Upper Columbia River
Expanded Site Inspection Report
Northeast Washington
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Region 10

START-2

Superfund Technical Assessment and Response Team

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UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION REPORT
NORTHEAST WASHINGTON

TABLE OF CONTENTS

Section		Page
1. INTRODUCTION		1-1
2 BACKGROUND		2-1
2.1	REGIONAL CHARACTERISTICS AND DESCRIPTIONS	2-1
2.2	PHYSICAL SETTING	2-2
2.2.1	Regional Land Management	2-3
2.3	OPERATIONS AND WASTE CHARACTERISTICS	2-4
2.3.1	Mining and Milling	2-4
2.3.2	Smelters	2-5
2.3.2.1	Former Le Roi/Northport Smelter	2-5
2.3.2.1.1	Smelter Description/Features	2-6
2.3.2.1.2	START-2 Site Visit	2-8
2.3.2.2	Cominco Smelter	2-8
2.3.2.2.1	Trail Smelter Case	2-11
2.3.3	Pulp Industry	2-12
2.3.4	Other Potential Sources of Contamination	2-14
2.4	PREVIOUS INVESTIGATIONS	2-14
3. FIELD ACTIVITIES AND ANALYTICAL PROTOCOL		3-1
3 1	SAMPLING METHODOLOGY	3-3
3.1.1	Sample Identification	3-3
3.1.2	EPA Contract Laboratory Program Sediment Sampling	3-4
3.2	ANALYTICAL PROTOCOLS	3-5
3.3	GLOBAL POSITIONING SYSTEM	3-5
3.4	EQUIPMENT DECONTAMINATION AND INVESTIGATION-DERIVED WASTE	3-5
4. QUALITY ASSURANCE/QUALITY CONTROL		4-1
4.1	LABORATORY ANALYSES	4-1
4 2	QA/QC SAMPLES	4-2
4.3	DATA VALIDATION	4-2
4.4	SATISFACTION OF DATA QUALITY OBJECTIVES	4-2
4.4.1	Precision and Accuracy	4-2
4 4.2	Completeness	4-3
4.4.3	Representativeness	4-3
4 4 4	Comparability	4-3
4 5	LABORATORY AND FIELD QA/QC PARAMETERS	4-3
4 5 1	Holding Times	4-3
4 5 2	Initial and Continuing Calibration	4-4

TABLE OF CONTENTS (CONTINUED)

Section | Page

4.5 3 Laboratory Blanks 4-4
4.5 4 Trip and Rinsate Blanks 4-4

5. ANALYTICAL RESULTS REPORTING AND BACKGROUND SAMPLES 5-1
5.1 ANALYTICAL RESULTS EVALUATION CRITERIA 5-1
5.2 DATA PRESENTATION 5-2
5.3 BACKGROUND SEDIMENT 5-2
5.3.1 Background Sample Location and Description 5-3
5.3.2 Background Sampling Method 5-3
5.3.3 Background Sample Laboratory Analysis 5-3
5.3.4 Data Quality 5-4
5.3.5 Background Sediment Sample Analytical Results 5-4

6. ANALYTICAL RESULTS 6-1
6.1 SAMPLE LOCATIONS 6-1
6.2 ANALYTICAL RESULTS 6-1

7. TARGETS/RECEPTORS SURFACE WATER MIGRATION PATHWAY 7-1
7.1 SURFACE WATER MIGRATION PATHWAY 7-1

8. CONCLUSIONS AND RECOMMENDATIONS 8-1

9. REFERENCES 9-1

LIST OF APPENDICES

A PRELIMINARY ASSESSMENT PETITION

B LAKE ROOSEVELT COOPERATIVE MANAGEMENT AGREEMENT

C SUMMARY OF COMPOUNDS DETECTED IN SEDIMENT AND SURFACE WATER SAMPLES

D FIGURES DEPICTING DATA RESULTS OF ARSENIC, CADMIUM, COPPER, LEAD, MERCURY, AND ZINC IN TRIBUTARY SEDIMENT SAMPLES

E PHOTOGRAPHIC DOCUMENTATION

F FIELD SAMPLE RECORD FORMS

G SUMMARY OF CHEMICAL ANALYSES PERFORMED AND SUMMARY OF SAMPLE QUALITY ASSURANCE AND QUALITY ASSURANCE AND QUALITY CONTROL ANALYSIS

H GLOBAL POSITIONING SYSTEM COORDINATES

I DATA QUALITY ASSURANCE REVIEW MEMORANDA AND ANALYTICAL DATA FORMS (COLUMBIA RIVER SEDIMENT SAMPLE RESULTS FOR METALS ONLY. ALL OTHERS AVAILABLE UPON REQUEST)

J EPA'S REQUEST FOR PERMISSION TO CONDUCT SAMPLING IN CANADA

K CHAIN OF CUSTODY FORMS AND DATA VALIDATION REPORTS RELATING TO THE SEDIMENT SAMPLE COLLECTED FROM LOWER ARROW LAKE DURING THE ECOLOGY 2001 SAMPLING EVENT

L GRAIN SIZE CLASSIFICATION

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LIST OF TABLES

Table Page

2-1 Washington State Department of Ecology 2001 Sampling Event Comparison of Metals in Lake Roosevelt Sediments to FSQVs and Consensus-Based TECs for Freshwater Sediments . 2-17

3-1 Upper Columbia River Sediment Sample Summary Table 3-6

5-1 Upper Columbia River Analytical Methods, Reporting Limits, and Laboratories 5-5

6-1 Upper Columbia River Sediment Sample Analytical Results Data Summary 6-3

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LIST OF FIGURES

Figure		Page
2-1	Lake Roosevelt Drainage Basin	2-18
2-2	Upper Columbia River Vicinity Map	2-19
2-3	Le Roi/Northport Smelter Sample Location Map	2-20
2-4	Columbia River Teck Cominco Study Area	2-21
2-5	Columbia River Ecology's Sediment Sampling Location Map	2-22
3-1	Overview of Samples Collected from the Upper Columbia River Project Area	3-9
6-1	Upper Columbia River Sediment Sample Results-Arsenic, Cadmium, Copper, Lead, Mercury, and Zinc (Samples CS004 to CS023)	6-11
6-2	Upper Columbia River Sediment Sample Results-Arsenic, Cadmium, Copper, Lead, Mercury, and Zinc (Samples CS024 to CS052)	6-13
8-1	Upper Columbia River Sediment Sample Significant/Elevated Copper Results (Samples CS004 to CS023)	8-5
8-2	Upper Columbia River Sediment Sample Significant/Elevated Copper Results (Samples CS025 to CS052)	8-7
8-3	Upper Columbia River Sediment Sample Significant/Elevated Lead Results (Samples CS004 to CS023)	8-9
8-4	Upper Columbia River Sediment Sample Significant/Elevated Lead Results (Samples CS025 to CS052)	8-11
8-5	Upper Columbia River Sediment Sample Significant/Elevated Zinc Results (Samples CS004 to CS023)	8-13
8-6	Upper Columbia River Sediment Sample Significant/Elevated Zinc Results (Samples CS025 to CS052)	8-15

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LIST OF ACRONYMS

Acronyn	Definition
AMSL	above mean sea level
B C.	British Columbia
BOR	Bureau of Reclamation
Celgar	Celgar Pulp Company
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CLP	Contract Laboratory Program
COCs	contaminants of concern
Cominco	Teck Cominco, Ltd.
CRDL	Contract Required Detection Limit
CRQL	Contract Required Quantitation Limit
DFAIT	Canadian Department of Foreign Affairs and International Trade
DOI	United States Department of the Interior
DQOs	data quality objectives
E & E	Ecology and Environment, Inc.
Ecology	Washington State Department of Ecology
EPA	United States Environmental Protection Agency
ESI	expanded site inspection
GPS	Global Positioning System
HRS	Hazard Ranking System
ID	identification
IDW	investigation-derived waste
IJC	International Joint Commission
kg/d	kilograms per day
Lake Roosevelt	Franklin D. Roosevelt Lake
LRWQC	Lake Roosevelt Water Quality Council
MEL	Manchester Environmental Laboratory
mg/kg	milligrams per kilogram
MHW	mean high water
MRL	method reporting limit

LIST OF ACRONYMS (CONTINUED)

Acronyn	Definition
MS	matrix spike
MSD	matrix spike duplicate
NCA	North Creek Analytical
NPS	National Park Service
NPL	National Priorities List
PA	preliminary assessment
PCBs	polychlorinated biphenyls
pesticide	chlorinated pesticide
QA	quality assurance
QC	quality control
%R	percent recovery
RM	river mile
RPD	relative percent difference
SARA	Superfund Amendments and Reauthorization Act of 1986
SOW	statement of work
SQAP	sampling and quality assurance plan
SQL	sample quantitation limit
START	Superfund Technical Assessment and Response Team
SVOCs	semivolatile organic compounds
TAL	Target Analyte List
TDD	Technical Direction Document
TDL	target distance limit
TOC	total organic carbon
U.S.	United States
USGS	United States Geological Survey
VOCs	volatile organic compounds
WESTON	Roy F Weston, Inc.
WSDH	Washington State Department of Health

UPPER COLUMBIA RIVER
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1. INTRODUCTION

Pursuant to United States Environmental Protection Agency (EPA) Superfund Technical Assessment and Response Team (START)-2 Contract Nos. 68-S0-01-01 and 68-S0-01-02, Ecology and Environment, Inc. (E & E) and Roy F. Weston, Inc. (WESTON) conducted an expanded site inspection (ESI) of sediment contamination in the upper Columbia River and its tributaries from the United States (U.S.)-Canada border downstream to approximately river mile (RM) 675 near Inchelium, Washington.

The ESI, under the authority of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA), is intended to collect sufficient data to determine a site's potential for inclusion on the National Priorities List (NPL) and establish priorities for additional action, if warranted. The assessment process does not include extensive or complete site characterization, contaminant fate determination, or quantitative risk assessment.

The EPA assessment of hazardous substance contamination in the upper Columbia River area was conducted in response to a formal Preliminary Assessment (PA) Petition submitted by the Confederated Tribes of the Colville Indian Reservation under Section 105(d) of CERCLA, 42 U.S.C. § 9605(d). A copy of the PA Petition, dated August 2, 1999, is provided in Appendix A. Under the authority of CERCLA and SARA, the EPA completed a PA of the upper Columbia River, from the U.S.-Canada border to the Grand Coulee Dam (E & E 2000). The PA, which is the first phase in the site assessment process was completed in December of 2000, and included an evaluation of information and data from previous studies. Based on the findings of the upper Columbia River PA, the EPA determined that sediment sampling along the northern reaches of the upper Columbia River was necessary to determine if releases of hazardous substances are occurring and if there is a potential for releases to affect human health and the environment. In the spring and summer of 2001, field sampling activities at the upper Columbia River and its tributaries, from the U S -Canada border to RM 675 near Inchelium, Washington, were conducted under a CERCLA ESI

Sediment sampling activities in the upper Columbia River were conducted by WESTON under Technical Direction Document (TDD) No 01-02-0001 Efforts to identify potential sources of contamination to the upper Columbia River, including visits to 60 mines and mills in Stevens County and Pend Oreille County, Washington, were conducted by E & E under TDD Nos 01-02-0028 and 01-08-0009, respectively.

A summary of findings and recommendations for each of the 39 mine and mill sites visited in Stevens County, Washington, can be found in the *Upper Columbia River Mines and Mills Preliminary Assessments and Site Inspections Report* (E & E 2002a). A summary of findings and recommendations for each of the 21 mine and mill sites visited in Pend Oreille County, Washington, can be found in the *Lower Pend Oreille River Mines and Mills Preliminary Assessments and Site Inspections Report* (E & E 2002b).

This document presents the objectives, sampling activities, and results of the sediment sampling event conducted by WESTON in the upper Columbia River. Included are background information (Section 2), field activities and analytical protocol (Section 3), quality assurance (QA)/quality control (QC; Section 4), analytical results reporting and background samples (Section 5), analytical results (Section 6), the targets/receptors in the surface water migration pathway (Section 7), conclusions and recommendations (Section 8), and references (Section 9).

2. BACKGROUND

This ESI was intended to collect sufficient data to support a hazard ranking system (HRS) evaluation of the upper Columbia River and to assess the need for additional detailed investigation and/or response action Accordingly, the sampling objectives defined for the upper Columbia River ESI are to:

- Document a threat or potential threat to public health or the environment posed by sediment contamination in the upper Columbia River;
- Assess the need for additional detailed investigation and/or response action in the upper Columbia River; and
- Determine the potential for placement of the Upper Columbia River site on the NPL

A sampling and quality assurance plan (SQAP) describing field activities to be conducted by WESTON in the upper Columbia River was developed prior to commencement of field work (WESTON 2001a). The SQAP describes the sampling strategy, sampling methodology, and analytical program to be used to investigate sediment contamination in the upper Columbia River.

2.1 REGIONAL CHARACTERISTICS AND DESCRIPTIONS

The Columbia River flows from northern British Columbia (B.C.), Canada, generally south through eastern Washington, and then west, forming part of the border between Washington and Oregon, and eventually emptying into the Pacific Ocean. The Columbia River is the principal inflow to Franklin D. Roosevelt Lake (Lake Roosevelt) and contributes about 90% of the flow from a large drainage area in Canada and the U S In addition to the Columbia River, four other major rivers flow directly into Lake Roosevelt: the Kettle, Colville, Spokane and San Poil rivers. The Pend Oreille River flows into the main stem of the Columbia River just north of the U S.-Canada border. (Figure 2-1; USGS 1994) The portion of the river addressed in this report, and referred to as the upper Columbia River, extends approximately 70 RMs through northeast Washington from the U.S.-Canada border to approximately RM 675 near Inchelium, Washington, crossing portions of both Ferry and Stevens counties (Figure 2-2)

In 1942, construction of the Grand Coulee Dam on the Columbia River was completed by the U S Department of the Interior (DOI) Bureau of Reclamation (BOR) to supply irrigation water, provide flood control, and produce hydroelectric power (E & E 2000) The portion of the Columbia River from the dam upstream to the Northport area (approximately 135 RMs) is referred to as Lake Roosevelt Reservoir (E & E 2000). The reservoir developed into a major recreational and economic resource for the surrounding area (E & E 2000). The Lake Roosevelt National Recreation Area, comprising the lake and its shorelines, attracts more than 1 million visitors per year (E & E 2000). The National Recreation Area ends south of Northport at Onion Creek. The distance from Grand Coulee Dam to Onion Creek is approximately 132 miles (DOE 2000). Recreational activities include boating, swimming, fishing, and camping (E & E 2000).

