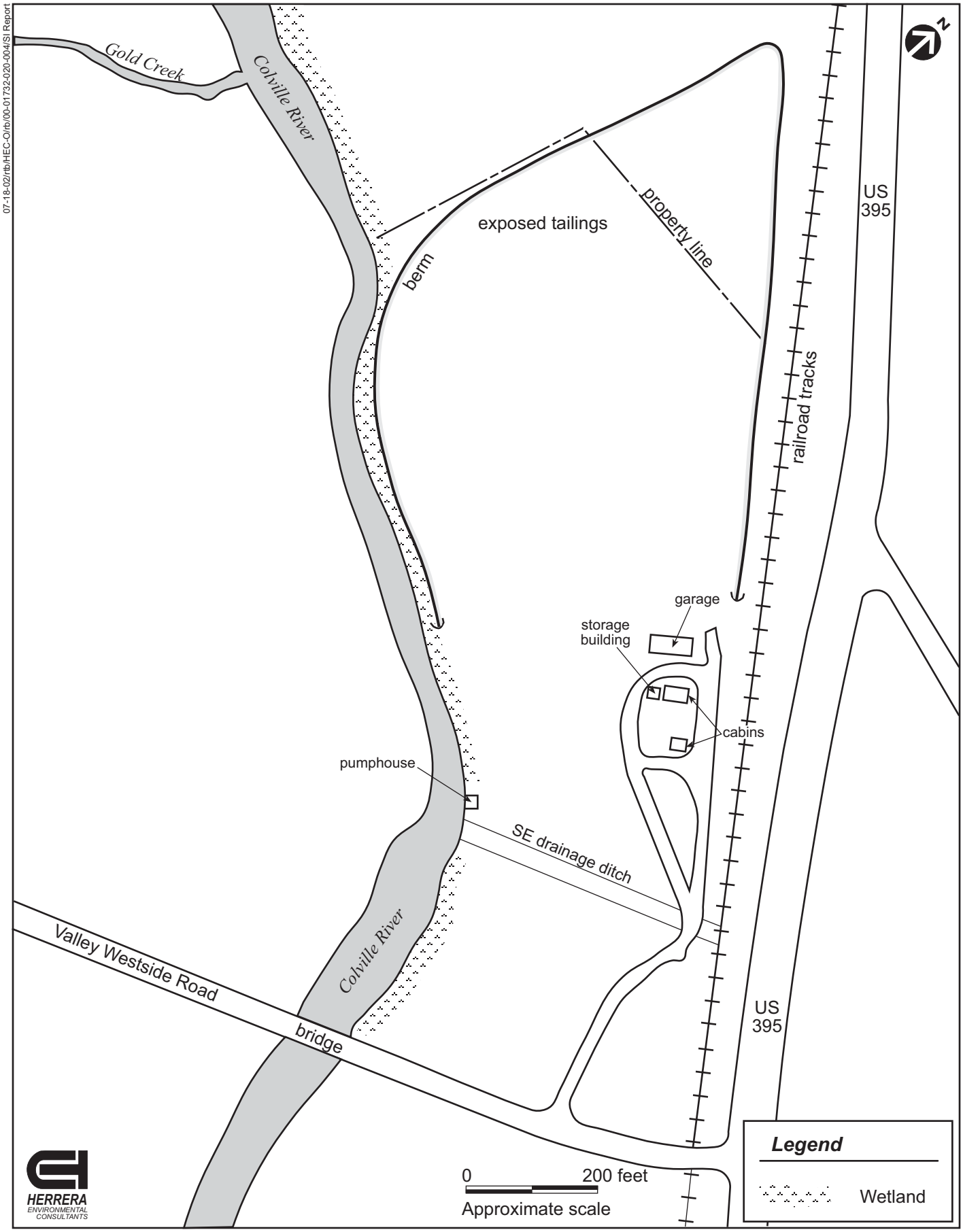

Figure 2-3. Site map of the Bonanza Mill, Stevens County, Washington.

On the southeast end of the site a drainage ditch (SE drainage ditch) was observed conveying water from another ditch running parallel to the railroad tracks to the Colville River (Figure 2-3). The banks of the SE drainage ditch appeared to be constructed from tailings and waste rock.

Palustrine emergent wetlands were observed extending beyond the most downstream site boundary along the banks of the Colville River

A tributary named Gold Creek discharges into the Colville River 500 feet downstream of the site (Figure 2-3).

2.2.3. Summary of SI Investigation Locations

Based on a review of existing information, areas and features within the site were identified for sample collection during the SI as potential Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) hazardous substance sources. Potential targets/receptors were also identified. Potential sources and targets are listed below.

Potential Sources:

- **Tailings piles and waste rock piles.** It is assumed that tailings at the site have been chemically processed, and that waste rock at the site has not been chemically processed. Contaminants of concern include Target analyte list (TAL) metals (including mercury).

- **Mill site soils.** Historical mill processes potentially included concentration, flotation, and mercury amalgamation. Contaminants of concern include TAL metals (including mercury). Electrical transformers, assay laboratories, and support operations may have existed at the site, with contaminants of concern that include PCBs, VOCs, and SVOCs.

Potential Targets:

- **Colville River surface water.** Contamination from potential sources at the site may be migrating via overland runoff, flooding, and ground water. The Colville River may be a source of drinking water and is known to support sport fishing. Contaminants of concern include TAL metals (including mercury), PCBs, VOCs, and SVOCs.

- **Colville River sediment.** River sediment may accumulate persistent contaminants, providing a long-term exposure mechanism to aquatic organisms. Contaminants of concern include TAL metals (including mercury), PCBs, VOCs, and SVOCs.

- **Wetlands.** Contamination from potential sources at the site may be migrating via overland runoff and the Colville River to wetlands located adjacent to and downstream of the site. Contaminants of concern include TAL metals (including mercury), PCBs, VOCs, and SVOCs.

- **Ground water.** Contamination from potential sources at the site may be migrating to ground water beneath the site. Contaminants of concern include TAL metals (including mercury), PCBs, VOCs, and SVOCs.

3.0 Field Activities and Analytical Protocol

The sampling quality assurance plan (SQAP) developed by Herrera and approved by EPA prior to field sampling was based upon review of background information, interviews with site representatives, and a site reconnaissance visit by the START in October 1999. The SQAP describes the sampling strategy and methodology, in addition to the analytical program used to investigate potential hazardous substance sources and potential targets. With few exceptions, SI field activities were conducted in accordance with the approved SQAP. Deviations from the SQAP were approved by the EPA and are described, when applicable, in the sampling location discussions in Section 6 and Section 7.

The SI field-sampling event was conducted from April 8 through April 11, 2002. A total of 22 samples, including background samples but excluding quality assurance samples, were collected from onsite and offsite locations. Sample types and methods of collection are described below. A list of all samples collected for laboratory analysis for the SI is presented in Table 3-1 and photographic documentation of field activities is presented in Appendix A.

Alphanumeric identification numbers applied by the START to each sample location (e.g., BM01SS) are used in the report as the sample location identifiers. Sample locations are provided in Figure 3-1.

3.1. Sampling Methodology

Surface soil, sediment, and ground water samples were collected at the Bonanza Mill site in accordance with the sampling methodologies provided in the SQAP. Materials unsuitable for analysis were removed from samples before being placed into sample containers. Soil and sediment sample material for all analysis (except VOCs) was homogenized in dedicated stainless steel bowls prior to containerization. Dedicated stainless steel spoons and bowls were used to collect, homogenize, and place sampled material into sample containers. All bowls and spoons were decontaminated before use and disposed of after each sample was containerized. No non-dedicated sampling tools were used in this sampling event. Samples were stored on ice in coolers maintained under the custody of START personnel.

3.1.1. Surface Soil Samples

A total of 12 surface soil samples, including two at background locations, were collected from the Bonanza Mill site and its vicinity. They were discrete grab samples collected across the site in areas of potential contamination and at background locations determined to be outside the potential influence of the site. Samples were collected from 0 to 6 inches below ground surface (bgs).

Table 3-1. Sample collection and analytical summary, Bonanza Mill Site, Stevens County, Washington.

EPA Sample ID	Station	Inorganic CLP Sample ID	Organic CLP Sample ID	Matrix	Depth (inches bgs)	Analysis				Description
						Metals	Pest/PCBs	SVOCs	VOC	
02154000	BM01SS	MJ0L68	J0L11	SS	0-6	X	X	X	X	Soil sample collected from near cabins. Soil was a fine reddish brown silt.
02154001	BM02SS	MJ0L69	J0L12	SS	0-6	X	X	X	X	Soil sample collected approximately 50 feet south of BM01SS. Soil was a fine reddish brown silt.
02154002	BM03SS	MJ0L70	J0L13	SS	0-6	X	X	X	X	Soil sample collected from approximately 100 feet NW of old pumphouse. Soil was a fine reddish brown silt.
02154003	BM04SS	MJ0L71	J0L14	SS	0-6	X	X	X	X	Soil sample collected from approximately 25 feet NW of sample BM03SS. Soil was a fine reddish brown silt.
02154004	BM05SS	MJ0L72	J0L15	SS	0-6	X	X	X	X	Soil sample collected approximately 30 feet NW of BM04SS adjacent to the river bank. Soil was a fine reddish brown silt.
02154005	BM06SS	MJ0L73	J0L16	SS	0-6	X	X	X	X	Soil sample collected approximately 50 feet NW of BM05SS. Soil was a fine reddish brown silt with trace organics.
02154006	BM07SS	MJ0L74	J0L17	SS	0-6	X	X	X	X	Soil sample collected from a pile with suspected oily substances in it. Black and orange fine sand.
02154007	BM08SS	MJ0L75	J0L18	SS	0-6	X	X	X	X	Soil sample was collected from the berm of tailings along the railroad tracks on the NE side if the site. Soil was a fine reddish brown silt.
02154008	BM09SS	MJ0L76	J0L19	SS	0-6	X	X	X	X	Soil sample was collected from the west side of the SE drainage ditch. Soil was red/orange and brown with some larger pieces of shale. Soil was moist.
02154009	BM10SS	MJ0L77	J0L20	SS	0-6	X	X	X	X	Soil sample was collected from the downstream end of the SE drainage ditch on the east bank, approximately 10 feet upstream of the culvert. Soil was a reddish brown silt with some larger pieces of shale in it.
02154010	CR01SD	MJ0L78	J0L21	SD	6-8	X	X	X	X	Sample was collected from a small wetland draining the Colville Post and Pole property. Sediment was moist and a fine gray/black sand.
02154011	CR02SD	MJ0L79	J0L22	SD	6-8	X	X	X	X	Sample was collected from a wetland approximately 600 feet downstream of PPE1. Sediment was moist and a fine gray/black silt.
02154012	CR03SD	MJ0L80	J0L23	SD	6-8	X	X	X	X	Sample collected directly downgradient of tailings visible on the site. Sediment was moist, fine gray silt with a high organic content consisting mostly of Reed Canary-grass roots.

Table 3-1. Sample collection and analytical summary, Bonanza Mill Site, Stevens County, Washington (continued).