In spring and early summer, substantial fluctuations in lake levels can occur. The degree of drawdown is based on snowmelt predictions. The normal operating range on the lake is between 1,290 feet above mean sea level (AMSL; full pool) to 1,208 feet AMSL.

2.2 PHYSICAL SETTING

The Colville Indian Reservation borders Lake Roosevelt on the north and west for approximately 93 RMs. North and west of Lake Roosevelt, the terrain is mountainous and mostly forested, with a small amount of farmland. The area is thinly populated, with about 3.2 persons per square mile. The are is mainly made up of national forest and Colville Indian Reservation lands. Logging and mining dominate the economy. (DOI 2000)

The Spokane Indian Reservation borders Lake Roosevelt to the east for about 8 miles, just north of the Spokane Arm (confluence of the Spokane River with the Columbia River). East of Lake Roosevelt is a mixture of forest and farmland, with a population density of 14.3 persons per square mile. Forest products manufacturing dominates the economy The area south of Lake Roosevelt and the Spokane Arm is generally flat with low rolling hills. The population density is 4.2 persons per square mile, and agriculture is the main livelihood. (DOI 2000)

The upper Columbia River Gorge, where Lake Roosevelt is located, spans three distinct physiographic provinces: the Okanogan Highlands, the Kootenay Arc, and the Columbia Plateau. During the last ice age, glaciers descended from the north and gouged out large valleys and canyons. Huge lakes were formed when ice dammed rivers and streams When the ice dams collapsed, floods scoured the landscape, creating the channeled scablands of the Columbia Plateau and the Grand Coulee. (DOI 2000)

From the north, the Columbia River generally follows the boundary of the Okanogan Highlands on the west and the Kootenay Arc on the east The rocks within the Kootenay Arc were originally ocean bottom sediments that were deposited in a trench formed as part of a subduction zone where the North

American continent overrode the Pacific Plate. Lake Roosevelt is contained within a fairly narrow gorge for most of this distance, and it retains much of the character of a large river rather than a lake. In the upper stretches of Lake Roosevelt, there is often an observable current due to the high river flow. (DOI 2000)

The Columbia River runs north to south for most of its length. Just south of the Spokane Arm, the river turns west where it meets the flood basalts of the Columbia Plateau. Here, massive outpourings of lava forced the river to change its course and form a large loop around the north and west extent of the plateau. Basalts were deposited over granite and were uncovered by the ice age floods. In this Lincoln County area, the Columbia River also borders the north end of the Palouse Hills, where basalts of the Columbia Plateau have been buried by wind-blown soils known as loess. Large areas were high enough to be unaffected by the ice age floods, and the resulting deep soils provide valuable agricultural land. The landscape in this area is mainly rolling cultivated hills. (DOI 2000)

Toward the Grand Coulee Dam, the river meanders and flows almost directly north. During the ice age, the river was diverted from its normal course by a lobe of ice and forced to flow southwest through the Columbia Plateau basalts. The force of the water from the various floods carved a huge canyon with vertical walls more than 800 feet high. The floor of the Grand Coulee is about 500 feet higher than the original river channel, and when the ice receded the river returned to its original channel, leaving the Grand Coulee dry. (DOI 2000)

The climate of the area changes significantly from the south end to the north. The south is hot and dry in the summer with little rainfall. The average annual precipitation at the dam is approximately 10 inches. Vegetation is characterized by shrub steppe species such as sagebrush and bitterbrush. To the north in Colville, precipitation averages approximately 17 inches, which is sufficient to support the ponderosa pines and Douglas-fir forests that are common to the area. Rainfall continues to increase as Lake Roosevelt approaches Northport. (DOI 2000)

2.2.1 Regional Land Management

Initially, the DOI National Park Service (NPS) managed all the lands surrounding Lake Roosevelt that had been acquired or withdrawn by the BOR for construction of the reservoir. In 1974, the Secretary of the Interior directed that management for all lands within the reservations not needed for operation of the reservoir be returned to the tribes, and a cooperative management agreement be developed. The Lake Roosevelt Cooperative Management Agreement, approved in 1990 by the Secretary of the Interior and signed by the BOR, the NPS, the Bureau of Indian Affairs, the Spokane

Tribe of Indians, and the Confederated Tribes of the Colville Indian Reservation, confirms the roles and areas of management responsibility on Lake Roosevelt for the various parties. In addition to delineating management responsibilities, the agreement recognized the Lake Roosevelt National Recreation Area as an existing unit of the National Park system (DOI 2000). A copy of the existing Lake Roosevelt Cooperative Management Agreement is provided in Appendix B

The Lake Roosevelt Water Quality Council (LRWQC), which includes members from federal, state, and local governments; the Confederated Tribes of the Colville Indian Reservation; the Spokane Tribe of Indians; citizen groups; and individuals, was formed in 1990 to address point source pollution coming out of Canada directly impacting Lake Roosevelt. The LRWQC developed a Management Plan and continues with the coordination of water quality and air quality studies.

2.3 OPERATIONS AND WASTE CHARACTERISTICS

Previous studies carried out on the upper Columbia River Basin indicated elevated levels of arsenic, cadmium, copper, lead, and zinc in sediment and fish in Lake Roosevelt and the upper reach of the Columbia River. Mercury levels exceeding Canadian health standards in fish tissue also have been documented. Previous studies have found elevated levels of polychlorinated biphenyls (PCBs) , polychlorinated dibenzo-p-dioxins, and polychlorinated dibenzofurans in water, sediment, and fish samples collected from the upper Columbia River. (E & E 2000)

Sources of contamination that have contributed to this contamination include mining and milling operations, smelting operations, pulp and paper production, sewage treatment plants, and other industrial activities. These contaminant sources are summarized in the following sections.

2.3.1 Mining and Milling

Numerous mining and milling operations along the tributaries feeding the upper Columbia River in the U.S. and in Canada have occurred since the late 1800s. Although claims were staked earlier, development of resources in the area did not become economically feasible until approximately the 1890s, when ore concentration processes were developed Ores were concentrated in mills built at or close to each mine, significantly reducing transportation costs. Concentrated ores were transported to smelters for further refining. Large amounts of ore process wastes containing arsenic, cadmium, copper, lead, mercury, and zinc were produced during these operations. (E & E 2000)

The Northport area was comprised mostly of lead-zinc mines (Ecology 2000). Low-grade lead and zinc ore concentration processes involved physical crushing, pulverizing, and classifying using a stream of water, followed by a flotation process. Flotation was accomplished by adding reagents to the fines and then skimming off the resulting concentrated metals Reagents used in this process included pine oil, cresylic acid, alcohols, eucalyptus oils, coal tar (wood creosotes), flotation reagents, xanthates, thiocarbonilides, lime soda ash, copper sulfate, sodium cyanide, and sodium silicate. The cleaned concentrate then was dried on a vacuum filter and sent to a smelter for refining. (Orlob 1950)

Mine and mill sites identified by the EPA as potential sources of contamination to tributaries that discharge to the upper Columbia River were visited as part of the ESI. A summary of the findings and recommendations for each of the mine and mill sites visited in Stevens and Pend Oreille counties, Washington, are presented in separate reports (E & E 2002a; E & E 2000).

2.3.2 Smelters

Smelters in the vicinity of the upper Columbia River watershed include the former Le Roi/Northport Smelter in Northport, Washington, and the Teck Cominco, Ltd. (Cominco) facility in Trail, B.C.

2.3.2.1 Former Le Roi/Northport Smelter

The Le Roi/Northport Smelter is a former smelter located northeast of the town center of Northport, Washington, along Highway 25. The city of Northport is located along the east bank of the Columbia River approximately 7 miles south of the U.S.-Canada border in Stevens County. (URS 1993)

The Northport-Waneta Road borders the Le Roi/Northport Smelter site along the south and east. Highway 25 defines the western boundary of the site. The Burlington Northern Santa Fe Railway (formerly the Spokane Falls and Northern Railroad) runs parallel to the Columbia River and designates the northern site boundary. The Columbia River is located approximately 200 feet north of the Le Roi/Northport Smelter property. Properties west of the site are residential homes. Smelter Hill is located directly east of the site and Silver Crown Mountain is south of the site. A city park with an area of approximately 10 acres is located northwest of the site along the Columbia River, approximately 50 feet from the site The park is accessed by means of a road on the southwest corner of the site. (Figure 2-1; URS 1993)

The property encompasses approximately 32 acres and is accessed from the Northport-Waneta Road via Highway 25 (SAIC 1997) Access to the Le Roi/Northport Smelter site is not restricted (URS 1993). The ground surface generally slopes toward the Columbia River in elevation from about 1,360 feet AMSL at the site to 1,290 feet AMSL, the normal pool elevation for the Columbia River

(SAIC 1997). The former smelter buildings, which are no longer standing, included the furnace building, the roaster building, and the crusher and ore building (Heritage 1981)

In the 1890s, a flurry of mining activities evolved in northeastern Washington and southern B C. In 1892, D.C. Corbin, owner of the Spokane Falls and Northern Railroad, built a rail line to reach the town of Northport, then consisting of a lumber mill and several tents The railroad tracks were located adjacent to the Le Roi site. In 1896, Mr Corbin donated the site to the Le Roi Mining and Smelting Company for the construction of a smelter called Breen Copper Smelter. The smelter location was chosen because the area contained large quantities of materials necessary for smelting, such as limerock and flux. (URS 1993)

In 1896, the Breen Copper Smelter began refining copper and gold ores from mines in northeast Washington, as well as copper ore from B.C. for the Le Roi Mining and Smelting Company (Northport Pioneers 1981). In 1901, the Le Roi Company Smelting Operations reorganized with the Red Mountain Smelting Operations to become the Northport Smelting and Refining Company (URS 1993). By 1908, it was one of the largest smelters on the West Coast, processing 500 tons of ore per day (URS 1993). In 1909, the smelter closed because of competition from another smelter located in Trail, B.C. (URS 1993). During World War I, the government demand for lead encouraged the Northport Mining and Smelting Company to reopen and process the lead ores that had been discovered at Leadpoint, Washington, approximately 9 miles east of Northport (URS 1993). In September 1914, Jerome Day purchased the smelter and renovated it to accomodate lead ores (URS 1993). The government curtailed its lead puchases in 1921, and subsequently, the smelter closed and was dismantled in 1922, after 24 years of sporadic operation (E & E 2000). After the smelter closed, the American Smelting and Refining Company purchased the site. The company removed the smelting equipment and transported it to a smelter elsewhere (URS 1993). Sometime between 1922 and 1953, the inactive site was purchased by J.D. Harms. Between 1953 and 1969, a lumber mill went into operation on the property (URS 1993). In 1975, Cecil Frazier purchased the property and operated a lumber mill (URS 1993) In 1985, Steve Frazier purchased the property and business and operated the lumber mill under the name SSF Building Materials until the property was sold in 2001 to KES Contracting, Trail, B.C., the current owner.

2.3.2.1.1 Smelter Description/Features

The Breen Copper Smelter treated copper and gold ores transported from the Rossland Mine located in B.C. The initial smelter operations were rudimentary and involved releases of large quantities of pollutants The tellurium ore was difficult to process, however, it contained high enough amounts of copper and gold to make the process worthwhile Tellurium is naturally occurring and belongs to the same family of elements as sulfur and selenium. Because of the tellurium, the ore had to be burned or heated to release the minerals. The burning released high amounts of sulfur dioxide into the air. (URS 1993)

The copper and gold ore was processed by heap roasting, which involves open burning of the raw ore prior to placing it in a mineral filtration furnace. A slag brick platform was utilized for the initial burning, or heap roasting, of the ore. The ore was piled on the brick platform to an approximate depth of 4 feet. Cord wood was then stacked on top of the ore pile and ignited. The tellurium in the ore vaporized during this process, thus freeing the gold and copper for smelting. The Northport city wells are currently located on the brick platform area. (URS 1993)

The burned ore was then placed into the furnace where the separation of the minerals occurred. Limerock was used during the flux process. Tap holes were located at different levels in the furnace to filter the minerals and rocks (including iron, copper, and slag rock). The tap hole for the iron and slag rock was located higher than the copper tap hole. The iron and slag rock collected from this filtration was considered waste. The copper mineral was collected and loaded into box cars for shipment to a copper refinery. (URS 1993)

Because gold is heavy, it settled to the bottom of the furnace and formed a gold matte. After the gold accumulated to a thickness of 14 inches, the furnace was shut down. Once the furnace and materials cooled, the sides of the furnace were removed to gain access to the gold matte, which was then pried from the furnace and cut into pieces before being loaded into box cars and shipped to a gold refinery. (URS 1993)

In the operational period of the copper and gold smelter, two large steam engines, fueled by coal, provided power. Both flywheel steam engines were hooked onto one long line shaft. On the other end of the line shaft, a dynamo produced 10,000 volts of electricity prior to being boosted by a generator that provided up to 100,000 volts. Once the smelter reopened to process lead ores, a high-voltage line from Canada supplied the power, and the steam plant was shut down. (URS 1993)

The lead smelter used a process more sophisticated than that used in the copper and gold process, although a large quantity of sulfur (approximately 30 tons per day) was still being discharged into the air. Filters for the smokestacks were added later. (URS 1993)

The abandoned and dismantled smelter remained inactive after closure in 1922. The town of Northport demolished the buildings for the usable brick. One building retained enough walls to provide an ice-skating rink during the winter. The railroad was abandoned and the tracks salvaged. (URS 1993)

The smelting operations produced a tailings waste referred to as slag. The slag was usually placed in piles near the smelter for temporary or permanent disposal The contaminants of concern (COCs) in the slag include arsenic, cadmium, copper, lead, mercury, zinc, and other metals commonly associated with the smelting process.

2.3.2.1.2 START-2 Site Visit

On June 29, 2001, START-2 and EPA personnel visited the sand bar/beach area at the Northport boat launch located approximately 200 feet north of the Le Roi/Northport Smelter property. START-2 and EPA personnel observed black glassy sand-like material along the bank of the Columbia River at the sand bar/beach and boat launch areas. The START-2 characterized the material as slag. START-2 personnel collected sediment samples at locations along the Columbia River at the sand bar/beach and boat launch areas. Brick remnants were observed scattered along the bank of the Columbia River near the boat launch area.

On September 13, 2001, START-2; EPA personnel; Don Hurst of Fulcrum Environmental; and Murray McConnachie, the property owner representative, conducted a walk-through of the former Le Roi/Northport Smelter site. An area of slag bricks was observed south of the former smelter operations. The slag bricks were observed to be glossy black. A potential former tailings pile was observed west of the slag brick area. Stone foundations and old brick walls from the former smelter facility remain on the site. The majority of these remains are located on the northern portion of the property. One of three original smokestacks is still standing. This remaining stack was reported as the second largest stack, being only half the size of the large stack. It stands approximately 75 feet high and has a maximum width of approximately 10 feet.

The START-2 collected sediment and soil samples from locations on the property (Figure 2-3). The results of the 9 sediment samples collected from the sand bar/beach and boat launch areas are included in Table 6-1. A detailed discussion of sampling activities conducted, sample results, recommendations, and conclusions, can be found in the *Upper Columbia River Mines and Mills Preliminary Assessments and Site Inspections Report* (E & E 2002a).

2.3.2.2 Cominco Smelter

The Cominco smelter is located approximately 10 RM upstream of the U.S -Canada border (Figure 2-2) Smelter operations have been underway in Trail, B.C., since 1896 (G3 Consulting 2001a). The smelter became known as Consolidated Mining and Smelting Company of Canada Ltd. in 1906, was officially renamed Cominco in 1966, and merged with Teck Ltd. to become Teck Cominco, Ltd. in 2001 (G3 Consulting 2001b). Cominco smelts cadmium, copper, gold, lead, zinc, and other products from ores mined in various regions of North and South America (G3 Consulting 2001a).

The Cominco lead/zinc smelter process produces slag as a by-product. This slag undergoes a fuming process in fuming furnaces which allows recovery of substantial quantities of metals, in particular lead and zinc. This fuming process involves injection of air and coal into molten slag, driving off metals that are then recovered as an oxide fume (Nener 1992). At the end of a fuming cycle, molten-treated slag is granulated with water, and the slurry discharged to the Columbia River (Nener 1992). This procedure of discharging began when operations first started and continued through to mid-1995 (Nener 1992). Under the assumption that treated granulated slag was inert, the smelter was permitted to discharge up to 1,000 tons per day. The amount of slag discharged was reduced in the mid-1980s to about 450 tons per day (USGS 1994). The slag is a black, glassy material which contains approximately 2.5% zinc, 0.1% lead, and 1% copper. Other metals are present at low concentrations. The bulk of the material has the size and texture of sand; however, approximately 1% by weight consists of fines which have a broken egg-shell or needle-like morphology. (Nener 1992)

Historically, effluent from Cominco has been discharged to the Columbia River through five outfalls. One outfall from the Warfield Fertilizer Operation, three submerged outfalls from the metallurgical plants, and one from the slag launder system (Cominco 1997). The production of treated slag from the fuming furnace operation was about 400 tons per day and was reportedly discharged to the river in accordance with B.C. Environment effluent permit PE-02753. (Cominco 1991)

In 1991, concerns expressed by the public and government agencies over the principle of river discharge prompted Cominco to undertake an extensive research program on the metals-related environmental properties of slag and an investigation into systems for slag collection and land disposal. Testing of slag samples was conducted using both the B C protocol Special Waste Extraction Procedure and the U.S. version Toxicity Characteristic Leachate Procedure which are utilized to characterize waste materials. Based on the test results, Cominco confirmed the long held position that granulated slag has a high degree of chemical stability and is essentially inert in the river environment Cominco recommended that the implementation of land disposal of slag was not an immediate priority and it could be delayed without significant environmental consequences until the completion of Phase II of Lead Smelter Modernization (Cominco 1991)

A 1992 study by J C Nener presents data obtained by the Canadian Department of Fisheries and Oceans as part of its fisheries assessment on the toxicity of fumed slag to aquatic organisms

(WSDH 1993) Fumed slag was collected from Cominco's lead/zinc smelter located at Trail, B.C and tested for toxicity using five species of aquatic organisms representative of different levels of the food chain: *Selenastrum capricornutum*, a unicellular green algae; *Daphnia magna*, a zooplanktonic species; *Hyalella azteca*, an epibenthic invertebrate; *Chironomus tentans*, a benthic invertebrate; and *Oncorhynchus mykiss*, rainbow trout fingerlings. Slag was found to be deterimental to all species studied Results indicate that the five species of organisms tested were all negatively impacted by exposure to slag, or in some cases supernatants prepared from slag, under study conditions. Results of inductively coupled argon plasma scans on bioassay water collected at the completion of each bioassay indicated that elevated levels of copper and zinc may have been at least partly responsible for the acute toxicity observed. Results of histological analyses performed on rainbow trout exposed to slag indicated that slag also caused mortality by abrading delicate exposed surfaces such as gills. Extrapolation of these results to the Columbia River would be speculative; however, bioassay results clearly showed that slag is not biologically inert and therefore suggests that there may be some potential to negatively impact organisms in the receiving environment. (Nener 1992)

The discharge of slag to the Columbia River was discontinued in mid-1995. Prior to this, up to 145,000 tons of slag had been discharged annually, moving downstream to settle out in slower flowing, sandy areas. The environmental effects of slag discharge to the river includes both chemical and physical components. Chemical effects include increased loads of heavy metals and potential bioaccumulation and toxicity problems in river organisms. Physical effects include scouring of plant and animal life from river substrates, damage to gills and soft tissues of aquatic insects and fish, and smothering of habitat and food sources. (G3 Consulting 2001a)

Cominco's 1996 Environmental Report, which was developed to present outcomes of process improvements, includes a trend graph of metals in effluents from the metallurgical operation from 1980 to 1996 According to the 1996 report, the average discharges for total dissolved metals were as high as 18 kilograms per day (kg/d) of arsenic, 62 kg/d of cadmium, 200 kg/d of lead, 4 kg/d of mercury, and 7,400 kg/d of zinc Additionally, fertilizer plant operations contributed up to 4 kg/d of mercury and 350 kg/d of zinc (Cominco 1997)

Between 1995 and 1999, the percent reduction for several key metals from all sources (air, slag, and water) discharged directly to the Columbia River was reported to be 90% for arsenic, 84% for cadmium, 99% for copper, 77% for lead, 95% for mercury, and 92% for zinc A new lead smelter was commissioned in 1997 and became fully operational in 1999, reportedly providing improved air emission and effluent treatment controls Currently, the Cominco slag is being stockpiled. Cominco has an active market development program seeking ways to use the slag beneficially. (G3 Consulting 2001a)

The Trail, B.C., area has been designated a Contaminated Site by Environment Canada. Cominco has hired a consultant to conduct an ecological risk assessment related to Trail operations. The results will be integrated with the findings of a human health risk assessment conducted by the Trail Lead Task Force. This task force was composed of representatives from numerous Trail community groups, local government, the Province of B.C., and Cominco. The Trail Cominco Study Area is shown in Figure 2-4. (Cantox 2000)

In 2001, Cominco initiated a groundwater investigation of the Trail Smelter Facility as part of their ongoing work to inventory and characterize potential sources of contamination to the environment. The purpose of the investigation was to obtain an estimate of the quantities of dissolved metals and other substances discharging into the Columbia River, via groundwater, from under the smelter. The investigation consisted of the installation and testing of 18 groundwater monitoring wells at eight locations, including five along the back of the Columbia River. The investigation found evidence of groundwater contamination (Cominco 1998).

Additional work planned in the groundwater investigation at the smelter site includes five more monitoring well sites in 2002 to allow a more complete assessment of the contaminant loadings to the Columbia River. Additionally, regional groundwater investigations will be performed to identify surface water drainages in the Cominco Study Area that may be effected by contaminated groundwater discharge (Cominco 1998).

2.3.2.2.1 Trail Smelter Case

The Cominco Smelter discharged sulphides into the air through a brick stack 409 feet high. The air pollution traveled south and remained trapped in northern Stevens County Columbia River Valley In 1925, the Trail Smelter increased the discharge of sulfur dioxide into the air from 4,700 to 10,000 tons a month The citizens of Northport complained that sulfur pollution was threatening their health and environment. They insisted that area soils and forests were becoming poisoned with sulfur, causing their crops and forest land to die. They formed a "Citizens Protective Association" of farmers and property owners whose letters of protest were sent to politicians in both Ottawa and Washington. The matter, known as the Trail Smelter Case of 1926 to 1934, was the first case of air pollution brought before an international tribunal. (Northport Pioneers 1981)

In 1926, a Northport farmer wrote to Cominco complaining about fumes. Cominco offered to buy the property of those that had suffered damage. Washington state alien land laws prohibited foreign corporations from owning American real estate, and the farmer was informed by local officials that he could not sell his land to Cominco. (Northport Pioneers 1981)

The matter moved to the level of international diplomacy. The U S. State Department opened negotiations to collect damages from the Canadian government for the citizens of Northport. The State Department did press the case of the Americans, and the Canadian Consul-General wrote his prime minister that their nation was facing what amounted to an international lawsuit. The Canadian government suggested that the fumes problem should be placed on the agenda of the International Joint Commission (IJC). The IJC did not consider the case until August 1928. In 1931, the IJC recommended that the Canadian government stop polluting the atmosphere and pay damages assessed against the corporation in the amount of $350,000. The U.S. government, speaking for all of the claimants, refused to accept the $350,000 award, and asked that the case be reexamined by an arbitration tribunal. In 1935, President Franklin D. Roosevelt formally announced that the Treaty of Arbitration was in effect. In 1938, the appointed members of the tribunal announced a Preliminary Final Decision assessing an additional $78,000 in damages for injuries sustained from 1932 to 1937. They also announced temporary control measures for the smelter. The tribunal issued a new Final Decision which was published in 1941. They decided that no damage had taken place after 1938 in Stevens County. They also issued a policy statement that itself became a precedent in future cases of this kind: "No State has the right to use or permit the use of its territory in such a manner as to cause injury by fumes or to the territory of another or the properties or persons therein, when the case is of serious consequence and the injury is established by the clear and convincing evidence. The Dominion of Canada is responsible in international law for the conduct of the Trail Smelter." (Northport Pioneers 1981)

2.3.3 Pulp Industry

Celgar Pulp Company (Celgar) operates a bleach kraft pulp mill in Castlegar, B.C., approximately 30 RMs upstream from the U S.-Canada border (Figure 2-4). The mill operated from 1961 until mid-1993, and primarily used chlorine in its bleaching process The pulp mill discharged effluent containing chlorinated organic compounds including dioxins and furans into the Columbia River (USGS 1994)

As a result of concerns about health implications of dioxin and furan levels in fish downstream of pulp mills, the provincial and federal governments initiated fish sampling in the Columbia River from

1988 to 1990 as part of a nation-wide survey. Levels in a variety of species downstream of Celgar, including rainbow trout, showed low or normal background levels of contamination, with the exception of whitefish, which showed levels above background. In response to these findings, a consumption advisory was issued by the local Medical Health Officer recommending that consumers of whitefish caught in the vicinity of the area from the Hugh Keenlyside Dam to the U.S.-Canada border limit their consumption to one meal per week. The 1990 whitefish consumption advisory prompted voluntary changes to the mill's bleach plant to reduce chlorinated furan (i.e., 2,3,7,8 TCDF) effluent discharges into the Columbia River. (Celgar 1994)

In 1993, Celgar completed a major expansion and modernization project including the installation of a new bleach plant that uses chlorine dioxide instead of chlorine for bleaching pulp and a secondary treatment process for plant effluent. According to Celgar, in the process of modernization, which included reduction of chlorine usage, the plant reduced discharges of furans and by 1993 had reduced dioxin and furan concentrations in effluent to below minimum detection limits. In 1995, the Medical Health Officer removed the whitefish consumption advisory (USGS 1994, Celgar 1994).