EPA Sample ID	Station	Inorganic CLP Sample ID	Organic CLP Sample ID	Matrix	Depth (inches bgs)	Analysis				Description
						Metals	Pest/PCBs	SVOCs	VOC	
02154013	CR04SD	MJ0L81	J0L24	SD	6-8	X	X	X	X	Sample was collected upstream of CR03SD, adjacent to visible tailings. Sediment was saturated and fine gray sand.
02154014	CR05SD	MJ0L82	J0L25	SD	6-8	X	X	X	X	Sample was collected at PPE1, located at the mouth of the SE drainage ditch. Sediment was a fine reddish/orange and brown silt with organic material.
02154015	CR06SD	MJ0L83	J0L26	SD	6-8	X	X	X	X	Sample was collected from within the SE drainage ditch upstream of PPE1. Sediment was a fine orange and brown silt with lots of organic material.
02154016	BG01SS	MJ0L84	J0L27	SS	0-6	X	X	X	X	Sample was collected from upland area, upstream of the Valley-Westside Bridge. Soil was a dark fine silt with moderate organic content.
02154017	BG02SD	MJ0L85	J0L28	SD	6-8	X	X	X	X	Sample was collected from a wetland area, upstream of the Valley-Westside Bridge. Sediment was dark, fine, moist silt.
02154018	BG03SD	MJ0L86	J0L29	SD	6-8	X	X	X	X	Sample was collected from a wetland area, approximately 15 feet upstream of sample BG03SD. Sediment was dark brown, fine silt with organic content.
02154019	BM11GW	MJ0L87	J0L30	GW	NA	X	X	X	X	Sample was collected from the onsite well.
02154020	CR07SD	MJ0L88	J0L31	SD	6-8	X	X	X	X	Sample was collected from Gold Creek, approximately 50 feet upstream of the confluence with the Colville River. Sediment was brown sand.
02154021	BG04SS	MJ0L89	J0L32	SS	0-6	X	X	X	X	Sample was collected from soil, approximately 3 miles up the Valley-Westside road. Sample was fine brown sand.
02154022	BM12TB	NA	J0L33	TB	NA				X	Trip blank.
02154023	BM13RS	MJ0L90	J0L34	RS	NA	X	X	X	X	Rinsate sample collected from sample bowl and spoon.

Key:

bgs	= below ground surface	Pest/PCBs	= Pesticides/Polychlorinated Biphenyls.
CLP	= Contract Laboratory Program.	RS	= Rinsate blank.
EPA	= United States Environmental Protection Agency.	SD	= Sediment.
GW	= Ground water.	SS	= Surface soil.
ID	= Identification.	SVOCs	= Semivolatile Organic Compounds.
MS/MSD	= Matrix Spike/Matrix Spike Duplicate.	TB	= Trip blank.
NA	= Not applicable.	VOCs	= Volatile Organic Compounds.

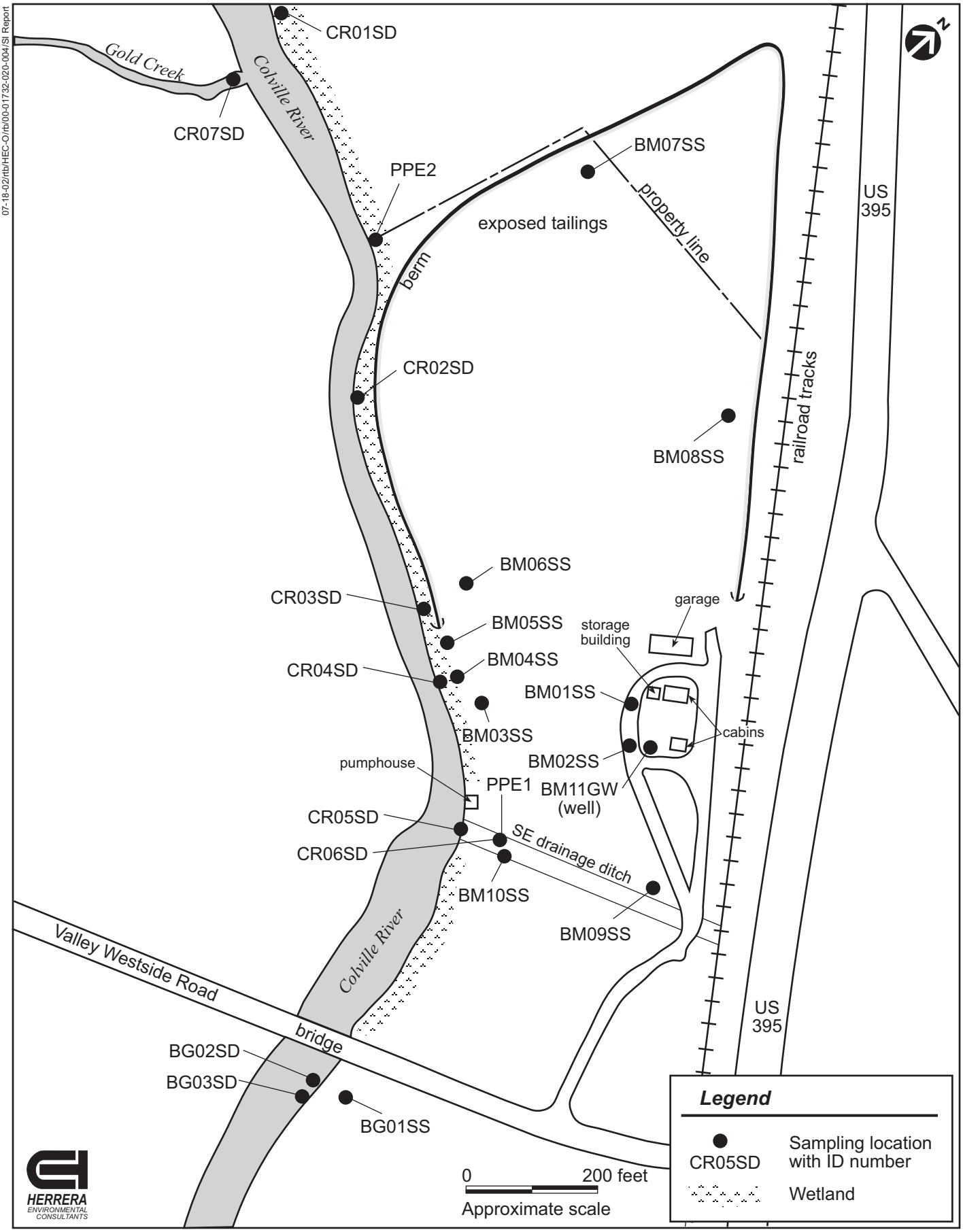

Figure 3-1. Sampling locations at the Bonanza Mill site, Stevens County, Washington.

3.1.2. Sediment Samples

A total of nine sediment samples (including two background samples and one contribution sample from Gold Creek) were collected from the Colville River, SE drainage ditch, and two upstream background locations. The contribution sample was collected to assess the contribution of contaminants to sediment collected downstream of the confluence of Gold Creek and the Colville River. The samples were collected from 6 to 8 inches below the sediment surface. Samples were collected from the most downstream locations first, progressing to the most upstream locations last to avoid potential cross-contamination between samples.

3.1.3. Domestic Ground Water Well Sample

One ground water sample was collected from the domestic well, located on the Bonanza Mill property. The sample was collected from as close to the wellhead as possible. Prior to sample collection, the property residents had watered their lawn for over 60 minutes; faucets were purged for an additional 10 minutes. All samples were collected directly into sample containers and preserved with nitric acid to a pH $\leq$ 2.

3.2. Analytical Protocols

Analytical methods applied to SI samples include Contract Laboratory Program Analytical Services (CLPAS) TAL metals (ILM04.1), SVOCs (OLM04.2), pesticides/PCBs (OLM04.2), and VOCs (OLM04.2). These analytical suites were applied to samples in varying combinations based on the sample location and expected contaminants at each location. Analyses of samples for TAL metals were performed by American Analytical and Technical Services (AATS), located in Broken Arrow, Oklahoma. Analyses of SVOCs, VOCs, and pesticides/PCBs were performed by Cemic Corp., located in Narragansett, Rhode Island. Both laboratories were contracted by the EPA under the CLP.

3.3. Global Positioning System

Trimble Pathfinder Professional Global Positioning System (GPS) survey units and Corvalis data loggers were used by START personnel to record coordinates of all sample locations. Recorded GPS coordinates by sample point are listed in Appendix B.

3.4. Investigation-Derived Waste

Investigation-derived waste (IDW) generated during the SI sampling effort consisted of solid disposable sampling equipment and approximately 0.5 gallons of fluids used for decontaminating

the sampling bowls and spoons prior to soil and sediment sampling. The IDW was disposed of as non-hazardous waste in a local landfill by the START on April 11, 2002. No IDW generated during the sampling event remains at the site.

4.0 Quality Assurance/Quality Control

A total of 22 soil/sediment samples and one water sample were analyzed for the TAL total metals, VOCs, SVOCs, and Pesticides/PCBs. Total metal analyses were performed in accordance with the *EPA Contract Laboratory Program Statement of Work for Inorganic Analyses* (EPA 1991a). VOC, SVOC, and Pesticides/PCB analyses were performed in accordance with *EPA Contract Laboratory Program Statement of Work for Organic Analyses* (EPA 1999a). Specific quality assurance/quality control (QA/QC) requirements for these analyses of the Bonanza Mill Site samples are presented in the respective CLP statements of work and the project SQAP (Herrera 2002).

All data from analyses performed by the CLP laboratories were reviewed and validated by an EPA chemist, except for rinsate blank data reviewed by a START chemist. Data qualifiers were applied by the EPA chemist as necessary according to statements of work and the following guidance:

- *U.S. EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review* (EPA 1994)
- *U.S. EPA Contract Laboratory Program National Functional Guidelines for Organic Data Review* (EPA 1999b).

Copies of the data QA memoranda are included in Appendix C.

4.1. Satisfaction of Data Quality Objectives

Data Quality Objectives Process for Superfund, Interim Final Guidance (EPA 1993) guidance document was used to establish data quality objectives (DQOs) for this SI.

The data quality achieved during field sample collection and sample analyses conducted at the laboratories produced sufficient data to meet DQOs established in the SQAP (Herrera 2002).

4.2. Quality Assurance/Quality Control Samples

Samples were collected or processed in the field to assist analysis of QA/QC measures. QA samples included rinsate blank samples, temperature blank samples, and trip blank samples (for VOC analysis only); one rinsate blank sample collected from the sample bowl and spoons, one trip blank sample in the VOC shipment cooler, and one temperature blank sample per shipment cooler were submitted for the project. QC samples included matrix spike/matrix spike duplicate (MS/MSD) for organic samples and a matrix spike/duplicate (MS/DUP) for inorganic samples at a rate of one per 20 organic or inorganic samples, respectively.

4.3. Project-Specific Data Quality Objectives

The following describes the laboratories' ability to meet project DQOs for precision, accuracy, and completeness, and the overall success of the field team and the laboratories at meeting project DQOs for representativeness and comparability. The laboratories and the field team were able to meet DQOs for the project with the exceptions noted below. Table 4-1 presents a summary of data qualification by the EPA chemist.

Table 4-1. Data qualification summary for the Bonanza Mill Site, Stevens County, Washington.