As a result of pulp process effluent discharges, a fibre mat formed downstream of Celgar's outfalls. Fibre mats often form when effluent containing wood debris and pulp fibres is discharged into an aquatic environment and then settles to the substrate and accumulates. While fibre mats are readily degraded by microorganisms (producing ammonia and hydrogen sulfide by-products), they often contain persistent chemicals from pulp production and bleaching processes. Persistent chemicals documented in other fibre mats have included polynuclear aromatic hydrocarbons, tetrachlorodibenzo-p-dioxins, and heavy metals. (USGS 1994)

In 1994, a physical, chemical, and video survey of the fibre mat located downstream of Celgar's discharge was conducted for comparison with similar surveys in 1990 and 1992. EVS Consultants prepared a report on the fibre mat which was submitted to the B.C. Ministry of Environment, Land, and Parks in 1995. The study states that the fibre mat adjacent to the mill had decreased in size and character as a result of process changes, and that the remaining mat now consisted of black silt (flyash) and wood debris mix. Recommended areas of study identified by EVS Consultants to Celgar include: characterize the fibre mat for organic contaminants, especially dioxins and furans, assess the toxicity of the fibre mat to benthic invertebrates; monitor contaminant concentrations of dioxin and furan in mountain whitefish and suckers for comparison with historical data; conduct an intensive survey of benthic macroinvertebrates; and, describe and determine the physical extent of the fibre mat. (Celgar 1994)

2.3.4 Other Potential Sources of Contamination

Cominco's 1997 Environmental Report identified Stoney Creek, located just upstream of the Cominco smelter near RM 755, as a significant contributor of contaminants to the Columbia River (Cominco 1998). The Stoney Creek watershed is affected by Teck-Cominco's historic waste dumping and current storage activities, which contribute metal-laden drainage from seepage and surface runoff, as well as runoff from the urban area and a municipal landfill (G3 Consulting 2001b). Cominco's 1997 Environmental Report identified seepage from an old landfill site and an old arsenic storage site as the source of contaminants from Stoney Creek (Cominco 1998). Teck Cominco completed installation of a seepage collection system in late 1999 to collect and divert water from Stoney Creek (G3 Consulting 2001b). Water and sediment in Stoney Creek contained elevated arsenic, cadmium, copper, lead and zinc levels compared to other tributaries. Stoney Creek metal levels in both water (loads, calculated as concentration multiplied by flow) and sediment were reportedly reduced substantially between 1995 and 1999, with exception of copper levels, which increased in sediment. (G3 Consulting 2001b)

Permitted waste discharges in the Columbia River include municipal wastewater treatment facilities in Castlegar and Trail, B.C. Permitted waste discharges also enter the upper Columbia River indirectly via the Colville River. These are mostly treated municipal wastes discharged into the Colville River from the cities of Colville, Washington, and nearby Chewelah, Washington (USGS 1994).

2.4 PREVIOUS INVESTIGATIONS

Past investigations of the upper Columbia River have been conducted at varying levels of scope A summary of previous investigations is provided in the *Upper Columbia River/Lake Roosevelt Preliminary Assessment Report* (E & E 2000). Past sediment studies have demonstrated the presence of hazardous substances including arsenic, cadmium, copper, lead, mercury, and zinc in sediments collected from the upper Columbia River.

A 1992 study by the U.S. Geological Survey (USGS) assessed the sediment quality of Lake Roosevelt and the reach of the Columbia River downstream from the U.S.-Canada border. Elevated copper and zinc concentrations were associated with sandy sediment found in the Northport reach of the Columbia River. In the study, the elevated concentrations in bed sediments were explained by the presence of slag particles that contained concentrations of these trace elements as high as 6,000 milligrams per kilogram (mg/kg) for copper and 25,000 mg/kg for zinc The slag particles, consisting of dark glassy needles and angular grains, were progressively finer at sites with downstream distance. A detailed discussion of the study by USGS can be found in the USGS Open File Report 94-315. (USGS 1994)

In 1994, the USGS, in cooperation with the Colville Confederated Tribes, analyzed fish tissue to determine levels of mercury and other metals in three fish species (walleye, smallmouth bass, and rainbow trout) in three reaches within the Columbia River: the reach between Northport and Kettle Falls, the Spokane River Arm reach, and the San Poil reach. The highest concentrations of mercury were found in walleye samples, with concentrations ranging from 0.11 mg/kg to 0.44 mg/kg. Smallmouth bass and rainbow trout samples also contained mercury, but at lower concentrations. Although the Federal Food and Drug Administration standard of 1.0 parts per million was not exceeded, the USGS and Washington Department of Health (WSDH) issued a fact sheet that advised the public to limit consumption of walleye taken from Lake Roosevelt (USGS 1997). In 1998, USGS initiated a follow-up fish tissue study to determine present concentrations of mercury, dioxins and furans, and PCBs, and if possible, determine if concentrations have changed since the 1994 studies. The study concluded that the concentrations of contaminants in fish that were identified as a potential threat to human health have either not changed since the 1994 studies, or have decreased. The study found that concentrations of PCBs in rainbow trout remained elevated and did not appear to be decreasing. Although dioxins and furans were still present in sport fish, concentrations of 2,3,7,8-TCDF had decreased in rainbow trout, although not in whitefish. The study found that concentrations of total mercury in walleye decreased by about 50 percent from 1994 to 1998. WSDH used the information from the USGS study in a human health assessment and provided updated recommendations regarding the consumption of fish from Lake Roosevelt. The updated information indicated that WSDH did not expect individuals to experience any adverse health effects from consuming fish with the reported mercury concentrations (WSDH 2000, USGS 2000).

Studies conducted by the Washington State Department of Ecology (Ecology) and the USGS have included bioassay tests on Lake Roosevelt and upper Columbia River sediments. Significant toxicity was reported at seven mainstem Columbia River locations and near the mouths of the Kettle and San Poil rivers, which are tributaries to the Columbia River. Based on the toxicity results, these sites were included on the federal Clean Water Act Section 303(d) list of impaired water bodies for 1998. (Ecology 2001)

In May 2001, Ecology conducted a reassessment of sediment toxicity in Lake Roosevelt and the upstream reach of the Columbia River by analyzing sediment metals and toxicity at the nine sites previously found to have sediment toxicity, and at a reference site located at Lower Arrow Lake in Canada. A map showing Ecology's approximate sediment sampling locations is presented in Figure 2-5

The objectives of the survey were to obtain current data on sediment metals concentrations and toxicity on the nine 303(d) listed sites within Lake Roosevelt and the upstream reach of the Columbia River, and to determine if the sites should remain on the 303(d) list. (Ecology 2001)

Sediment samples were analyzed for arsenic, cadmium, copper, lead, mercury, and zinc. Bioassays for sediment toxicity included *Chironomus tentans* 20-day survival and growth, *Hyalella azteca* 10-day survival, and Microtox® 100% porewater. Sediment samples taken at the upper Columbia River sampling sites (sites 1 to 3) consisted of a visibly dark sandy mixture, which possibly indicated the presence of slag from the Cominco Smelter Elevated levels of copper and zinc were found at these same three sites, indicating that slag material may still be present in the upper Columbia River. (Ecology 2001)

The study found that metals concentrations and toxicity levels in Lake Roosevelt and upper Columbia River sediments remain relatively high. All but one sampling site (near Grand Coulee Dam) had at least one elevated toxicity level from the suite of bioassay tests performed on the sediments. In Lake Roosevelt, cadmium, mercury, and zinc concentrations were elevated. In the upper Columbia River reach, cadmium, copper, lead, and zinc concentrations were elevated. (Era and Serdar 2001)

Although the bioassay listing decisions for the study do not depend on the results of metal concentrations for Lake Roosevelt sediments, Ecology noted the relationship between sediment toxicity and metals concentrations. Ecology compared metals concentrations to Freshwater Sediment Quality Values for metals in Washington state and to Consensus-Based Threshold Effects Concentrations for freshwater sediments shown in Table 2-1.

Based on the existing 303(d) policy, which requires only one toxicity hit per segment or grid, eight of nine sites met 303(d) listing criteria. However, none of the sampling segments met criteria based on the newly proposed listing policy, which requires toxicity at three separate locations within a segment or grid Consequently, it was recommended that the eight sites showing toxicity be reassigned to part 5, Undetermined Status, of the proposed 2002 303(d) list The study also concluded that regardless of the 303(d) listing status, there is sufficient toxicity at the majority of sampling sites in the upper Columbia River and Lake Roosevelt to warrant further investigation. (Ecology 2001)

Table 2-1

WASHINGTON STATE DEPARTMENT OF ECOLOGY
2001 SAMPLING EVENT
COMPARISON OF METALS IN LAKE ROOSEVELT SEDIMENTS TO FSQVs AND CONSENSUS-BASED TECs FOR FRESHWATER SEDIMENTS
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

	(mg/kg)					
Site Name	Arsenic	Cadmium	Copper	Lead	Mercury	Zinc
Lower Arrow Lake	2 0 U	0 46	4	12	0 0004 U	27
Boundary	6 6	**6.7**	**494**	182	0 10	**3730**
Auxiliary Gage	5 0	**18.0**	**2210**	324	0 02	**16100**
Goodeve Creek	20 0	**16.2**	**2210**	344	0 08	**12200**
Kettle River	2 0 U	1 0	16	5	0 0007 U	34
Castle Rock	8 3	**7.1**	66	173	**0.68**	**471**
Whitestone Creek	13 0	**11.9**	74	285	**1.25**	**952**
Whitestone Creek (duplicate)	13 0	**12.4**	76	292	**1.07**	**979**
Sanpoil	3 5	1 9	20	19	0 03	70
Swawilla Basin	11 0	**12.4**	73	295	**1.25**	**1040**
Grand Coulee Dam	9 2	1 8	11	17	0 03	86
FSQVs	57	5 1	390	450	0 41	410
Consensus-Based TECs	9 8	0 99	32	36	0 18	121

Source Ecology 2001

Note Bold type indicates sample concentration is above the FSQV
Underlined type indicates the sample concentration is above the TEC

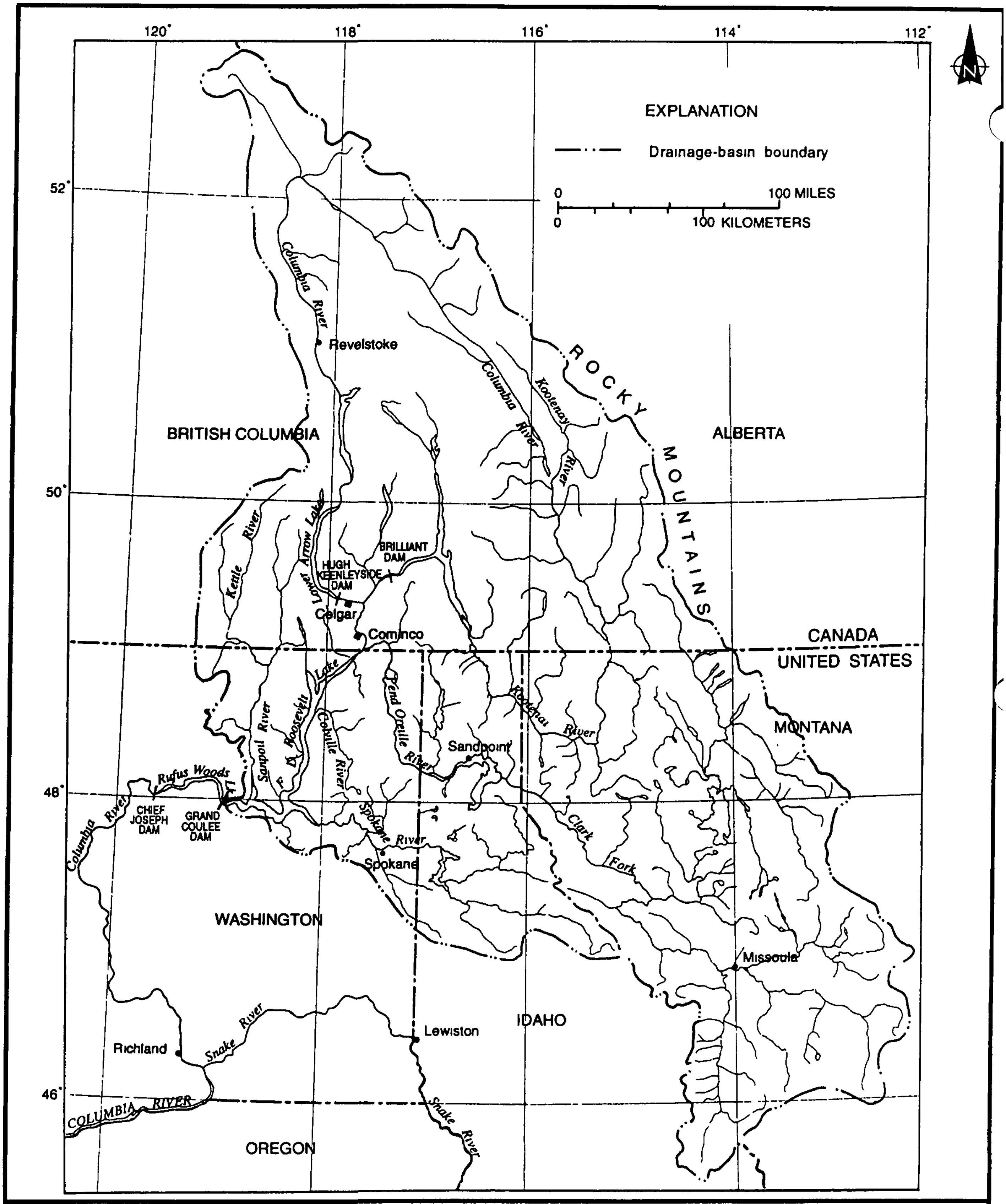
Key

FSQV = Freshwater Sediment Quality Values FSQVs represent the moderately conservative values that have been used to evaluate potential effects of metals concentrations to benthic life (Ecology 2001)

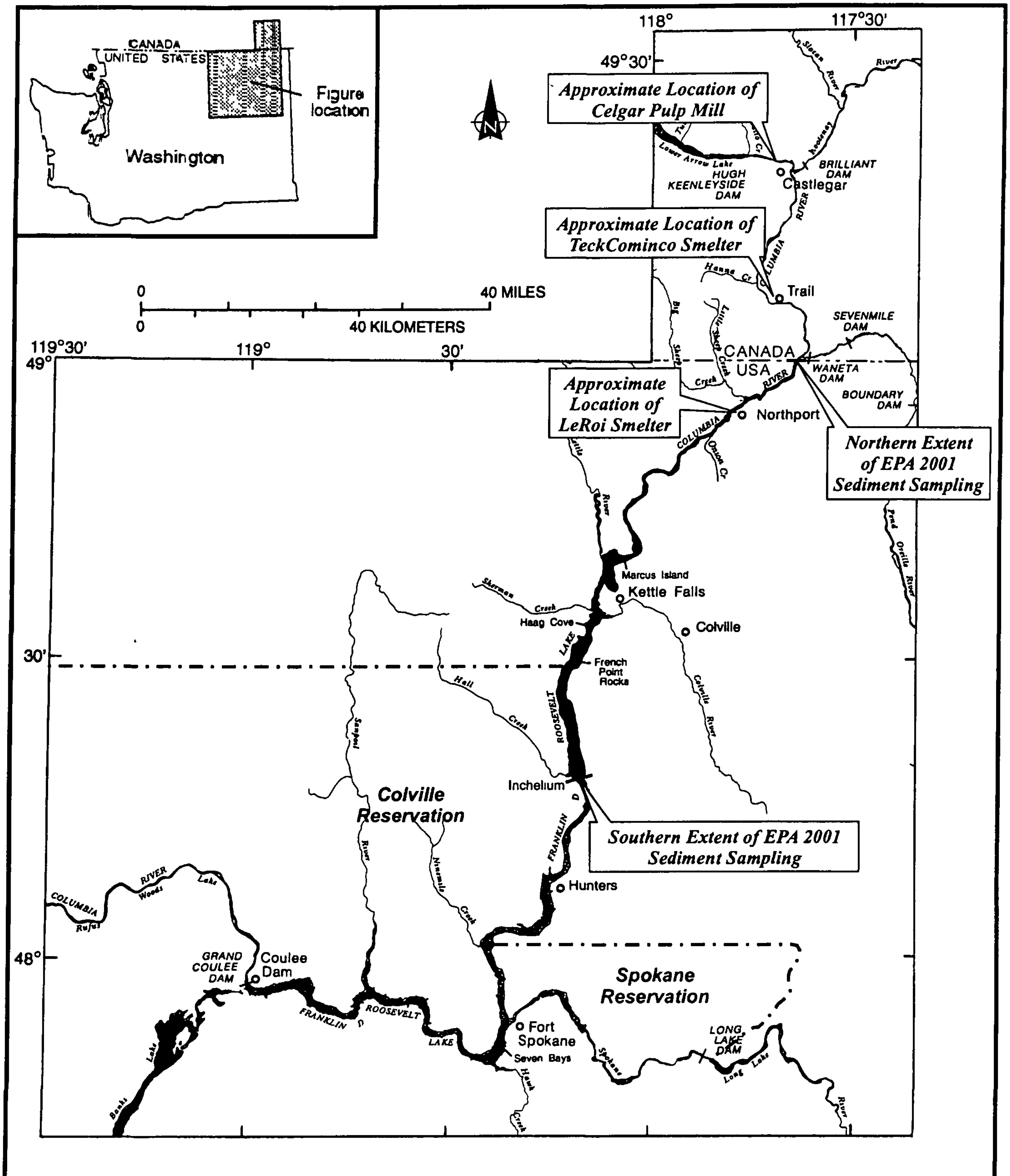
mg/kg = milligrams per kilogram

TEC = Threshold Effects Concentrations TECs are concentrations below which harmful effects on sediment dwelling organisms are not expected to occur, and are therefore more conservative values (Ecology 2001)

U = The analyte was not detected The associated numerical value is the contract required detection limit

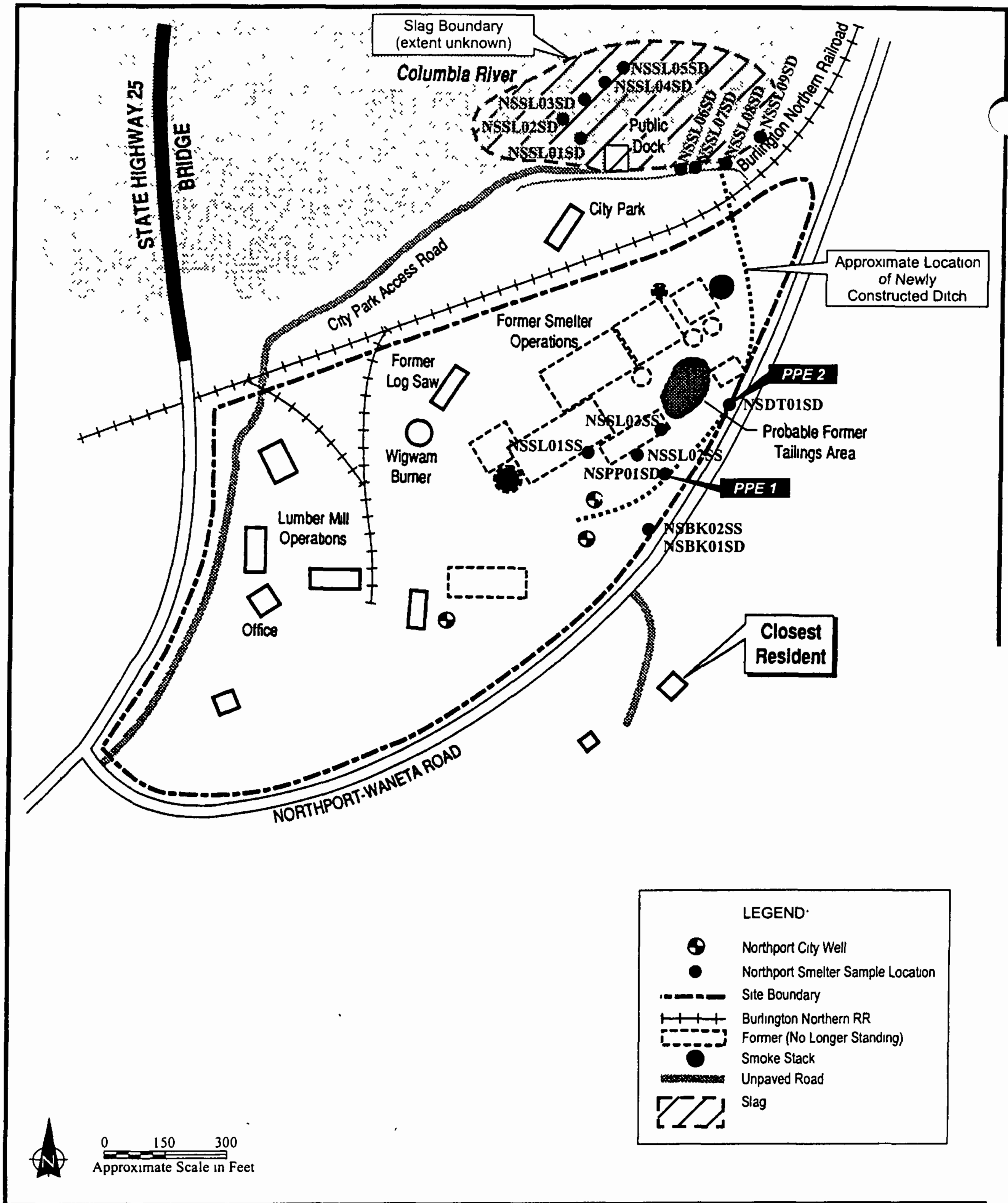


ecology and environment, inc. International Specialists in the Environment Seattle, Washington	UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION Stevens County, Washington	Figure 2-1 LAKE ROOSEVELT DRAINAGE BASIN
	Source USGS 1958	Date 10-14-02 / Drawn by AES / 10 START-2\01020028\fig 2-1

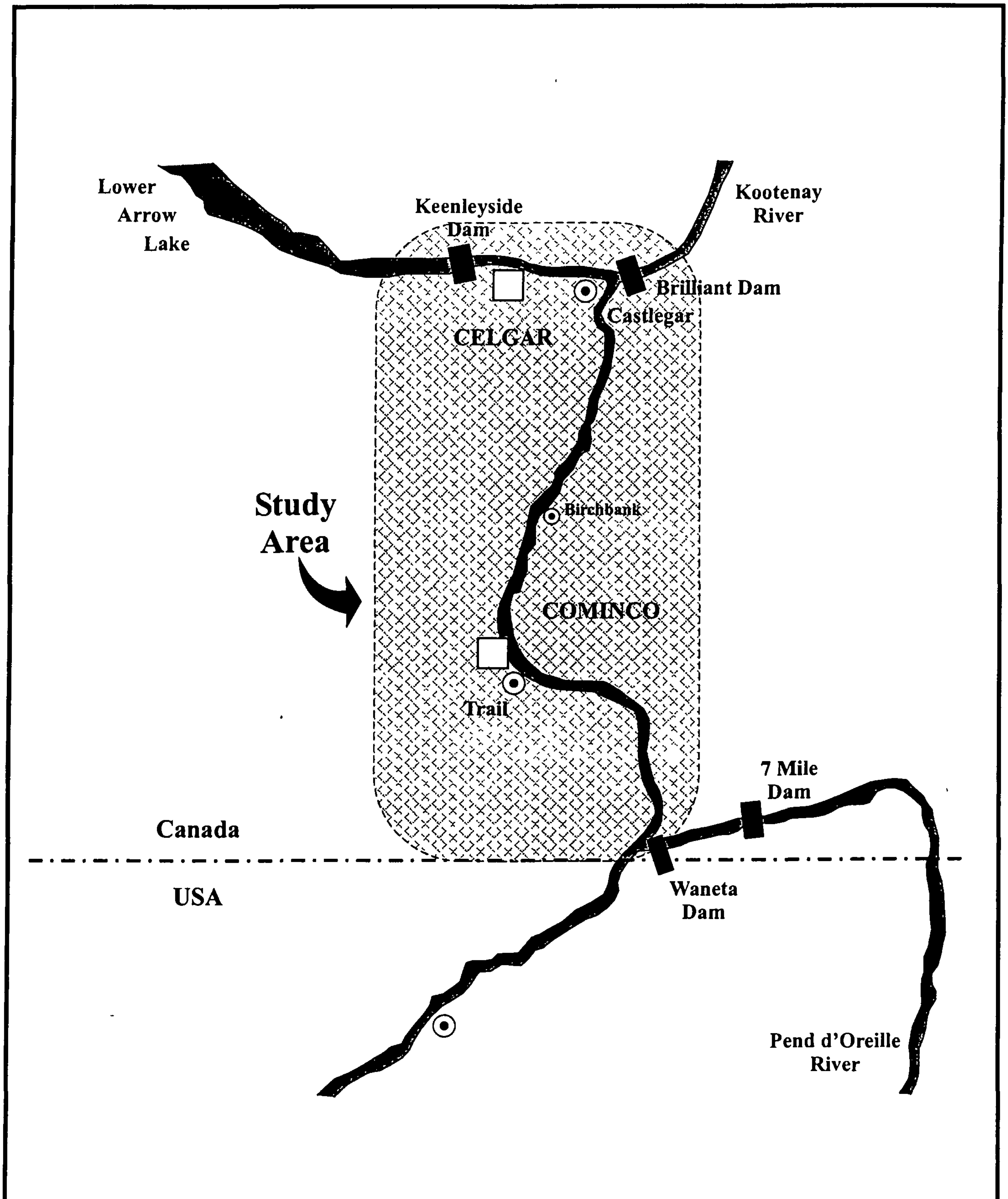


Source USGS 1982

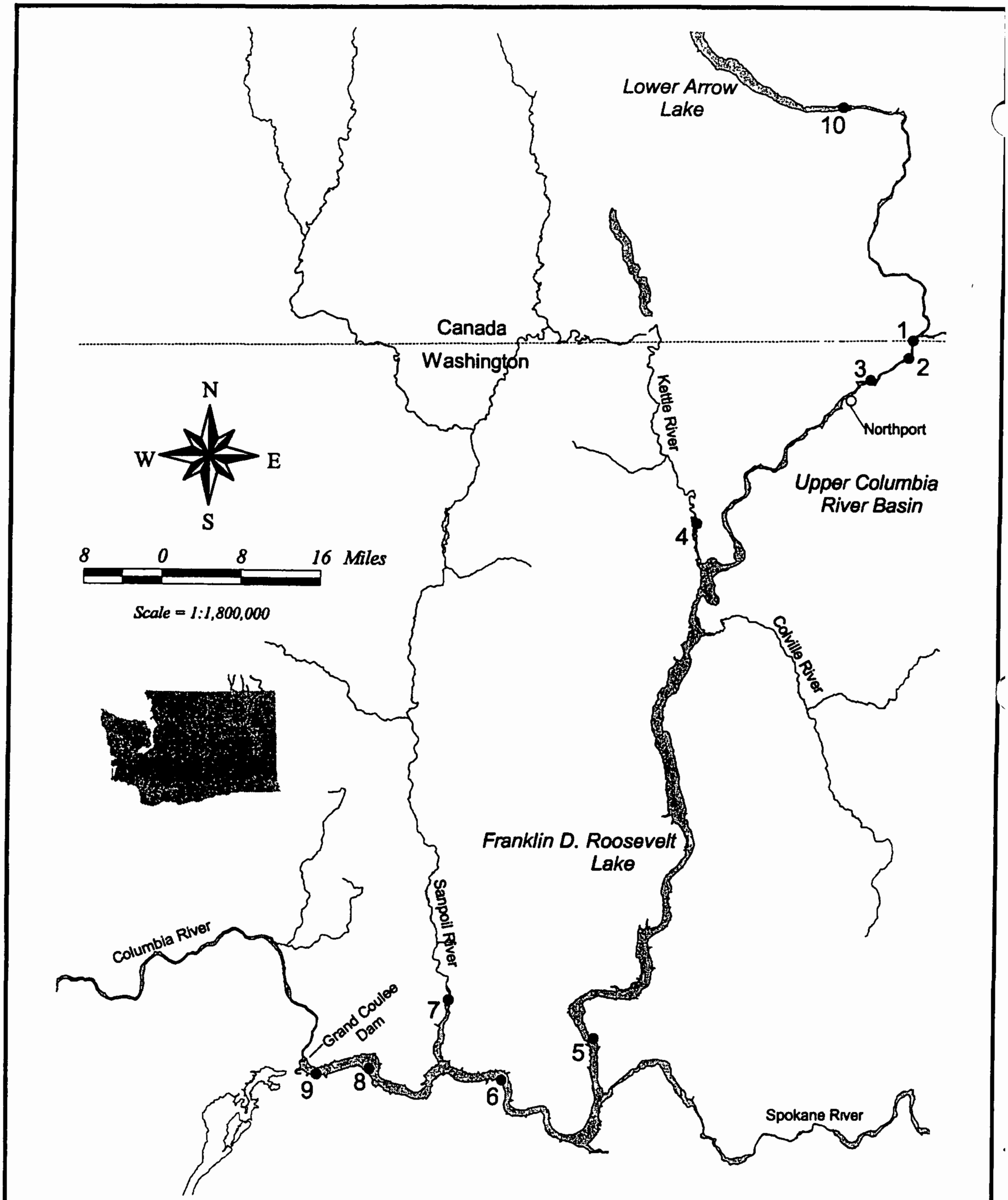
ecology and environment, inc. International Specialists in the Environment Seattle, Washington	UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION Stevens County, Washington	Figure 2-2 UPPER COLUMBIA RIVER VICINITY MAP	
		Date 10-14-02	Drawn by AES
		10 START-2\01020028\fig 2-2	