Analysis	No. of Samples	Total No. of Data Values [a]	Qualification	Number (%) of Data Qualified	Qualification Categories [b]
Total Metals	22 Soil/Sediment 2 Water 2 PE	575	Estimated (J or UJ)	157 (27%)	< CRDL, negative blanks, serial dilution, laboratory control samples, duplicate, matrix spikes
VOCs SVOCs Pesticides/PCBs	22 Soil 3 Water [c]	3,291	Unusable (R)	4 (0.001 %)	Low matrix spike recovery and relative response factors
			Estimated (J or UJ)	179 (5%)	< CRDL, holding times, calibrations, and matrix spikes
			Not detected (U)	47 (1%)	Blank contamination

Key:
< CRDL = Value reported at less than the contract required detection limit.
PE = Performance evaluation sample.

Notes:
[a] = The total number of data values is defined as the total of each chemical constituent in each sample analysis (e.g., 22 soils/sediment samples x 23 TAL metals).
[b] = See the following pages for detailed reasons for sample data qualification.
[c] = Includes a trip blank for analysis of volatile organic compounds only.

4.3.1. Precision

Precision represents the reproducibility of the sampling and analytical methodology. Laboratory and field precision is measured as the relative percent difference (RPD) between laboratory duplicate samples or MS/MSD samples.

The RPD values were reviewed for all laboratory duplicate samples (metals analyses) and MS/MSD samples (organic analyses). According to data validation reports provided by EPA, the precision DQOs for the Bonanza Mill Site Investigation were met for all analyses, except selenium and zinc analyses of the two water samples.

4.3.2. Accuracy

Accuracy represents the measure of bias from a set of measurements relative to a known or true value. Data accuracy was measured using various quality control samples and procedures that include:

- Maximum sample holding times
- Instrument calibration and performance checks
- Preparation, calibration, trip, temperature, and rinsate blank analyses
- Interference check sample, serial dilution, and laboratory control sample analyses (metals only)
- Surrogate spike analyses (organics only)
- Matrix spike analyses.

According to data validation reports provided by the EPA, accuracy DQOs for the Bonanza Mill Site were met with the exceptions noted below.

Metals data were qualified by the EPA chemist for the following reasons:

- Negative response in the preparation and/or continuing calibration blank(s) for analysis of thallium in seven soil samples, beryllium in 19 soil samples, antimony in two water samples, calcium in one water sample, and zinc in one water sample (values were qualified as estimated)
- High recovery of sodium in a laboratory control sample associated with two soil samples (values were qualified as estimated)
- High difference between serial dilution analysis for chromium and nickel in two soils samples (values were qualified as estimated)
- High recovery of arsenic and lead in a matrix spike sample associated with two soil samples
- Low recovery of copper and high recovery of selenium in a matrix spike sample associated with 19 soil samples (values were qualified as estimated).

Organics data were qualified by the EPA chemist for the following reasons:

- High percent differences for continuing calibration verification checks for several volatile and semivolatile compounds associated with 21 soil samples and two water samples (values were qualified as estimated)

- Low average response factor for one volatile compound (1,2-dibromo-3-chloropropane) associated with one soil sample and two water samples (values were qualified as unusable)

- Contamination of one or more VOC and SVOC blanks with a few compounds that were detected in soils and water samples at concentrations less than ten times the blank value (sample values were qualified as undetected)

- Low recoveries of four volatile compounds in the matrix spike duplicate analyses for one soil sample (sample values were qualified as estimated)

- Extremely low recovery of one SVOC (pentachlorophenol) in the matrix spike duplicate analysis of one soil sample (sample values were qualified as unusable)

- Low recovery of one pesticide compound (gamma-BHC) in the matrix spike duplicate analyses of one water sample (sample values were qualified as estimated)

- Holding time exceedance for extraction of one water sample for SVOC and Pesticides/PCB analyses (sample values were qualified as estimated).

In addition, the EPA chemist qualified detected values as estimated if they were reported at levels less than the CRDL.

A START chemist reviewed analytical results for rinsate blanks because these samples were submitted as blind samples. Chloroform and toluene were detected in the VOC rinsate blank, and 4-chloro-3-methylphenol was detected in the SVOC rinsate blank. These compounds were not detected in the associated source or target samples and, therefore, no data were qualified. Calcium and sodium were detected in the metals rinsate blank, but no data were qualified because associated sample results were greater than five times the blank values.

4.3.3. Completeness

Data completeness is measured as the percentage of usable data (usable data divided by the total possible data where estimated values are considered usable). All laboratory data were reviewed for data validation and usability. The project DQOs for completeness of 90 percent for soil/sediment samples and 95 percent for water samples were met.

4.3.4. Representativeness

Data representativeness is the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental condition. The number and selection of samples were determined for the SQAP and verified in the field to accurately account for site variations and sample matrices. Therefore, the DQOs for representativeness have been met.

4.3.5. Comparability

Comparability represents the ability to evaluate one set of data with another. Data produced for this site resulted from applicable field and consistent sampling techniques, consistent analytical methods, standard units of measurement, and required data reporting formats. Therefore, the DQOs for comparability have been met.

5.0 Analytical Results Reporting and Background Samples

All analytical results are reported in Sections 5, 6, and 7; this section describes the criteria for data presentation and provides a description of background sample conditions.

5.1. Analytical Results Evaluation Criteria

Analytical results presented in the summary tables in Sections 6 and 7 show all compounds detected above laboratory detection limits in bold type. Analytical results indicating significant concentrations of contaminants in source samples (Section 6) with respect to background concentrations are shown underlined and in **bold** type. Similarly, analytical results indicating elevated concentrations of contaminants in target samples (Section 7) with respect to background concentrations are also shown underlined and in **bold** type. For the purposes of this investigation, significant/elevated concentrations are those concentrations:

- Equal to or greater than the sample's Contract Required Detection/Quantitation Limit (CRDL/CRQL) or the sample quantitation limit (SQL); and
- Equal to or greater than the background sample's CRDL/CRQL or SQL when the background concentration is below detection limits; or
- At least three times greater than the background concentration when the background concentration equals or exceeds the detection limits.

The analytical summary tables in Sections 6 and 7 present all detected compounds. Only those detected analytes at potential sources or in targets meeting the significant and/or elevated concentration criteria are discussed in the report text. All detected concentrations are also discussed for background samples, including those concentrations that were qualified as estimated (i.e., JB) because they were detected below the SQL.

For analytical results qualified as estimated, the sample concentration was not adjusted in order to determine whether the concentration was significant or elevated. All hazardous substances detected at target locations and meeting the above described evaluation criteria can be used to document an observed release from the site to the target.

5.1.1. Analytical Sample Results Reporting

When four or more analytes are detected or are significant or elevated for an analytical suite (e.g., SVOCs or TAL metals) in Section 6 and 7, the number of such analytes and the

concentration ranges are given. When three or fewer analytes are detected or are significant/elevated for an analytical suite, the specific analyte and its concentration are provided. Based on EPA, Region 10 policy, evaluation of aluminum, calcium, iron, magnesium, potassium, and sodium (common earth crust elements) is beyond the scope of this report. For this reason, these elements are not discussed.

5.2. Background Samples

Background samples were collected for each of the media from which SI samples were collected. Those media are surface soil, Colville River and SE drainage ditch sediment, wetland sediment, and ground water. The domestic ground water sample will be compared to EPA Drinking Water Regulations and Health Advisories. Results for the appropriate background samples are shown in the first column of the analytical results summary tables in Sections 6 and 7 for comparison against source or target results.

5.2.1. Background Surface Soil

5.2.1.1. Sample Locations

Two offsite background surface soil samples (BG01SS and BG04SS) were collected from areas determined to be outside the influence of the site. For sample BG01SS, native soil was collected approximately 0.08 mile south of the site near the Colville River bank (Figure 3-1). Sample BG04SS was collected from native soil located along Valley-Westside Rd, approximately 3 miles southwest of the site. This sample location is not shown on the site figures due to its distance from the site, although its geographic coordinates are listed in Appendix B. Background soil types matched those of samples collected on site. Two background samples were collected to ensure the locations were outside of the range of influence of the site. The highest analyte value in the two background samples will be used for sample comparison.

5.2.1.2. Sample Results

Ten inorganics were detected in background sample BG01SS, ranging in concentration from 2.4 milligrams per kilogram (mg/kg) (cadmium; J) to 242 mg/kg (manganese). Thirteen inorganics were detected in background sample BG04SS, ranging in concentration from 0.40 mg/kg (beryllium; J) to 268 mg/kg (manganese). No values exceeded those identified as typical 90th percentile background concentrations found in Eastern Washington State soils (Ecology 1994). No SVOCs, VOCs or Pest/PCBs were detected in either background sample.

5.2.2. Colville River Wetland Sediments

5.2.2.1. Sample Locations

Two background sediment samples (BG02SD and BG03SD) were collected. One background sediment sample (BG02SD) was collected approximately 0.08 miles south of the site within the

wetlands along the Colville River banks. The second background sample (BG03SD) was collected approximately 50 feet south of sample BG02SD, ten feet upgradient from the bank of the Colville River within the wetland (Figure 3-1). Two background samples were collected to ensure the locations were outside the range of influence of the site. The highest analyte value in the two background samples will be used for sample comparison. The background sample matrices matched those of samples collected adjacent to and downstream from the site.

5.2.2.2. Sample Results

Eleven inorganics were detected in background sediment sample BG02SD, ranging in concentration from 0.48 mg/kg (cadmium; J) to 353 mg/kg (manganese). Twelve inorganics were detected in background sediment sample BG03SD ranging in concentration from 0.32 mg/kg (silver; J) to 245 mg/kg (manganese). No values exceeded those identified as typical 90th percentile background concentrations found in Eastern Washington State soils (Ecology 1994). No SVOCs, VOCs or Pest/PCBs were detected in either background sample.

5.2.3. Gold Creek Sample

5.2.3.1. Sample Locations

One sample (CR07SD) was collected from Gold Creek, a small perennial stream that discharges into the Colville River downgradient of the site. This sample was collected to assess the contribution of contaminants to sediment collected downstream of the confluence of Gold Creek and the Colville River. Only sample CR01SD was located downstream of the confluence with the Colville River, and was assessed against this contribution sample in addition to the previously discussed sediment background samples. Sample CR07SD was collected approximately 50 feet upstream of the confluence of Gold Creek and the Colville River, from 6-8 inches below the sediment surface.

5.2.3.2. Sample Results

Twelve inorganics were detected in contribution sample CR07SD, ranging in concentration from 0.32 mg/kg (silver; J) to 245 mg/kg (manganese). No values exceeded those identified as typical 90th percentile background concentrations found in Eastern Washington State soils (Ecology 1994). No SVOCs, VOCs, or Pest/PCBs were detected in the contribution sample.

6.0 Potential Sources

Sampling locations, sampling rationale, and analytical results are summarized in the following sections. Table 6-1 summarizes analytes detected at each potential source location investigated. Laboratory analytical results for all samples are in provided in Appendix C.

6.1. Surface Soil Sources

During the START site visit, mill tailings were observed on the soil surface across most of the site. Tailings and/or waste rock also were observed to line the banks of the SE drainage ditch that flows offsite into the Colville River. The total estimated volume of tailings onsite is 17,500 cubic yards. The total estimated volume is based on contaminated area estimates calculated using the known sample points and an estimated average depth of tailings calculated using a hand auger to reach the tailing/soil interface. The depth of tailings was estimated to be approximately 3 feet deep.