ecology and environment, inc. International Specialists in the Environment Seattle Washington	UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION Stevens County, Washington	Figure 2-3 LE ROI/NORTHPORT SMELTER SAMPLE LOCATION MAP
	Source. E&E GIS, 2002	Date 10-14-02 / Drawn by AES / 10 START-2\01020028\fig 2-3



ecology and environment, inc. International Specialists in the Environment Seattle Washington	UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION Ferry and Stevens Counties, Washington	Figure 2-4 UPPER COLUMBIA RIVER TECK COMINCO STUDY AREA		
	Source BCWLAP 2002	Date 10-14-02	Drawn by AES	10 START-2\01020028\fig 2-4



ecology and environment, inc. International Specialists in the Environment Seattle Washington	UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION Stevens County, Washington	Figure 2-5 UPPER COLUMBIA RIVER ECOLOGY'S SEDIMENT SAMPLING LOCATION MAP	
	Source WADOE 2001	Date 10-14-02	Drawn by AES — 10 START-2\01020028\fig 2-5

3. FIELD ACTIVITIES AND ANALYTICAL PROTOCOL

A SQAP for the upper Columbia River ESI activities was developed by WESTON prior to performing the field sampling (WESTON 2001a). The SQAP was based on background information collected by E & E. The SQAP describes the sampling strategy, sampling methodology, and analytical program used to identify hazardous substances potentially present in sediments within the upper Columbia River and the potential impact to targets A detailed discussion of field activities and analytical protocol for the nine sediment samples collected from the sand bar/beach and boat launch areas at Le Roi/Northport Smelter can be found in the *Upper Columbia River Mines and Mills Preliminary Assessments and Site Inspections Report* (E & E 2002a).

The field sampling event was conducted with the assistance of various organizations and individuals. Mark Munn and Gil Bortleson (retired) of the USGS provided planning and logistical advice to the field crew. Craig Sprankle of the BOR provided updated information on lake levels and drawdown operations. Adeline Fredine of the Colville Confederated Tribes History/Archaeology Department facilitated coordination of EPA's planned sampling activities with the Colville Tribes Archaeology Department. Steve Tromly, archaeologist with the Colville Tribes History/Archaeology Department provided archaeology assistance in the field. Ray DePuydt and Scott Hebner, NPS archaeologists also provided archaeology assistance in the field, and reviewed all proposed river sediment sampling locations. Approximately 15 sampling locations were offset in order to avoid known cultural resources. Vaughn Baker, Gig LeBret, and Dan Mason of the National Parks Service made park resources available to the field sampling crew, including provisions for back-up vessels and emergency assistance, and secure overnight equipment storage. Al Johnson of the U S. Forest Service assisted with sample collection. Dennis Francis of the City of Grand Coulee assisted in locating and providing access to drinking water supply sampling points at the City of Grand Coulee. Sampling was conducted using EPA research vessels (R V. *Monitor*, and a 17-foot Boston Whaler) operated by Doc Thompson and Dave Terpening of the EPA

The field event was conducted by WESTON from May 14 to June 28, 2001 In total, 187 samples were collected (Figure 3-1) from the upper Columbia River and potential receptors/targets. Potential receptors/targets may include wetland areas, fisheries, surface water intakes, sensitive environments, etc. as defined in the EPA HRS; Final Rule (EPA 1990) Samples were analyzed for Target Analyte List (TAL) metals, chlorinated pesticide (pesticide)/PCBs, volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), and total organic carbon (TOC) The samples collected consist of·

Upper Columbia River and its Tributaries

- 49 surface sediment samples between RM 675 and the U.S -Canada border.
- 110 surface sediment samples from tributaries to the upper Columbia River between RM 675 and the U.S.-Canada border.
- 9 sediment samples from sand bar/beach and boat launch areas at the Le Roi/Northport Smelter collected by E & E during the June 29, 2001 sampling event.

Grand Coulee Dam

- 3 sediment samples near the Grand Coulee Dam
- 1 surface water sample from the City of Grand Coulee municipal drinking water system distribution point (CW001) and 1 surface water sample from Lake Roosevelt near the system intake (CW002).

Pend Oreille County and Stevens County (in conjunction with mine and mill site visits)

- 10 sediment/soil samples from locations upstream/upland of mine and mill sites visited in Pend Oreille County and Stevens County.
- 7 surface water samples from tributaries to the lower Pend Oreille River and upper Columbia River.
- 6 soil samples from mine and mill sites visited.

Discussions of analytical results in this report will be limited to only the sediment samples collected from the upper Columbia River. Tributary sediment sample results are presented in a trip report prepared for the EPA by WESTON in December 2001 (WESTON 2001b). A copy of analytical results tables from this report are included in Appendix C Figures depicting data results of arsenic, cadmium, copper, lead, mercury, and zinc in tributary sediment samples are provided in Appendix D

Samples near the Grand Coulee Dam were collected to determine the concentration of potential hazardous substances near or at the municipal intake Since these samples were collected outside the ESI study area (i e., RM 675 to the U S.-Canada border), they will not be included in the surface water targets discussed in Section 7 of this report However, analytical data summary tables for these samples are provided in Appendix C. The two surface water samples collected from the City of Grand Coulee municipal drinking water system distribution point (CW001) and from Lake Roosevelt near the system intake (CW002) did not contain pesticide/PCBs or SVOCs at concentrations above detection limits The analysis for VOCs revealed the presence of chloroform at 26 micrograms per liter in water sample CW001. The concentration of chloroform and detected metal concentrations were not above existing federal drinking water standards.

A discussion of analytical results for samples collected in conjunction with the Stevens County and Pend Oreille County mine and mill site visits can be found in the *Upper Columbia River Mines and Mills Preliminary Assessments and Site Inspections Report*, dated October 2002 and the *Lower Pend Oreille River Mines and Mills Preliminary Assessments and Site Inspections Report*, dated April 2002.

3.1 SAMPLING METHODOLOGY

ESI sample identification, types, and methods of collection are described below. A list of all samples collected for laboratory analysis are contained in Table 3-1 at the end of this section. A discussion of the upper Columbia River sediment sample results is contained in Section 6. Photographic documentation of ESI field activities are contained in Appendix E.

3.1.1 Sample Identification

At the request of the EPA, station identification (ID) codes were revised to follow a sequential order from downstream to upstream along the river. Table 3-1 presents the original station codes (listed as the Internal Sample ID) and its corresponding new station code (listed as the Station ID). The sample IDs consist of a two-letter code indicating the station type, followed by a three-digit sequential number. The following station type codes were used:

CS	—	Columbia River sediment
CW	—	Columbia River surface water
TS	—	Tributary sediment
US	—	Tributary sediment/soil (upstream/upland sampling location)
UW	—	Upland surface water
RS	—	Rinsate of sediment sampling equipment
RW	—	Rinsate of water sampling equipment
TB	—	Trip Blank

3.1.2 EPA Contract Laboratory Program Sediment Sampling

Sediment samples were collected from the upper Columbia River during a period of low water The mean high water (MHW) or average annual full pool elevation for Lake Roosevelt is 1,290 feet AMSL. All sediment samples from the river were collected from locations below the apparent MHW elevation, as determined by estimated water level elevations and observed shoreline MHW level indicators (e.g., water marks on shoreline, tree lines). Water levels measured at Grand Coulee Dam during the river sediment sampling period ranged from 1,237.01 feet AMSL on May 14, 2001, to 1,277.88 feet AMSL on June 8, 2001. Many of the sampling locations were subaerially exposed during the sampling event because of the low water levels. Both exposed and submerged sediment samples were collected. The sediment samples were collected from the most downstream locations to the most upstream locations.

All sediment samples were collected using stainless steel sampling equipment, including a petit ponar dredge, hand auger, and/or bowls and spoons. All sampling was conducted in accordance with the procedures outlined in the SQAP (WESTON 2001a).

Submerged stations were sampled using a petit ponar dredge sampler deployed from the EPA research vessel *Monitor*. Sampling with the petit ponar dredge required between one and five grabs to collect the required sample volume. Penetration depths using the dredge ranged from 0 to 5 inches below the sediment surface. The sediment samples at Haag Cove (CS017) and Pingston Creek (CS024) were collected from depth intervals ranging from 18 to 24 inches below the sediment surface. All other sediment samples were collected from 0 to 8 inches below the sediment surface.

Tributary sampling locations were identified based on USGS 7.5-minute series topographic maps. Samples from tributaries were collected using a bowl and spoon. Water depths at tributary sampling locations were generally 0 to 4 inches, but depths up to 12 inches were recorded. Depths of tributary sediment samples ranged from 0.5 to 10 inches below the sediment surface.

Observations of sample material characteristics such as grain size, color, odor, and the presence of debris (including suspected slag material) were noted on a Field Sampling Record Form for each sample (Appendix F). Sample grain size was described according to visually estimated percentages of gravel, sand, silt, and clay.

After the sample containers were filled, the samples were photographed and packed in coolers with ice for shipment to analytical laboratories

3.2 ANALYTICAL PROTOCOLS

In general, all samples were analyzed in accordance with the methods and procedures specified in the SQAP (WESTON 2001a). A summary of chemical analyses performed on each sample and a summary of sample QA/QC analysis is presented in Appendix G

3.3 GLOBAL POSITIONING SYSTEM

The locations illustrated in the figures are based on differentially corrected Global Positioning System (GPS) data recorded in the field and on location notes recorded on Field Sample Record Forms. A table of corrected GPS coordinates and location notes for each sampling station is provided in Appendix H. Copies of the Field Sample Record Forms for each sample are provided in Appendix F.

3.4 EQUIPMENT DECONTAMINATION AND INVESTIGATION-DERIVED WASTE

Procedures specified in the SQAP (WESTON 2001a) for decontaminating equipment and disposing of investigation-derived waste (IDW) were followed during field activities. Every effort was made to minimize the need for decontamination of sampling equipment through the use of dedicated pre-cleaned sampling equipment (e.g., bowls, spoons); however, the use of non-dedicated sampling equipment (e.g., dredge samplers) was required in some locations, as discussed previously. When used, the non-dedicated sampling equipment was decontaminated prior to each use to avoid sample cross-contamination.

WESTON made every effort to minimize the generation of IDW that could not be disposed of as solid waste. All extra sediment volume collected for a sample remained at the sampling location. Disposable personal protective equipment generated during field activities was double-bagged in plastic garbage bags and disposed of at a solid waste disposal facility. No IDW water was generated during the investigation.