6.1.1. Surface Soils

6.1.1.1. Sample Locations

A total of ten surface soil samples (samples BM01SS, BM02SS, BM03SS, BM04SS, BM05SS, BM06SS, BM07SS, BM08SS, BM09SS, and BM10SS) were collected across the Bonanza Mill site. The samples were collected from four locations upslope of the bank of the Colville River, two locations in the vicinity of the two homes onsite, two locations in the north end of the site, and two locations along the banks of the SE drainage ditch (Figure 3-1). All surface soils collected from the site appeared to be primarily fine reddish brown silt. Samples BM09SS and BM10SS, collected from the banks of the SE drainage ditch had some larger pieces of shale mixed in with the fines. No soil odors were noted during sample collection, although the soil in sample BM07SS was observed to be stained.

6.1.1.2. Sample Results

Sample results are summarized in Table 6-1. Twelve inorganic compounds were detected at significant concentrations in onsite surface soil samples, ranging from 0.43 mg/kg (mercury) to 43,300 mg/kg (lead). No SVOCs, VOCs, or Pesticides/PCBs were detected at significant concentrations in the onsite source soil samples.

Lead, arsenic, copper, mercury, and zinc were detected at significant concentrations in all soil samples collected onsite. Lead exhibited the highest concentrations, ranging from 442 mg/kg (BM07SS) to 43,300 mg/kg (BM10SS). Several other inorganics were detected at significant concentrations in a majority of the onsite soil samples, including barium, cadmium, manganese, silver, and thallium.

Table 6-1. Source surface soil samples, analytical results, Bonanza Mill Site, Stevens County, Washington.

EPA Sample No.	02154016	02154021	02154000	02154001	02154002	02154003	02154004	02154005	02154006	02154007	02154008	02154009
CLP Number	MJ0L84	MJ0L89	MJ0L68	MJ0L69	MJ0L70	MJ0L71	MJ0L72	MJ0L73	MJ0L74	MJ0L75	MJ0L76	MJ0L77
Sample Location	BG01SS	BG04SS	BM01SS	BM02SS	BM03SS	BM04SS	BM05SS	BM06SS	BM07SS	BM08SS	BM09SS	BM10SS
Depth (inches bgs)	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6
Sample Type	Background	Background	Source	Source	Source	Source	Source	Source	Source	Source	Source	Source
TAL Metals (mg/kg)												
Aluminum	**5870**	**8350**	**8270**	**9140**	**8190**	**5780**	**6230**	**7950**	**4160**	**5030**	**7280**	**7460**
Antimony	1.2 U	0.97 JB	9.0 JB	4.5 JB	9.1 JB	8.3 JB	9.1 JB	6.2 JB	**15.0**	7.4 JB	**19.4**	**20.6**
Arsenic	**2.4**	**7.4** JH	**50.6**	**39.4**	**61.5**	**62.0**	**72.3**	**42.5**	**76.9**	**84.3**	**164**	**114**
Barium	**80.1**	**76.2**	**855**	**674**	**1010**	**1090**	**1350**	**1510**	**94.8**	**1340**	**258**	**532**
Beryllium	0.24 UJK	0.40 JB	0.23 UJK	0.22 UJK	0.23 UJK	0.22 UJK	0.23 UJK	0.24 UJK	0.24 UJK	0.24 UJK	0.30 UJK	0.26 UJK
Cadmium	0.45 JB	0.23 U	**3.3**	**6.1**	**3.1**	**2.4**	**1.6**	1.1 JB	**25.0**	1.1 JB	0.93 JB	**4.1**
Calcium	**4980**	**3560**	**15800**	**18000**	**12300**	**10500**	**9110**	**1910**	**69100**	**5790**	**1530**	**2260**
Chromium	**8.7**	**18.7** JH	**13.4**	**26.6**	**15.7**	**10.9**	**11.2**	**14.8**	**9.2**	**17.0**	**21.7**	**14.8**
Cobalt	4.4 JB	6.4 JB	**29.6**	**31.0**	**36.8**	**21.6**	**26.9**	**14.5**	**29.0**	**25.3**	12.9 JB	**61.9**
Copper	0.71 UJK	**16.5**	**215** JL	**132** JL	**105** JL	**103** JL	**105** JL	**64.2** JL	**2740** JL	**64.0** JL	**180** JL	**176** JL
Iron	**11600**	**18600**	**126000**	**101000**	**169000**	**155000**	**183000**	**146000**	**41800**	**233000**	**254000**	**305000**
Lead	**28.9**	**8.5** JH	**12500**	**8580**	**17800**	**14200**	**17600**	**12800**	**442**	**19600**	**33600**	**43300**
Magnesium	**3530**	**4200**	**3310**	**7970**	**3930**	**2430**	**2190**	**2280**	**27900**	**1650**	**2260**	**3810**
Manganese	**242**	**268**	**1560**	**2890**	**1690**	**1520**	**1700**	**913**	**901**	**3500**	**653**	**3910**
Mercury	0.06 U	0.05 U	**2.2**	**1.2**	**3.5**	**3.0**	**2.8**	**2.8**	**0.43**	**3.6**	**4.7**	**5.2**
Nickel	9.1 JB	**16.0** JH	**25.0**	**43.8**	**36.6**	**22.3**	**27.6**	**15.3**	**21.7**	**27.6**	**30.9**	**42.7**
Potassium	**1270**	**1360**	878 JB	1100 JB	1000 JB	762 JB	577 JB	926 JB	604 JB	442 JB	262 JB	384 JB
Silver	0.24 U	0.23 U	**15.7**	**8.8**	**17.1**	**16.5**	**16.8**	**12.3**	1.3 JB	**17.4**	**39.5**	**31.9**
Sodium	355 JB	272 JB	412 JB	384 JB	414 JB	433 JB	413 JB	421 JB	416 JB	325 JB	565 JB	359 JB
Thallium	1.2 UJK	1.5 JB	**8.7**	**7.8**	**12.7**	**9.6**	**7.6**	**6.9**	1.4 JB	**10.3**	**10.0**	**7.6**

Table 6-1. Source surface soil samples, analytical results, Bonanza Mill Site, Stevens County, Washington (continued).

EPA Sample No.	02154016	02154021	02154000	02154001	02154002	02154003	02154004	02154005	02154006	02154007	02154008	02154009
CLP Number	MJ0L84	MJ0L89	MJ0L68	MJ0L69	MJ0L70	MJ0L71	MJ0L72	MJ0L73	MJ0L74	MJ0L75	MJ0L76	MJ0L77
Sample Location	BG01SS	BG04SS	BM01SS	BM02SS	BM03SS	BM04SS	BM05SS	BM06SS	BM07SS	BM08SS	BM09SS	BM10SS
Depth (inches bgs)	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6	0-6
Sample Type	Background	Background	Source	Source	Source	Source	Source	Source	Source	Source	Source	Source
TAL Metals (mg/kg)												
Vanadium	**13.5**	**31.5**	**35.7**	**38.0**	**44.0**	**39.1**	**48.3**	**51.2**	**35.2**	**48.8**	**42.5**	**40.9**
Zinc	**52.5**	**52.5**	**1110**	**1080**	**1260**	**1040**	**1030**	**671**	**6630**	**728**	**531**	**1700**

Key:
B = Associated sample result is greater than the instrument detection limit, but less than the sample quantitation limit.
bgs = below ground surface
CLP = Contract Laboratory Program
EPA = Environmental Protection Agency
H = High bias
J = The analyte was positively identified. The associated numeric value is an estimate.
K = Unknown bias
L = Low bias
mg/kg = milligrams per kilogram
TAL = Target Analyte List
U = The analyte was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for, but was not detected. The associated numerical value is an estimate.

Analytical results presented in **bold** type show concentrations of contaminants in source samples detected above laboratory detection limits.
Analytical results presented in **bold** type and underlined indicate significant concentrations of contaminants in source samples with respect to background concentrations.

7.0 Migration/Exposure Pathways And Targets

The following sections describe migration/exposure pathways and potential targets within the site's range of influence (Figures 7-1 and 7-2). Analytical data QA forms from laboratory analyses are provided in Appendix C.

7.1. Ground Water Migration Pathway

7.1.1. Pathway Description

Average net precipitation in the immediate vicinity of the Bonanza Mill site is estimated to be 5 to 15 inches (EPA 1990). Native surface soil in the area consists of Colville silty loam, which typically is deep and poorly-drained. The surface layer is generally a dark gray, calcareous silty loam, approximately 17 inches thick. Subsoil is a mottled, gray, calcareous, silty clay loam approximately 10 inches thick. This soil exhibits moderately slow permeability with high available water. The soil is subject to occasional flooding for long periods from February through May (USDA 1978).

Bedrock in the vicinity consists of the Kootenay Arc, a northwest-trending structural belt containing multiple deformed sedimentary rocks (Watkinson and Ellis 1987). Ground water is present primarily in solution cavities and joints in carbonate rocks (USGS 1994).

7.1.2. Targets

Two hundred and nine domestic drinking water wells are reported to exist within a 4-mile radius of the site (Ecology 2002). Based on the average number of persons per household for Stevens County of 2.73 people (USCB 1990), these wells serve approximately 575 people.

Ground water is usable for drinking water, for stock watering, and irrigation of commercial crops (Ecology 2002). The ground water drinking population served within designated distance rings is provided in Table 7-1.

The nearest domestic ground water well is located on the Bonanza Mill site. At the time of the sampling event, the on-site well served two residences. The residents of the houses informed the START that they do not drink the well water due to a strong odor and that they use bottled water for drinking purposes. At this time, both residences are no longer occupied.

The City of Colville operates one municipal well located 2 to 3 miles from the site, serving an estimated 667 persons (EPA 2000). The well is screened approximately 250 feet bgs (Fergeson 2000). The Buena Vista Nursing Home operates a public well located 2 to 3 miles from the site that serves 45 persons (EPA 2000).

The site does not lie within a wellhead protection area (EPA 2000).

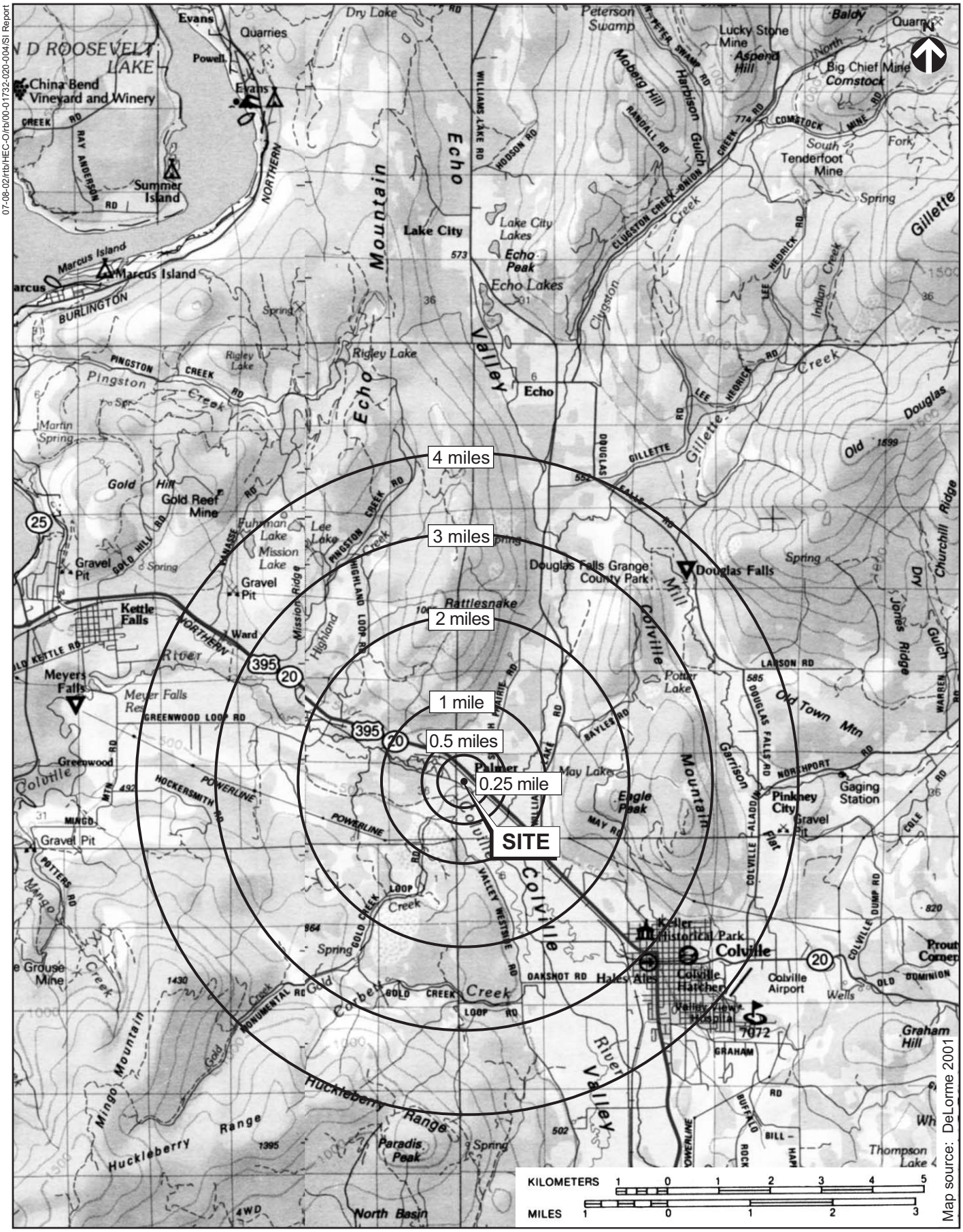

Figure 7-1. Four-mile target distance limit map of the Bonanza Mill site, Stevens County, Washington.

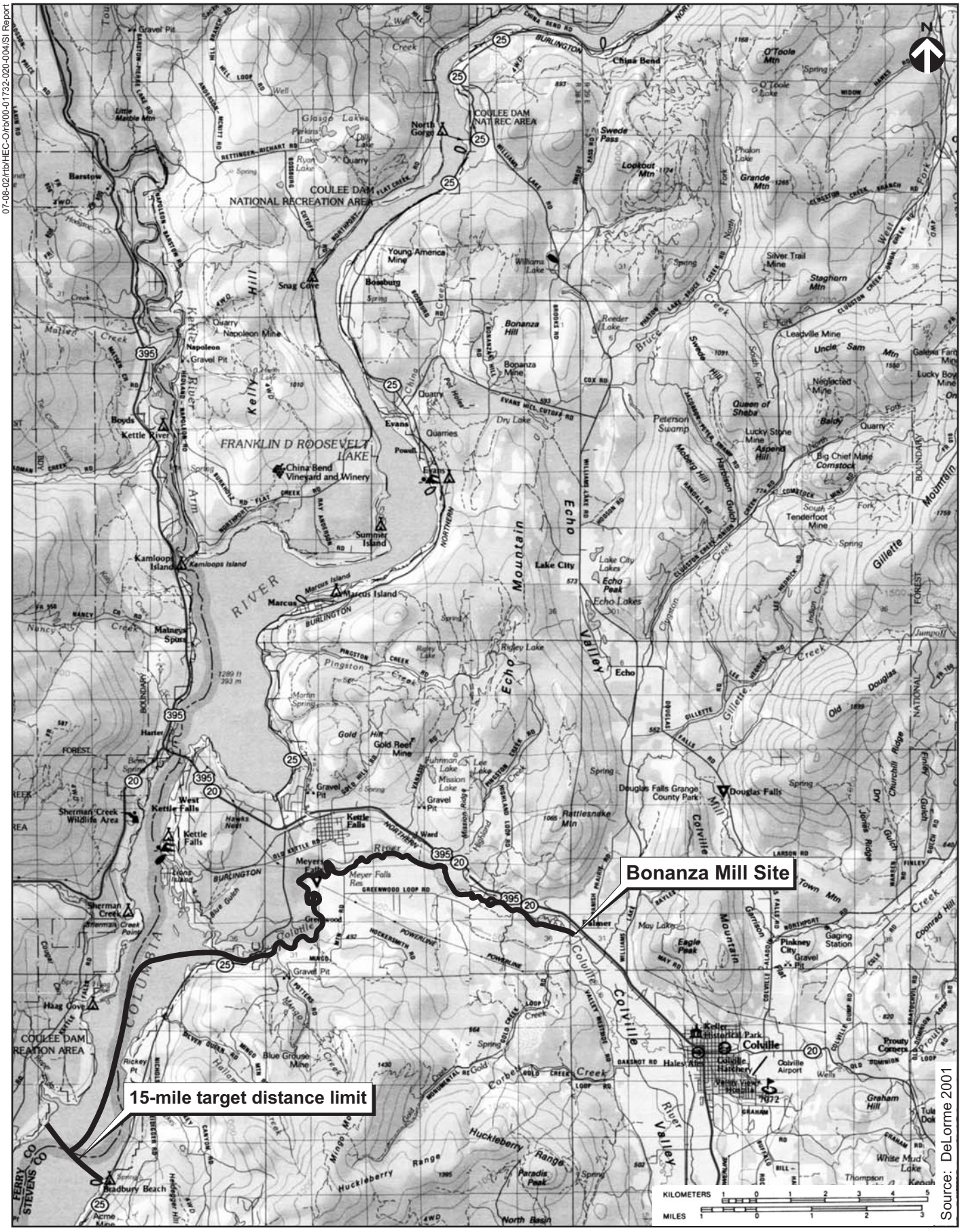

Figure 7-2. Fifteen-mile target distance limit map of the Bonanza Mill site, Stevens County, Washington.

Table 7-1. Ground water drinking population within a 4-mile radius of the Bonanza Mill site, Stevens County, Washington.

Distance (Miles)	Wells	Population [a]
0-0.25	1 (Domestic)	0 [b]
0.25-0.5	5 (Domestic)	13.65
0.5-1	24 (Domestic)	65.52
1-2	68 (Domestic)	185.64
2-3	57 (Domestic) 2 (Municipal)	155.61 712
3-4	54 (Domestic)	147.42
Total	**209 Domestic** **2 Municipal**	**567.84 Domestic** **712 Municipal**

Source: Ecology 2002; U.S. EPA 2000.
[a] Domestic well population was estimated based on the average number of persons per household for Stevens County of 2.73 people (USCB 1990).
[b] Residences are no longer occupied as of June 2002.

7.1.3. Sample Locations

One water sample (BM11GW) was collected from the on-site domestic well located approximately 20 feet from the residences. The well is located within the source area and served seven people until June 2002. The sample was collected from an outdoor spigot located in the front yard. No odor was detected during sample collection.

7.1.4. Domestic Ground Water Well Sample Results

Sample results are summarized in Table 7-2. The water sample was compared to EPA Drinking Water Regulations and Health Advisories. No inorganics, VOCs, SVOCs, or Pesticides/PCBs were detected above existing maximum contaminant levels (MCLs) listed in EPA Drinking Water Regulations and Health Advisories.

7.2. Surface Water Migration Pathway

7.2.1. Pathway Description

The Bonanza Mill Site is located in the riparian valley of the Colville River, near Colville, Washington. The site has been graded level in most areas, with an estimated elevation of 5 to 10 feet above the Colville River, depending on river stage. It is assumed that surface water runoff from source material (tailings and waste rock piles) may flow overland 10 to 50 feet to either the SE drainage ditch or directly to the Colville River.

Table 7-2. Ground water well sample analytical results, Bonanza Mill Site, Stevens County, Washington.

EPA Sample Number	02154019	MCL
CLP Number	MJ0L87 / J0L30	
Sample Location	BM11GW	
TAL Metals (ug/L)		
Analyte		
Aluminum	13.0	
Barium	82.6 JB	2,000
Calcium	96,900	NA
Copper	14.8 JB	1,300
Iron	47.9 JB	NA
Magnesium	27,600	NA
Nickel	3.0 JB	NA
Potassium	3,080 JB	NA
Selenium	6.2	50
Sodium	13,000	NA
Zinc	48.5 JK	NA
VOC		
1,2-Dibromo-3-chloropropane	10 R	0.2

Key:
B = Associated sample result is greater than the instrument detection limit, but less than the sample quantitation limit.
CLP = Contract Laboratory Program
EPA = Environmental Protection Agency
J = The analyte was positively identified; the associated numeric value is an estimate.
K = Unknown bias
MCL = Maximum Contaminant Levels (40 CFR 141).
NA = Not Available.
R = Rejected.
TAL = Target Analyte List
ug/L = micrograms per liter.
VOC = Volatile Organic Compounds

The most upstream probable point of entry (PPE1) is located within the SE drainage ditch, approximately 100 feet upstream of the confluence with the Colville River, at sample location CR06SD. The most downstream PPE (PPE2) is located at the Colville River adjacent to the most downstream property boundary. There are several PPEs located between the PPE1 and PPE2, along the banks of the SE drainage ditch and the Colville River and at the south and western boundaries of the site, where potential contaminants from onsite sources may enter surface water through overland surface flow. The 15-mile Target Distance Limit (TDL) begins at PPE1, extends approximately 100 feet to the Colville River, then continues approximately 0.2 miles along the Colville River to PPE2, and follows the Colville River west approximately 11.25 miles to its confluence with the Columbia River. The remaining 3.75 miles of the TDL is within the Columbia River (Figure 7-2).

The upland drainage area for the site is estimated from topographic maps to be 485 acres (USGS 1992b). Mean annual precipitation in Colville, Washington is 17.20 inches (WRCC 2000a); the two-year, 24-hour rainfall event for the site is 1.4 inches (WRCC 2000b). The site is located within the 100-year flood plain (FEMA 1990). A berm, or levee, was observed to surround the east, west, and north sides of the property. This berm ranges in height from 5 to 10 feet above the ground surface and appears to have been breached in the past.

Surface soil in the area (not sampled as tailings) consists of Colville silty loam, which typically is deep and poorly-drained. The surface layer is generally a dark gray, calcareous silty loam, approximately 17 inches thick. Subsoil is a mottled, gray, calcareous, silty clay loam approximately 10 inches thick. This soil exhibits moderately slow permeability with a high available water. The soil is subject to occasional flooding for long periods from February through May (USDA 1978).