Table 3-1

UPPER COLUMBIA RIVER SEDIMENT SAMPLE SUMMARY TABLE
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

Station ID	Station Description	Sample Interval (inches below media surface)	Sample Identification: Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	Analyses: TAL Metals	pesticide/PCBs	TOC	Sample Date	Sample Time
CS004	Lake Roosevelt near Inchelium	0 - 4"	01204110	MJ08Z0	JX433	CR-005-SD	X	X	X	17-May-01	1000
CS005	Lake Roosevelt at point south of Hall Creek	0 - 4"	01204111	MJ08Z1	JX434	CR-006-SD	X	X	X	17-May-01	1045
CS006	Lake Roosevelt at Mission Point	0 - 4"	01204112	MJ08Z2	JX435	CR-007-SD	X	X	X	17-May-01	1130
CS007	Lake Roosevelt north of Daisy Station	0 - 2"	01204113	MJ08Z3	JX436	CR-008-SD	X	X	X	17-May-01	1330
CS008	Lake Roosevelt south of Cheweka Creek	0 - 4"	01204114	MJ08Z4	JX437	CR-009-SD	X	X	X	17-May-01	1415
CS009	Lake Roosevelt south of Chalk Grade Point	0 - 7"	01204115	MJ08Z5	JX438	CR-010-SD	X	X	X	17-May-01	1445
CS010	Lake Roosevelt south of Barnaby Island	0 - 0 5"	01204116	MJ08Z6	JX439	CR-011-SD	X	X	X	17-May-01	1600
CS011	Lake Roosevelt on flats north of Quillisascut Creek	0 - 2"	01204117	MJ08Z7	JX440	CR-012-SD	X	X	X	17-May-01	1700
CS012	Lake Roosevelt on flats north of Quillisascut Creek	0 - 3"	01204118	MJ08Z8	JX441	CR-013-SD	X	X	X	18-May-01	1030
CS013	Lake Roosevelt on flats between French Point Rocks and La Fleur Creek	0 - 4"	01204119	MJ08Z9	JX442	CR-014-SD	X	X	X	18-May-01	1100
CS014	Lake Roosevelt on mid-channel bar east of French Point Rocks	0 - 4"	01204120	MJ0900	JX443	CR-015-SD	X	X	X	18-May-01	1230
CS015	Lake Roosevelt north of French Point	0 - 8"	01204121	MJ0901	JX444	CR-016-SD	X	X	X	18-May-01	1330
CS016	Lake Roosevelt on flats North of Bradbury Beach	0 - 1"	01204122	MJ0902	JX445	CR-017-SD	X	X	X	18-May-01	1430
CS017	Lake Roosevelt on flats fronting Haag Cove	0 - 6"	01204123	MJ0903	JX446	CR-018-SD	X	X	X	18-May-01	1530
CS017	Lake Roosevelt on flats fronting Haag Cove	18-24"	01204124	MJ09E2	JX550	CR-066-SD	X	X	X	18-May-01	1545
CS018	Lake Roosevelt on flats south of Colville River	0 - 6 5"	01204125	MJ0904	JX447	CR-019-SD	X	X	X	19-May-01	900
CS019	Lake Roosevelt in bay at Colville River mouth	0 - 5"	01204126	MJ0905	JX448	CR-020-SD	X	X	X	19-May-01	1045
CS020	Lake Roosevelt south of Boise Cascade Log Boom	0 - 4"	01204127	MJ0908	JX451	CR-023-SD	X	X	X	19-May-01	1130
CS021	Lake Roosevelt, Marcus Flats, northwest of Martin Spring Creek	0 - 4"	01214102	MJ0907	JX450	CR-022-SD	X	X	X	21-May-01	1030

Table 3-1

UPPER COLUMBIA RIVER SEDIMENT SAMPLE SUMMARY TABLE
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

			Sample Identification				Analyses				
Station ID	Station Description	Sample Interval (inches below media surface)	Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	pesticide/PCBs	TOC	Sample Date	Sample Time
CS022	Lake Roosevelt, Marcus Flats, southwest of Pingston Creek	0 - 4"	01214104	MJ0909	JX452	CR-024-SD	X	X	X	21-May-01	1050
CS023	Lake Roosevelt, Marcus Flats (west bank)	0 < 0 25"	01214106	MJ0910	JX453	CR-025-SD	X	X	X	21-May-01	1200
CS024	Marcus Flats, north of Pingston Creek	18 - 24"	01234124	MJ0BK4	JX804	CR-062-SD	X	X	X	8-Jun-01	945
CS025	Lake Roosevelt on Marcus Flats west of Pingston Creek	0 - 3"	01214108	MJ0911	JX454	CR-026-SD	X	X	X	21-May-01	1245
CS026	Lake Roosevelt, Marcus Flats, south of Marcus Island	0 - 3"	01214114	MJ0914	JX457	CR-029-SD	X	X	X	21-May-01	1415
CS027	Lake Roosevelt, Marcus Flats, east of Kamloops	0 - 4"	01214110	MJ0912	JX455	CR-027-SD	X	X	X	21-May-01	1330
CS028	Lake Roosevelt, Marcus Flats northeast	0 - 2"	01214112	MJ0913	JX456	CR-028-SD	X	X	X	21-May-01	1445
CS029	Lake Roosevelt north of Summer Island	0 - 2"	01214116	MJ0915	JX458	CR-030-SD	X	X	X	21-May-01	1545
CS030	Lake Roosevelt on flats at Evans Campground	0 - 1"	01214118	MJ0916	JX459	CR-031-SD	X	X	X	21-May-01	1645
CS031	Lake Roosevelt east of Snag Cove	0 - 2"	01214120	MJ0917	JX460	CR-032-SD	X	X	X	21-May-01	1800
CS032	Lake Roosevelt on flats south of Bossburg	0 - 1"	01214122	MJ0918	JX461	CR-033-SD	X	X	X	22-May-01	1000
CS033	Lake Roosevelt on flats north of Bossburg	0 - 5"	01214124	MJ0919	JX462	CR-034-SD	X	X	X	22-May-01	1100
CS034	Lake Roosevelt on flats south of North Gorge (east bank)	0 - 1"	01214128	MJ0921	JX464	CR-036-SD	X	X	X	22-May-01	1400
CS035	Lake Roosevelt on flats south of North Gorge (west bank)	0 - 0 25 "	01214126	MJ0920	JX463	CR-035-SD	X	X	X	22-May-01	1200
CS036	Lake Roosevelt east of Flat Creek (north bank)	0 - 2"	01214130	MJ0922	JX465	CR-037-SD	X	X	X	22-May-01	1500
CS037	Lake Roosevelt at China Bar	0 - 2"	01214132	MJ0923	JX466	CR-038-SD	X	X	X	22-May-01	1630
CS038	Lake Roosevelt near navigation light south of Crown Creek	0 - 3"	01214134	MJ0924	JX467	CR-039-SD	X	X	X	23-May-01	1015
CS039	Lake Roosevelt north of Rattlesnake Creek (east bank)	0 - 4"	01214136	MJ0925	JX468	CR-040-SD	X	X	X	23-May-01	1130

Table 3-1

UPPER COLUMBIA RIVER SEDIMENT SAMPLE SUMMARY TABLE
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

			Sample Identification				Analyses				
Station ID	Station Description	Sample Interval (inches below media surface)	Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	pesticide/PCBs	TOC	Sample Date	Sample Time
CS040	Lake Roosevelt north of Onion Creek	0 - 2"	01214138	MJ0926	JX469	CR-041-SD	X	X	X	23-May-01	1245
CS041	Upper Columbia River southern tip of island northwest of Onion Creek	0 - 3"	01214140	MJ0927	JX470	CR-042-SD	X	X	X	23-May-01	1330
CS042	Upper Columbia River southern tip of island south of Squaw Creek	0 - 2"	01214142	MJ0928	JX471	CR-043-SD	X	X	X	23-May-01	1400
CS043	Upper Columbia River north of Fivemile Creek	0 - 2"	01214144	MJ0929	JX472	CR-044-SD	X	X	X	23-May-01	1515
CS044	Upper Columbia River on beach at Northport	0 - 4"	01224150	MJ0930	JX473	CR-045-SD	X	X	X	31-May-01	1045
CS045	Upper Columbia River north of Big Sheep Creek	0 - 3"	01224151	MJ0931	JX474	CR-046-SD	X	X	X	31-May-01	1215
CS046	Upper Columbia River south of Steamboat Rock	0 - 1"	01224154	MJ0932	JX475	CR-047-SD	X	X	X	31-May-01	1430
CS047	Upper Columbia River northeast of Steamboat Rock	0 - 1"	01224155	MJ0933	JX476	CR-048-SD	X	X	X	31-May-01	1515
CS048	Upper Columbia River north of Goodeve Creek	0 - 3"	01224157	MJ0934	JX477	CR-049-SD	X	X	X	31-May-01	1630
CS049	Upper Columbia River on point bar southwest of Scriver Creek	0 - 2"	01224160	MJ0935	JX478	CR-050-SD	X	X	X	1-Jun-01	930
CS050	Upper Columbia River south of Tom Bush Creek	0 - 2"	01224162	MJ0936	JX479	CR-051-SD	X	X	X	1-Jun-01	1145
CS051	Upper Columbia River at "Black Sand Beach"	0 - 4"	01224163	MJ0937	JX480	CR-052-SD	X	X	X	1-Jun-01	1230
CS052	Upper Columbia River on boulder bar near border	0 - 3"	01224164	MJ0938	JX481	CR-053-SD	X	X	X	1-Jun-01	1415

Key

#	= Number
CLP	= Contract Laboratory Program
ID	= Identification
pesticide	= Chlorinated pesticides
PCB	= Polychlorinated biphenyls
TAL	= Target analyte list
TOC	= Total organic carbon

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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TARGET SHEET

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Site Name: Upper Columbia River (UCRSF)

Figure 3-1 Upper Columbia Sample Location Map

4. QUALITY ASSURANCE/QUALITY CONTROL

QA/QC data are necessary to determine precision and accuracy of analytical results and to demonstrate the absence of interferences and/or contamination of sampling equipment, glassware, and reagents. Specific QC requirements for laboratory analysis are incorporated in EPA's *Contract Laboratory Program (CLP) Statement of Work (SOW) for Inorganics Analysis (ILM04.1*; EPA 2000), *CLP Statement of Work for Organics Analysis (OLM04.2*; EPA 1999a), and requirements listed in the other EPA analytical methods and laboratory standard operating procedures. These QC requirements or other equivalent requirements were followed for analytical work performed on the upper Columbia River ESI, unless otherwise noted. This section describes the QA/QC measures taken for the ESI and provides an evaluation of the usability of data presented in this report. A detailed discussion of QA/QC for the nine sediment samples collected from the sand bar/beach and boat launch areas at Le Roi/Northport Smelter can be found in the *Upper Columbia River Mines and Mills Preliminary Assessments and Site Inspections Report* (E & E 2002a).

Inorganic analyses, TAL metals, were performed at Sentinel, Inc., of Huntsville, Alabama, and at DataChem Laboratories of Salt Lake City, Utah, following CLP SOW ILM04.1 (EPA 2000). Inorganics analyses of TOC were performed by North Creek Analytical (NCA) of Bothell, Washington, following EPA SW-846 Method 9060 (modified). Organics analyses for VOCs, SVOCs, and pesticide/PCBs were performed by Compuchem, Inc., of Cary, North Carolina. Additional pesticide/PCBs analyses were conducted by Mitkem, Inc. of Warwick, Rhode Island. All organics analyses followed CLP SOW OLM04.2 (EPA 1999a).

4.1 LABORATORY ANALYSES

A total of 190 samples (179 soil/sediment, 11 water) were submitted to CLP laboratories (Sentinel, DataChem) for TAL metals analysis Ninety-seven soil/sediment samples were submitted to a commercial laboratory (NCA) for TOC analysis CLP laboratories (Compuchem, Mitkem) received 5 water samples for VOC analysis, 8 samples for SVOC analysis (3 soil/sediment, 2 water), and 109 samples for pesticide/PCBs analysis (100 soil/sediment, 9 water)

4.2 QA/QC SAMPLES

QA/QC samples included laboratory duplicate samples, matrix spike (MS) and matrix spike duplicate (MSD) samples at a rate of one duplicate and one MS per 20 samples submitted to CLP laboratories for metals analysis. For organics and TOC analyses, QA/QC samples included MS and MSD samples at a rate of one MS and one MSD per 20 samples submitted to CLP or commercial laboratories.

4.3 DATA VALIDATION

All data from analyses performed at the CLP laboratories were reviewed and validated by EPA chemists or by chemists from their Environmental Services Assistance Team contractor. In the latter case, EPA chemists provided a QA review of the data deliverables generated by the contractor. Data qualifiers were applied as necessary according to the following guidance:

USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review (EPA 1994),

USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 1999b), and

The Manchester Environmental Laboratory Quality Assurance Manual (rev May 1995).

In the absence of other QC guidance, method-specific QC limits also were utilized to apply qualifiers to the data. The START-2 reviewed EPA data validation reports to check for consistency and to add bias qualifiers as necessary. Results of these reviews and the associated data validation QA memoranda are provided with the laboratory forms in Appendix I.

4.4 SATISFACTION OF DATA QUALITY OBJECTIVES

The laboratory data were reviewed to ensure that the data quality objectives (DQOs) were met for the project The following EPA guidance document was used to establish DQOs for the project:

Data Quality Objectives Process for Superfund, Interim Final Guidance (EPA 1993)

4.4.1 Precision and Accuracy

Precision and accuracy measure the reproducibility of sampling and analytical methodology. Precision is defined as the relative percent difference (RPD) between duplicate sample analyses The laboratory duplicate samples measure the precision of the analytical method (both preparation and analysis), and RPD values are reviewed for each sample delivery group and analyte Overall, the project DQOs for precision were met.

Accuracy is defined as the MS and MSD percent recovery (%R) for each analysis. Together, laboratory MS/MSD samples and native spike samples measure the accuracy of the analytical method. The %R values were reviewed for all appropriate sample analyses. Overall, the project DQOs for accuracy were met.

4.4.2 Completeness

Data completeness is defined as the percentage of usable data (usable data divided by total possible data). All laboratory data were reviewed for data validation and usability. All of the data, with the exception of one result for mercury (which was rejected due to low percent solids), were determined to be usable; therefore, the project DQO for completeness of 90% was met.

4.4.3 Representativeness

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

4.4.4 Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this project followed applicable field sampling techniques and specified analytical methodology. Therefore, the DQOs for comparability were met.

4.5 LABORATORY AND FIELD QA/QC PARAMETERS

The laboratory data also were reviewed for holding times and blank sample analysis These QA/QC parameters are summarized below. In general, these parameters were considered acceptable

4.5.1 Holding Times

All samples met EPA, Region 10, and method specific holding time criteria

4.5.2 Initial and Continuing Calibration

With few exceptions, all initial and continuing calibration and check sample acceptance criteria were met. Following are those analytes whose concentrations were qualified as estimated (J) due to QC exceedances. 4-chloroaniline (2 samples), 2,4-dinitrophenol (2 samples), benzo(k)fluoranthene (2 samples), indeno(c,d-1,2,3)pyrene (2 samples), hexaclorocyclopentadiene (2 samples), and pentachlorophenol (2 samples). All atrazine results (4 samples) were rejected based on QC check failure

4.5.3 Laboratory Blanks

All laboratory blanks met frequency criteria. The following COCs were detected in the laboratory blanks associated with metals and organic analyses:

- Metals - Antimony, arsenic, aluminum, beryllium, cadmium, calcium, copper, iron, lead, manganese, silver, sodium, thallium, and vanadium.
- Organic Compounds - Acetone, methyl acetate, di-n-butylphthalate, and bis(2-hexylethyl)phthalate.