7.2.2. Targets

There are 17 surface water intakes for drinking water within the site's TDL (Ecology 2002). The three nearest intakes were indicated on the Colville River 1 to 2 miles from the site. There are two reported intakes approximately 5 to 6 miles downstream of the site on the Colville River, two reported intakes approximately 12 miles downstream from the site on the Columbia River, one reported intake located approximately 13 miles downstream from the site, and nine reported intakes located approximately 14 miles downstream from the site (Ecology 2002). Based on an average number of persons per household in Stevens County of 2.73, all 17 intakes serve approximately 46 people (USCB 1990). Additional surface water intakes are used for commercial crop irrigation and commercial stock watering (Ecology 2002).

The average annual flow rate of the Colville River measured at Kettle Falls, six miles downstream of the site, is 304 cubic feet per second (cfs), the average annual flow rate for the Columbia River, measured at International Boundary, Washington, is 99,820 cfs (USGS 1998). The International Boundary gauging station is located upstream of Lake Roosevelt. There are no USGS gauging stations to measure streamflow within Lake Roosevelt. It is assumed that the flow rate of the Columbia River within Lake Roosevelt is considerably less than that measured at International Boundary, Washington.

No known commercial fisheries exist on the Colville River or the Columbia River within the 15-mile TDL; however, sport fishing occurs in both (Vail 2002). Sport catch data for the 11.25- to 15-mile section of the TDL on the Columbia River has been estimated at 37.38 pounds of rainbow trout, 1,235 pounds of walleye, and 14.10 pounds of smallmouth bass; sturgeon also have been caught in this area, but no data is available for this species (Cichosz 1999).

There are no anadromous fish runs in the Columbia River due to the Coulee Dam located downstream from the site's 15-mile TDL. Bull trout (*Salvelinus confluentus*), a federally listed threatened species, is known to be present in the Columbia River at Lake Roosevelt within the 15-mile TDL (Vail 2002). Seven bald eagle (*Haliaeetus leucocephalus*; a federally listed threatened species) nesting areas are located within the 15-mile TDL of the site (Azerrad 2002).

It is assumed that these eagles will utilize portions of the site's 15-mile TDL for feeding purposes, including areas adjacent to the site boundary along the Colville River.

It is estimated from National Wetlands Inventory maps that 8.05 linear miles of wetlands exist within the site's 15-mile TDL (USFWS 1987a, 1987b, 1987c, 1987d). The Coulee Dam National Recreation Area also is located within the site's 15-mile TDL (USGS 1992a, 1992b, 1969).

During a subsequent START field visit, several people were observed swimming in the Colville River, directly adjacent to the SE drainage ditch and the Bonanza Mill site.

7.2.3. Sediment Sample Locations

Six sediment samples were collected within the wetlands adjacent to the Colville River and the SE drainage ditch. These six sediment samples included two samples collected from the SE drainage ditch (CR05SD and CR06SD) and four samples collected from wetlands adjacent to the Colville River (CR01SD, CR02SD, CR03SD, and CR04SD). Sediment samples collected along the SE drainage ditch were collected from the center of the ditch. Sediment samples collected from the Colville River were collected in the Palustrine emergent wetlands along the riverbank.

7.2.4. Sediment Sample Results

Sample results are summarized in Table 7-3. Twelve inorganics were detected at elevated concentrations in the sediment samples, ranging in concentration from 1.9 mg/kg (mercury) to 38,000 mg/kg (lead). No VOCs, SVOCs, or Pesticides/PCBs were detected at elevated concentrations in the sediment samples.

Except for one elevated detection in sediment sample CR03SD (lead, 82.5 mg/kg), all elevated concentrations of inorganics were observed within the SE drainage ditch. Sample results were consistent with inorganic results from onsite soil samples. Arsenic, barium, cadmium, cobalt, copper, lead, manganese, mercury, selenium, silver, thallium, and zinc were detected at elevated concentrations in both samples collected from the ditch.

7.3. Soil Exposure Pathway

Access to the Bonanza Mill site is unrestricted. At the time of the site visit, there were two residences within 200 feet of source material. One residence housed a family of two adults and two children and the other residence housed two adults and one child. At this time, both residences are no longer occupied. It is assumed that at least one worker is present on site, based on continued use for timber storage requiring loading and unloading of trucks. The population within 1 mile of the site is 121 persons (EPA 2000). There are no known schools or day-care facilities within 200 feet of a potential source. The town of Colville, population 4,670 (Fergeson 2000), is located within 4 miles of the site (Figure 7-1). No commercial agriculture or

Table 7-3. Sediment sample analytical results, Bonanza Mill Site, Stevens County, Washington.

EPA Sample Number	02154017	02154018	02154020	02154010	02154011	02154012	02154013	02154014	02154015
CLP Number	MJ0L85	MJ0L86	MJ0L88	MJ0L78	MJ0L79	MJ0L80	MJ0L81	MJ0L82	MJ0L83
Sample Location	BG02SD	BG03SD	CR07SD	CR01SD	CR02SD	CR03SD	CR04SD	CR05SD	CR06SD
Depth (inches bgs)	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8
Sample Type	Background	Background	Contribution	Target	Target	Target	Target	Target	Target
TAL Metals (mg/kg)									
Aluminum	**6890**	**10200**	**6510**	**10100**	**16800**	**8670**	**4450**	**11800**	**8540**
Antimony	1.4 U	1.3 U	0.55 U	1.6 U	1.7 U	1.5 U	1.2 U	15.8 JB	5.4 JB
Arsenic	2.3 JB	**3.6**	5.6 JH	**3.4**	**6.9**	2.9 JB	1.8 JB	**66.5**	**40.7**
Barium	**91.7**	**126**	**62.2**	**100**	**209**	**119**	36.0 JB	**841**	**300**
Beryllium	0.29 UJK	0.27 UJK	0.28 U	0.52 JB	0.43 JB	0.38 JB	0.25 UJK	0.38 JB	0.40 JB
Cadmium	0.33 JB	0.48 JB	0.28 U	0.31 U	0.71 JB	0.93 JB	0.25 U	**4.5**	**4.8**
Calcium	**16600**	**22300**	**4120**	**16700**	**24200**	**15400**	**9350**	**3460**	**7210**
Chromium	**9.4**	**13.5**	**18.1** JH	**13.2**	**21.8**	**11.4**	**6.4**	**18.0**	**11.0**
Cobalt	4.6 JB	6.6 JB	5.3 JB	6.5 JB	10.8 JB	8.9 JB	3.4 JB	**57.0**	**19.7**
Copper	0.87 UJK	0.81 UJK	**9.1**	0.94 UJK	1.0 UJK	0.93 UJK	0.74 UJK	**108** JL	**71.5** JL
Iron	**12400**	**17400**	**18000**	**17400**	**27500**	**15600**	**9640**	**170000**	**71700**
Lead	**10.6**	**13.2**	**4.6** JH	**20.8**	**27.1**	**82.5**	**6.4**	**38000**	**8420**
Magnesium	**7520**	**10500**	**3830**	**8400**	**10700**	**8530**	**5810**	**4140**	**4020**
Manganese	**203**	**353**	**245**	**220**	**835**	**586**	**165**	**4200**	**1410**
Mercury	0.07 U	0.07 U	0.06 U	0.07 U	0.08 U	0.08 U	0.06 U	**3.3**	**1.9**
Nickel	10.7 JB	**15.5**	**13.6** JH	**15.3**	**24.4**	**16.1**	7.6 JB	**40.1**	**30.7**
Potassium	1170 JB	**1660**	787 JB	1410 JB	**2710**	1440 JB	577 JB	567 JB	717 JB
Selenium	1.4 U	1.3 U	1.4 U	1.6 U	1.7 U	1.5 U	1.2 U	**3.8** JH	**4.2** JH
Silver	0.29 U	0.27 U	0.32 JB	0.31 U	0.34 U	0.31 U	0.25 U	**28.7**	**9.1**
Sodium	454 JB	462 JB	419 JB	559 JB	698 JB	551 JB	293 JB	432 JB	519 JB
Thallium	1.4 UJK	1.5 JB	1.7 JB	2.4 JB	2.9 JB	1.6 JB	1.2 UJK	**16.2**	**7.6**

Table 7-3. Sediment samples, analytical results, Bonanza Mill Site, Stevens County, Washington (continued).

EPA Sample Number	02154017	02154018	02154020	02154010	02154011	02154012	02154013	02154014	02154015
CLP Number	MJ0L85	MJ0L86	MJ0L88	MJ0L78	MJ0L79	MJ0L80	MJ0L81	MJ0L82	MJ0L83
Sample Location	BG02SD	BG03SD	CR07SD	CR01SD	CR02SD	CR03SD	CR04SD	CR05SD	CR06SD
Depth (inches bgs)	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8	6-8
Sample Type	Background	Background	Contribution	Target	Target	Target	Target	Target	Target
TAL Metals (mg/kg)									
Vanadium	14.3 JB	**19.4**	**22.2**	**19.3**	**30.8**	**18.0**	8.7 JB	**38.8**	**22.2**
Zinc	**55.5**	**76.2**	**49.8**	**75.4**	**126**	**164**	**37.5**	**1510**	**1320**

EPA Sample Number	02154017	02154018	02154020	02154010	02154011	02154012	02154013	02154014	02154015
CLP Number	J0L28	J0L29	J0L31	J0L21	J0L22	J0L23	J0L24	J0L25	J0L26
Sample Location	BG02SD	BG03SD	CR07SD	CR01SD	CR02SD	CR03SD	CR04SD	CR05SD	CR06SD
SVOC (ug/L)									
Pentachlorophenol	1400 U	1100 R	1500 U	1600 U	1400 U	1200 U	1100 U	1400 U	1600 U

Key:
B = Associated sample result is greater than the instrument detection limit, but less than the sample quantitation limit.
bgs = below ground surface
CLP = Contract Laboratory Program
EPA = Environmental Protection Agency
H = High bias
J = The analyte was positively identified. The associated numeric value is an estimate.
K = Unknown bias
L = Low bias
mg/kg = milligrams per kilogram
SVOC = Semivolatile Organic Compounds
TAL = Target Analyte List
U = The analyte was analyzed for, but was not detected. The associated numerical value is the sample quantitation limit.
UJ = The analyte was analyzed for, but was not detected. The associated numerical value is an estimate.

Analytical results presented in **bold** type show concentrations of contaminants in target samples detected above laboratory detection limits.
Analytical results presented in **bold** type and underlined indicate elevated concentrations of contaminants in target samples with respect to background concentrations.

silviculture is present within an area of potential contamination. There are no known terrestrial sensitive environments located on a potential source (Vail 2002, Azerrad 2002). Table 7-4 provides population figures within a 1-mile radius of the site.

Table 7-4. Human population within a 1-mile radius of the Bonanza Mill site, Stevens County, Washington.

Distance Ring (Miles)	Population
On site	0
0-0.25	18
0.25-0.5	22
0.5-1	81
Total	**121**

Source: U.S. EPA 2000.

7.4. Air Migration Pathway

There are 4,436 permanent residents within a 4-mile radius of the site (EPA 2000). A bald eagle nesting site is located approximately 0.5 mile southeast of the site (Azerrad 2002); it is assumed that their feeding range will fall within the 4-mile TDL. Commercial agriculture is conducted within 0.5 mile of the site. According to the NWI maps, there are 4,398 acres of designated wetlands within 4 miles of the site (USFWS 1987a, 1987b, 1987c, 1987d). No other resources are known to exist within a 4-mile radius of the site. Wetland acreage and population within 4 miles of the site are presented in Table 7-5.

Table 7-5. Human population and wetlands within a 4-mile radius of the Bonanza Mill site, Stevens County, Washington.

Distance Ring (Miles)	Population	Wetlands (Acreage)
On site	0	0
0-0.25	18	0.03
0.25-0.5	22	81.45
0.5-1	81	557.12
1-2	311	1,564.53
2-3	804	1,039.99
3-4	3,193	1,154.83
Total	**4,429**	**4,397.95**

Source: USFWS 1987a, 1987b, 1987c, 1987d; U.S. EPA 2000.

8.0 Site Summary and Conclusions

In April 2002, the START conducted SI sampling activities at the Bonanza Mill site located in Stevens County, Washington. The site is a former lead and zinc mill currently used for timber storage and for loading and unloading timber transport trucks. The site is located along the Colville River, approximately 3 miles downstream from the City of Colville.

The SI involved collection of samples from potential hazardous substance sources (i.e., tailings) on site and from target areas potentially impacted by contaminant migration. A total of 24 samples were collected for the SI, including background and QA samples. Samples were collected from onsite surface soil, as well as Colville River and wetland sediments in target areas. Additionally, one domestic water well sample was collected for comparison to EPA drinking water standards. Samples were analyzed by CLP laboratories under contract to the EPA.

8.1. Sources

Surface soil samples were collected from ten locations of tailing materials across the site. Soil samples contained significant concentrations of inorganic elements in every sample collected, including lead, arsenic, copper, mercury, and zinc. Lead had the highest concentrations found onsite ranging from 442 mg/kg (BM07SS) to 43,300 mg/kg (BM10SS). Other inorganics detected at significant concentrations in soil samples include barium, cadmium, manganese, silver, and thallium.

To further characterize the magnitude of the lead contamination in the surface soils at the Bonanza Mill site, a comparison of the maximum lead concentrations detected during the SI to EPA Region 9 Preliminary Remediation Goals (PRG) and the State of Washington Model Toxics Control Act (MTCA; WAC 173-340) Method A Soil Cleanup levels was conducted. The EPA Region 9 PRG for lead in residential soils is 400 mg/kg and for industrial soils 750 mg/kg (EPA 2002). The State of Washington Model Toxics Control Act (MTCA; WAC 173-340) Method A Soil Cleanup levels for lead in residential soils is 250 mg/kg and for industrial soils is 1,000 mg/kg. All onsite surface soil samples exceeded Region 9 PRG and MTCA benchmarks for residential soils. Additionally, all onsite surface soils, except for sample BM07SS (442 mg/kg), exceeded the benchmarks for lead allowed for industrial soils.

Arsenic was also compared to the applicable benchmarks. The EPA Region 9 non-cancer endpoint PRG for arsenic in residential soils is 22 mg/kg and in industrial soils is 440 mg/kg (EPA 2002). The MTCA Method A cleanup levels for both residential and industrial soils is 20 mg/kg. All onsite surface soil samples exceeded the Region 9 PRGs for residential soils and MTCA cleanup levels for both residential and industrial soils. None of the onsite surface soils exceeded the EPA PRG for industrial soils.

8.2. Targets

Of the four wetland sediment samples collected, lead was detected at an elevated concentration of 82.5 mg/kg in sediment sample CR03SD. Twelve inorganics were detected at elevated concentrations in both sediment samples collected from the SE drainage ditch (CR05SD and CR06SD). Lead was detected at 38,000 mg/kg (CR05SD) and 8,420 mg/kg (CR06SD). It is apparent that inorganic contaminants are migrating from the site to wetlands adjacent to the Colville River, although not to the same magnitude seen in the SE drainage ditch. This can be attributed to the observation that the banks of the SE drainage ditch are composed of tailings and waste rock.

8.3. Conclusions

Results of the SI indicate that the Bonanza Mill site is a source of hazardous inorganic substance contamination. The SI documented that contaminants have been and continue to be released to the SE drainage ditch and the Colville River through runoff from the site. This contamination could potentially impact nearby sport fisheries, wetlands, and other sensitive environments in the Colville River and the Columbia River. Subsequent to EPA providing the analyticial results to the property owner and the Northeast Tri-County Health District, the two families that lived on site vacated their residences. EPA Region 10 is currently undertaking a Removal Assessment of the Bonanza Mill site.

9.0 References

Azerrad, Jeff. January 4, 2002. Personal communication (correspondence with Dan Weiss, Herrera Environmental Consultants, concerning priority species near the Bonanza Mill site). Washington Department of Fish and Wildlife, Colville, Washington.

Cichosz, Thomas A., John P. Shields, Keith Underwood. May 1999. Spokane Tribe of Indians, Lake Roosevelt Monitoring/Data Collection Program 1997 Annual Report, Report to Bonneville Power Administration, Contract No. 1994BI32148, Project No. 199404300, (BPA Report DOE/BP-321-148-3).

DeLorme. 2001. Washington Atlas and Gazetteer, DeLorme, Yarmouth, Maine.

Ecology. 1994. Natural Background Soil Metals Concentrations in Washington State, Toxics Cleanup Program, Department of Ecology, Publication #94-115.

Ecology. 2002. Water Rights Application Tracking System, Eastern Regional Office, Washington State Department of Ecology.

EPA. December 1990. Hazard Ranking System; Final Rule, Net Precipitation Values. U. S. Environmental Protection Agency, Washington, D.C.

EPA. 1991. *Contract Laboratory Program Statement of Work for Inorganic Analyses*. U.S. Environmental Protection Agency, Washington, D.C.

EPA. September 1993, *Data Quality Objectives Process for Superfund, Interim Final Guidance*, EPA 540-R-93-071. U.S. Environmental Protection Agency, Washington, D.C.

EPA. February 1994. Contract Laboratory Program National Functional Guidelines for Inorganic Data Review. EPA-540/R-94-013 (PB94-963502), Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, DC.

EPA. 1999a. *Contract Laboratory Program Statement of Work for Organic Analyses*. U.S. Environmental Protection Agency, Washington, D.C.

EPA. February 1999b. Contract Laboratory Program National Functional Guidelines for Organic Data Review. EPA-540/R-94-013 (PB94-963502), Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, DC.

EPA. May 2000. Geographic Information System Information for the Bonanza Mill Site. United States Environmental Protection Agency, Washington, D.C.

EPA. June 2002. *Region 9 PRGs*, http://www.epa.gov/region09/waste/sfund/prg/s1_04.htm.

FEMA. September 14, 1990. Flood Insurance Rate Map, Community-Panel Number 530185 0265B, Federal Emergency Management Agency.

Fergeson, Dennis. October 24, 2000. Personal communication (telephone conversation regarding public wells serving the City of Colville, with Daniel Weiss, Ecology and Environment, Inc., Seattle, Washington.) Water manager, Colville Water Department, Colville, Washington.

Gregory, Guy. January 20, 2000. Personal communication (telephone conversation regarding the Bonanza Mill, with Daniel Weiss, Ecology and Environment, Inc., Seattle, Washington). Washington State Department of Ecology, Olympia, Washington.

Herrera. 2002. Bonanza Mill Site Sampling and Quality Assurance Plan. U.S. Environmental Protection Agency, Contract No. 68-S0-10-03, Technical Direction Document No. 01-12-008. Seattle, Washington.

Mills, Joseph W. 1985. Stratiform Sedimentary Lead Sulfide Ores of Bonanza Mine, Stevens County, Washington, Northwest Science, Vol. 59, No. 1, 53-57.

Orlob, Gerald T. and Saxton, Walter W. 1950. Mining and Mill Waste Pollution in the Upper Columbia River Basin and Lake Roosevelt. Prepared for the Washington Pollution control Commission in Cooperation with the United States Public Health Service and the British Columbia Department of Health and Welfare.

SCA. 2002. Assessor's report for the Tax Parcel 14, Section 31, Township 36, Range 39. Stevens County Assessor, Colville, Washington.

United States Geological Survey (USGS), 1998, Water Resources Data Washington Water Year 1997, prepared by W.D. Wiggins et al., pp. 305, 315, 323.

USCB. 1990. Census of Population and Housing, Stevens County, Washington. United States Census Bureau.

USDA. 1978. Soil Survey of Stevens County Area, Washington. United States Department of Agriculture.

USFWS. 1987a. National Wetlands Inventory map, 1:24,000 series, Echo Valley Quadrangle, Washington. United States Fish and Wildlife Service.

USFWS. 1987b. National Wetlands Inventory map, 1:24,000 series, Colville Quadrangle, Washington. United States Fish and Wildlife Service.

USFWS. 1987c. National Wetlands Inventory map, 1:24,000 series, Kettle Falls Quadrangle, Washington. United States Fish and Wildlife Service.

USFWS. 1987d. National Wetlands Inventory map, 1:24,000 series, Bangs Mountain Quadrangle, Washington. United States Fish and Wildlife Service.

USGS. 1969, Kettle Falls, Washington, Quadrangle, 7.5 minute series (topographic). U.S. Geological Survey, Denver, Colorado.

USGS. 1992a. Bangs Mountain, Washington, Quadrangle, 7.5 minute series (topographic). U.S. Geological Survey, Denver, Colorado.

USGS. 1992b, Colville, Washington, Quadrangle, 7.5 minute series (topographic). U.S. Geological Survey, Denver, Colorado.

USGS. 1994, Ground water Atlas of the United States, Segment 7, Idaho, Oregon, and Washington. U.S. Geological Survey, Denver, Colorado.

Vail, Kurt. January 4, 2002. Personal communication (telephone conversation with Dan Weiss, Herrera Environmental consultants, concerning threatened and endangered species on the Colville River). Washington Department of Fish and Wildlife, Colville, WA.

Watkinson, A.J. and M.A. Ellis. 1987. "Recent Structural Analysis of the Kootenay Arc in Northeastern Washington," in Selected Papers on the Geology of Washington: Washington Division of Geology and Earth Resources, edited by J.E. Schuster, Bulletin 77, pp. 41-53.

Webley, Duane. February 14, 2000. Personal communication (telephone conversation regarding Bonanza Mill property, with Daniel Weiss, Ecology and Environment, Inc., Seattle, Washington). Property owner of Bonanza Mill site.

WRCC. 2000a. Period of Record Monthly Climate Summary, Colville, Washington. Western Regional Climate Center website.

WRCC. 2000b. Two-Year Twenty-Four Hour Rainfall Event for Washington. Western Regional Climate Center website.

APPENDIX A

Photographic Documentation

Bonanza Mill Site Inspection
Stevens County, Washington
Photographic Log

Photo Number	Date	Time	Direction	By	Description
1.1	4/09/02	1145	SE	DB	Looking upstream on the Colville River from pump house
1.2	4/09/02	1150	NE	DB	SE drainage ditch – Hwy 395 in the background
1.3	4/09/02	1152	SW	DB	Point where SE drainage ditch enters the Colville River. PPE 1
1.4	4/09/02	1156	NW	DB	Possible tailings and shale waste rock at the confluence of SE drainage ditch and the Colville River
1.5	4/09/02	1202	NW	DB	Tailings and wetlands looking downstream from pump house
1.6	4/09/02	1208	NW	DB	Tailings and wetlands looking downstream from 200 feet downstream from the pump house
1.7	4/09/02	1213	NW	DB	Four-wheel recreational vehicle tracks on the site, documenting recreational use on the site.
1.8	4/09/02	1230	DN	DB	Wolverine pelt on site
1.9	4/09/02	1230	DN	DB	Wolverine pelt observed on site
1.10	4/09/02	1430	N	DW	DB collecting sample BM01SS
1.11	4/09/02	1435	DN	DW	Sample BM01SS
1.12	4/09/02	1447	N	DW	DB collecting sample BM02SS
1.13	4/09/02	1449	DN	DW	Sample BM02SS
1.14	4/09/02	1457	S	DW	DB collecting sample BM03SS
1.15	4/09/02	1459	DN	DW	Sample BM03SS
1.16	4/09/02	1503	S	DW	DB collecting sample BM04SS
1.17	4/09/02	1505	DN	DW	Sample BM04SS
1.18	4/09/02	1515	S	DW	DB collecting sample BM05SS
1.19	4/09/02	1518	DN	DW	Sample BM05SS
1.20	4/09/02	1520	NW	DW	View of long stretch of tailings near the bank of the Colville River and in the vicinity of samples BM03SS, BM04SS, BM05SS and BM06SS
1.21	4/09/02	1522	S	DW	DB collecting sample BM06SS
1.22	4/09/02	1525	DN	DW	Sample BM06SS
1.23	4/09/02	1528	SE	DW	View of tailings along the Colville River with the pump house in view
1.24	4/09/02	1543	N	DW	DB collecting sample BM07SS
2.1	4/09/02	1547	DN	DW	Sample BM07SS
2.2	4/09/02	1549	N	DW	View of small pile showing different color soils
2.3	4/09/02	1603	N	DW	DB collecting sample BM08SS
2.4	4/09/02	1605	DN	DW	Sample BM08SS
2.5	4/09/02	1620	N	DW	DB collecting sample BM09SS from SE drainage ditch
2.6	4/09/02	1622	DN	DW	Sample BM09SS
2.7	4/09/02	1630	S	DW	View downstream in the SE drainage ditch with tailings visible on the banks
2.8	4/09/02	1646	N	DW	DB collecting sample BM10SS in the SE drainage ditch
2.9	4/09/02	1649	DN	DW	Sample BM10SS
2.10	4/10/02	0920	DN	DB	DW collecting sample CR01SD
2.11	4/10/02	0920	DN	DB	Sample CR01SD
2.12	4/10/02	0921	SW	DN	Sample location of CR01SD on Colville Post and Pole property

Photo Number	Date	Time	Direction	By	Description
2.13	4/10/02	1015	NW	DW	DB collecting sample CR02SD
2.14	4/10/02	1019	DN	DW	Sample CR02SD
2.15	4/10/02	1025	SE	DW	View of wetlands upstream with pump house in the view
2.16	4/10/02	1045	NE	DW	DB collecting sample CR03SD
2.17	4/10/02	1049	DN	DW	Sample CR03SD
2.18	4/10/02	1103	SE	DW	DB collecting sample CR04SD
2.19	4/10/02	1105	DN	DW	Sample CR04SD
2.20	4/10/02	1134	SW	DB	DW collecting sample CR05SD at PPE 1
2.21	4/10/02	1138	DN	DB	Sample CR05SD
2.22	4/10/02	1147	SW	DB	DW collecting sample CR06SD
2.23	4/10/02	1153	DN	DB	Sample location CR06SD in SE drainage ditch
2.24	4/10/02	1330	NE	DW	DB collecting sample BG01SS
3.1	4/10/02	1335	DN	DW	Sample BG01SS
3.2	4/10/02	1340	SW	DW	DB collecting sample BG02SD
3.3	4/10/02	1342	DN	DW	Sample BG02SD
3.4	4/10/02	1351	SE	DW	DB collecting sample BG03SD
3.5	4/10/02	1354	DN	DW	Sample BG03SD
3.6	4/10/02	1410	NW	DW	DB collecting sample BM11GW
3.7	4/10/02	1519	NW	DW	Site panorama
3.8	4/10/02	1519	N	DW	Site panorama
3.9	4/10/02	1519	NE	DW	Site panorama
3.10	4/10/02	1519	E	DW	Site panorama
3.11	4/10/02	1520	SE	DW	Site panorama
3.12	4/10/02	1520	S	DW	Site panorama
3.13	4/10/02	1520	SW	DW	Site panorama
3.14	4/10/02	1520	W	DW	Site panorama
3.15	4/10/02	1521	S	DW	View from cabin including toys and tailings in the background
3.16	4/10/02	1525	DN	DW	View of abandoned pump house interior
3.17	4/10/02	1545	NW	DW	DB collecting sample CR07SD from Gold Creek confluence with Colville River
3.18	4/10/02	1550	DN	DW	Sample CR07SD
3.19	4/10/02	1555	W	DW	View upstream from confluence of Gold Creek and the Colville River
3.20	4/10/02	1555	E	DW	View downstream from confluence of Gold Creek and the Colville River
3.21	4/10/02	1625	W	DW	Sample BG04SS location
3.22	4/10/02	1628	W	DW	Sample BG04SS
3.23	6/25/02	NA	SE	PF	Observation of people swimming in the Colville River adjacent to the site
3.24	6/26/02	NA	NW	PF	Observation of people swimming in the Colville River adjacent to the site

APPENDIX B

GPS Sample Location Data

GPS DATA FOR BONANZA MILL SITE INVESTIGATION SAMPLES

Station Location	EPA ID No.	Longitude	Latitude	Horizontal Datum	Method
BG01SS	02154016	117 57 16.626583650 W	48 34 34.465662787 N	NAD 1983	GPS
BG02SD	02154017	117 57 16.958694310 W	48 34 34.623057261 N	NAD 1983	GPS
BG03SD	02154018	117 57 16.865886130 W	48 34 34.513893001 N	NAD 1983	GPS
BG04SS	02154021	117 59 01.536074230 W	48 32 42.184629861 N	NAD 1983	GPS
BM01SS	02154000	117 57 19.417238380 W	48 34 41.059959989 N	NAD 1983	GPS
BM02SS	02154001	117 57 19.120600070 W	48 34 40.672669735 N	NAD 1983	GPS
BM03SS	02154002	117 57 21.416192490 W	48 34 40.110194645 N	NAD 1983	GPS
BM04SS	02154003	117 57 21.882326990 W	48 34 40.056623128 N	NAD 1983	GPS
BM05SS	02154004	117 57 23.106483620 W	48 34 40.247076631 N	NAD 1983	GPS
BM06SS	02154005	117 57 24.162395710 W	48 34 40.618639813 N	NAD 1983	GPS
BM07SS	02154006	117 57 30.109784100 W	48 34 45.115034737 N	NAD 1983	GPS
BM08SS	02154007	117 57 23.097434920 W	48 34 44.769309167 N	NAD 1983	GPS
BM09SS	02154008	117 57 15.641582160 W	48 34 39.585722679 N	NAD 1983	GPS
BM10SS	02154009	117 57 18.565090280 W	48 34 39.054564896 N	NAD 1983	GPS
BM11GW	02154019	117 57 18.680151140 W	48 34 40.764948241 N	NAD 1983	GPS
CR01SD	02154010	117 57 45.730412010 W	48 34 45.656876043 N	NAD 1983	GPS
CR02SD	02154011	117 57 28.054522500 W	48 34 41.286747548 N	NAD 1983	GPS
CR03SD	02154012	117 57 23.842245850 W	48 34 40.353742506 N	NAD 1983	GPS
CR04SD	02154013	117 57 21.987873250 W	48 34 39.972717125 N	NAD 1983	GPS
CR05SD	02154014	117 57 19.522620110 W	48 34 38.968249550 N	NAD 1983	GPS
CR06SD	02154015	117 57 18.688542630 W	48 34 39.245732381 N	NAD 1983	GPS
CR07SD	02154020	117 57 40.341541680 W	48 34 43.525773809 N	NAD 1983	GPS

Station Location	Units	Elevation	Verticle Datum	Units	Method
BG01SS	DD MM SS.sss	471.628	MSL (GEOID96 conus)	meters	GPS
BG02SD	DD MM SS.sss	471.162	MSL (GEOID96 conus)	meters	GPS
BG03SD	DD MM SS.sss	470.939	MSL (GEOID96 conus)	meters	GPS
BG04SS	DD MM SS.sss	674.392	MSL (GEOID96 conus)	meters	GPS
BM01SS	DD MM SS.sss	472.804	MSL (GEOID96 conus)	meters	GPS
BM02SS	DD MM SS.sss	472.06	MSL (GEOID96 conus)	meters	GPS
BM03SS	DD MM SS.sss	472.141	MSL (GEOID96 conus)	meters	GPS
BM04SS	DD MM SS.sss	471.306	MSL (GEOID96 conus)	meters	GPS
BM05SS	DD MM SS.sss	471.24	MSL (GEOID96 conus)	meters	GPS
BM06SS	DD MM SS.sss	473.802	MSL (GEOID96 conus)	meters	GPS
BM07SS	DD MM SS.sss	469.34	MSL (GEOID96 conus)	meters	GPS
BM08SS	DD MM SS.sss	475.692	MSL (GEOID96 conus)	meters	GPS
BM09SS	DD MM SS.sss	474.009	MSL (GEOID96 conus)	meters	GPS
BM10SS	DD MM SS.sss	471.919	MSL (GEOID96 conus)	meters	GPS
BM11GW	DD MM SS.sss	472.497	MSL (GEOID96 conus)	meters	GPS
CR01SD	DD MM SS.sss	472.039	MSL (GEOID96 conus)	meters	GPS
CR02SD	DD MM SS.sss	470.274	MSL (GEOID96 conus)	meters	GPS
CR03SD	DD MM SS.sss	471.284	MSL (GEOID96 conus)	meters	GPS
CR04SD	DD MM SS.sss	470.367	MSL (GEOID96 conus)	meters	GPS
CR05SD	DD MM SS.sss	471.151	MSL (GEOID96 conus)	meters	GPS
CR06SD	DD MM SS.sss	471.393	MSL (GEOID96 conus)	meters	GPS
CR07SD	DD MM SS.sss	474.267	MSL (GEOID96 conus)	meters	GPS

APPENDIX C

Data Validation Memos and Laboratory Data

Herrera Environmental Consultants, Inc.

Memorandum

To	Monica Tonel, Task Monitor, EPA, Seattle, WA
cc	Peter Jowise, START Program Manager, Herrera, Seattle, WA (memorandum only)
From	Daniel Weiss, START Project Manager, Herrera Environmental Consultants
Date	July 22, 2002
Subject	Site Recommendation Bonanza Mill site Stevens County, Washington Contract No. 68-S0-01-03, Technical Direction Document No. 01-12-0008

This recommendation memorandum has been developed for the Bonanza Mill site located in Stevens County, Washington as part of a Site Inspection. The site consists of a former lead and zinc mill located adjacent to the Colville River. There are no current mill operations, but tailings and waste rock have been spread across most of the property. Sample results indicate that contaminants are migrating to the surrounding surface waters and wetlands.

Further action is recommended at the site under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). It should be noted that EPA is currently conducting a Removal Assessment at the site.

If you have any questions regarding this memorandum, please call please call Daniel Weiss, START Project Manager, at (206) 441-9080.