Any associated sample result less than five times the blank contamination were qualified as not detected (U). Associated sample results were qualified as estimated quantities (J or UJ) if the sample result was less than five times the absolute value of the negative blank concentration.

4.5.4 Trip and Rinsate Blanks

During the ESI, two trip blank samples and five rinsate samples were collected. No analytes were detected above sample quantitation limits (SQLs) in any trip or rinsate blank.

5. ANALYTICAL RESULTS REPORTING AND BACKGROUND SAMPLES

This section describes the reporting and methods applied to analytical results presented in Section 6 of this report, and discusses background sediment samples. A list of all samples collected for laboratory analysis is presented in Table 3-1.

5.1 ANALYTICAL RESULTS EVALUATION CRITERIA

Analytical results presented in the data summary tables in Section 6 show all analytes detected above laboratory detection limits in bold type. The analytical results of sediment samples collected from the upper Columbia River project area (i.e., CS004 through CS052) were compared to background concentrations. Analytical results indicating significant concentrations of contaminants in sediment samples with respect to background concentrations are shown underlined and in bold type. The analytical summary tables present all detected analytes; however, this report only discusses significant concentrations for a limited set of analytes, specifically the metals arsenic, cadmium, copper, lead, mercury, and zinc. For purposes of this investigation, significant/elevated concentrations are defined, using criteria in Table 2-3 of the EPA HRS; Final Rule for determining observed releases (i.e., significant or elevated concentrations), as follows:

- Equal to or greater than the sample's contract required quantitation limit (CRQL)/contract required detection limit (CRDL) or the SQL when a non-CLP laboratory was used; and
- Equal to or greater than the background sample's CRQL/CRDL 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 limit.

For analytical results that are qualified as estimated, the sample concentration was adjusted as described in *Using Qualified Data to Document an Observed Release and Observed Contamination* (EPA 1996a) before determination of whether the concentration is significant or elevated. All hazardous substances detected at target locations and meeting evaluation criteria can be used to document an observed release from the site to the target/receptor

5.2 DATA PRESENTATION

Based on QC data provided by the laboratory, analytical results can be qualified during data validation. The following data qualifiers were used:

B	—	Detected inorganic concentration is below the method reporting limit (MRL)/CRDL but is above the instrument detection limit.
H	—	High bias.
J	—	The analyte was positively identified, but the associated numerical value is an estimated quantity because QC criteria were not met or because concentrations reported are less than the quantitation limit or lowest calibration standard
K	—	Unknown bias.
L	—	Low bias.
NJ	—	The analysis indicates the presence of an analyte that has been "tentatively identified" and the associated numerical value represents its approximate concentration.
Q	—	The detected organic concentration is below the MRL/CRQL, but is above the method detection limit.
R	—	QC indicates that data are unusable (compound may or may not be present). Resampling and reanalysis are necessary for verification.
U	—	The compound was analyzed for, but not detected.
UJ	—	The compound was analyzed for, but was not detected; the associated quantitation limit is an estimate because QC criteria were not met.

5.3 BACKGROUND SEDIMENT

For HRS purposes, background sediment samples are typically collected from locations upstream of potential sources of contamination and upstream of areas of known sediment contamination. For purposes of this ESI, EPA identified Lower Arrow Lake in Canada as an ideal location for the collection of background sediment samples (see Figure 2-2). Lower Arrow Lake is upstream of potential sources of contamination to the Columbia River and areas of known sediment contamination south and north of the U.S.-Canada border Since Spring of 2001, EPA made repeated requests to the Canadian Department of Foreign Affairs and International Trade (DFAIT) for permission to conduct sampling at Lower Arrow Lake in Canada To date, DFAIT has not granted EPA permission to conduct the proposed sampling

(Appendix J). For this reason, existing data for a sediment sample collected from Lower Arrow Lake by Ecology in May 2001 will be used as the background sediment sample for this report (Ecology 2001; Appendix K).

5.3.1 Background Sample Location and Description

The background sediment sample collected by Ecology from Lower Arrow Lake in Canada was determined to be located at latitude 49°20.379' and longitude 117°52 452' using GPS data (NAD83 datum; see Figure 2-4). The sample was collected 20 feet off the left bank and 0.1 mile upstream of a boat ramp. The depth of water was estimated to be 7 feet (Ecology 2001).

5.3.2 Background Sampling Method

The sediment sample was collected using a 0.1 square meter van Veen grab sampler. The van Veen grab sampler was lowered three times and the top 10 centimeter layer of each grab was removed with a stainless steel spoon or scoop, placed in a stainless steel bowl, and homogenized by stirring. The homogenized sediment was placed in an 8 ounce glass container with a Teflon lid liner. The glass container was precleaned to EPA QA/QC specifications. (Ecology 2001)

Stainless steel implements used to collect the sediment sample were cleaned by washing with Liquinox detergent, followed by sequential rinses with tap water, 10% nitric acid, and deionized water. The equipment was then air-dried and wrapped in aluminum foil. Between-sample cleaning of the van Veen grab sampler consisted of thorough brushing and rinsing with on-site water. (Ecology 2001)

Puget Sound Estuary Protocols procedures (EPA 1996b) for collection, preservation, transportation, and storage of the sediment sample were followed in an effort to limit sources of bias. The sediment sample was placed on ice immediately after collection and transported to the Ecology/EPA Manchester Environmental Laboratory (MEL) within two days of collection. Chain-of-custody was maintained throughout the sampling and analysis. (Ecology 2001)

5.3.3 Background Sample Laboratory Analysis

Table 5-1 shows the reporting limits, analytical methods, and laboratories used by Ecology during the May 2001 sampling event. Chemical analysis was conducted by Ecology/EPA MEL in Port Orchard, Washington Grain size analysis was conducted by Rosa Environmental and Geotechnical Laboratory in Seattle, Washington (Ecology 2001). The sediment sample was analyzed for metals listed on Table 6-1

5.3.4 Data Quality

Chemical data relating to the 2001 Ecology study met laboratory QC analysis requirements (Table 5-1). QC samples for the chemical analysis included a laboratory duplicate, one MS, one MSD, method blanks, and laboratory control samples. A laboratory triplicate analysis was conducted for grain size. (Ecology 2001)

MS recovery values for the metals data were consistently near 100%, indicating little or no bias due to possible sample matrix interference (Ecology 2001).

Replicate field samples were compared to determine the overall precision of the data (sampling techniques and laboratory analysis). The RPD for each replicate was well within the DQO of 25%. (Ecology 2001)

5.3.5 Background Sediment Sample Analytical Results

Analytical results of sediment sample 01198040 collected by Ecology in May 2001 are presented in Table 6-1.

Table 5-1

ANALYTICAL METHODS, REPORTING LIMITS, AND LABORATORIES
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

Analysis	Reporting Limit	Method	Laboratory
Arsenic	4 mg/kg, dry	ICP/AES - EPA 3050B/6010B	Manchester
Cadmium	0 5 mg/kg, dry	ICP/AES - EPA 3050B/6010B	Manchester
Copper	1 mg/kg, dry	ICP/AES - EPA 3050B/6010B	Manchester
Lead	3 mg/kg, dry	ICP/AES - EPA 3050B/6010B	Manchester
Mercury	0 003 mg/kg, dry	CVAA - EPA 7471A/245 5	Manchester
Zinc	0 5 mg/kg, dry	ICP/AES - EPA 3050B/6010B	Manchester
TOC	0 1%	Combustion/CO2 - EPA (1996)	Manchester
% Solids	0 1%	Gravimetric - EPA (1996)	Manchester
Grain Size	0 1%	Sieve & Pipet - EPA (1996)	Rosa Environmental

Key

% = Percent
AES = Atomic emission spectroscopy
CO2 = Carbon dioxide
CVAA = Cold vapor atomic absorption spectroscopy
EPA = United States Environmental Protection Agency
ICP = Inductively coupled argon plasma
mg/kg = Milligrams per kilogram
TOC = Total Organic Carbon

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6. ANALYTICAL RESULTS

The following sections describe the results of samples analyzed by EPA CLP methods. Analytical results presented in this section were evaluated according to criteria as previously described in subsection 5.1.

6.1 SAMPLE LOCATIONS

A total of 49 sediment samples were collected from the upper Columbia River (CS004 to CS052) to determine whether hazardous substances are present in this area of the river at significant concentrations relative to background concentrations. The portion of the river addressed in this report, referred to as the upper Columbia River, extends approximately 70 RMs through northeast Washington from the U.S -Canada border to approximately RM 675 near Inchelium, Washington, in Lake Roosevelt (see Figure 2-2). A brief description of each sample location is provided in Table 3-1. Sample locations are presented in Figure 3-1.

Nine sediment samples (NSSL01SD through NSSL09SD) were collected from the sand bar/beach and boat launch areas along the Columbia River adjacent to the Le Roi/Northport Smelter (Figure 2-3). The samples were collected within the overland surface water drainage routes identified by E &E. The samples were collected to determine potential contamination associated with this source in the Columbia River. The samples appeared to consist of dark brown to black medium sand. No odor or staining was noted during sample collection.

6.2 ANALYTICAL RESULTS

Analytical results indicate that all six metals of concern, consisting of arsenic, cadmium, copper, lead, mercury, and zinc, were detected at significant concentrations at multiple locations throughout the upper Columbia River Table 6-1 presents results for all TAL metals detected and Figures 6-1 and 6-2 provide data results for arsenic, cadmium, copper, lead, mercury, and zinc at each sample point for sample locations CS004 through CS052

Antimony was detected at significant concentrations at 27 locations ranging from 1 5 mg/kg to 61 3 mg/kg Arsenic was detected at significant concentrations at 51 locations ranging from 2 8 mg/kg to

42 8 mg/kg. Barium was detected at significant concentrations at 37 locations ranging from 105 mg/kg to 2,150 mg/kg Cadmium was detected at significant concentrations at 40 locations ranging from 1 5 mg/kg to 11 1 mg/kg. Chromium was detected at significant concentrations at 15 locations ranging from 38 0 mg/kg to 165 mg/kg. Cobalt was detected at significant concentrations at 12 locations ranging from 10.6 mg/kg to 59.0 mg/kg. Copper was detected at significant concentrations at 56 locations ranging from 11.8 mg/kg to 3,300 mg/kg. Iron was detected at significant concentrations at all 58 locations ranging from 8,630 mg/kg to 245,000 mg/kg. Lead was detected at significant concentrations at 51 locations ranging from 64.9 mg/kg to 1,590 mg/kg. Magnesium was detected at significant concentrations at 49 locations ranging from 5,190 mg/kg to 26,600 mg/kg. Manganese was detected at significant concentrations at 58 locations ranging from 181 mg/kg to 4,360 mg/kg. Mercury was detected at significant concentrations at 28 locations ranging from 0.13 mg/kg to 1.7 mg/kg. Potassium was detected at significant concentrations at 40 locations ranging from 1,400 mg/kg to 4,260 mg/kg. Selenium was detected at significant concentrations at 13 locations ranging from 1.1 mg/kg to 4.5 mg/kg. Silver was detected at significant concentrations at 25 locations ranging from 2.1 mg/kg to 12.6 mg/kg. Thallium was detected at significant concentrations at four locations ranging from 2.3 mg/kg to 4.6 mg/kg. Vanadium was detected at significant concentrations in 55 locations ranging from 19.2 mg/kg to 45.0 mg/kg. Zinc was detected at significant concentrations at 55 locations ranging from 84.2 mg/kg to 24,900 mg/kg.

Estimations of grain size were performed visually and recorded at all sediment sampling stations. The grain size estimates indicate that river sampling stations averaged 54% total fine-grained sediment (silt and clay, i.e., "fines"), and 45% total sand. Grain size estimates for sample locations CS004 through CS052 are included in Appendix L.

Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01204110	01204111	01204112	01204113	01204114	01204115	01204116	01204117	01204118
CLP Inorganic ID		MJ08Z0	MJ08Z1	MJ08Z2	MJ08Z3	MJ08Z4	MJ08Z5	MJ08Z6	MJ08Z7	MJ08Z8
CLP Organic ID		JX433	JX434	JX435	JX436	JX437	JX438	JX439	JX440	JX441
Station Location ID	Background	CS004	CS005	CS006	CS007	CS008	CS009	CS010	CS011	CS012
Metals (mg/kg)										
Aluminum		13700	12100	4430	4700	8240	7440	21200	14300	14300
Antimony	4 UJ	1.5 JL	1.6 JB	0.76 UJK	0.85 UJK	0.97 JB	0.65 UJK	0.63 UJK	3.6 JB	3.3 JL
Arsenic	2.0 U	7.7 U	8.1 U	2.2 U	4.0 U	5.1 U	6.6	5.0	13.7	14.9
Barium	27.2	230	269	42.2 JB	57.4	105	61.1	227	512	596
Cadmium	0.47	3.6	4.0	0.12 JB	0.33 JB	0.73 JB	0.25 JB	4.4	8.1	9.4
Calcium		5970	7670	4420	2510	13200	3350	4920	14100	15900
Chromium	12.0 J	30.1	29.8	8.8	15.7	23.3	20.4	14.0	35.7	35.9
Cobalt	2.1	8.5 JB	8.1 JB	3.3 JB	3.6 JB	6.9 JB	6.7 JB	5.8 JB	9.4 JB	9.4 JB
Copper	3.5	48.5 JL	41.6 JL	10.4 JL	11.8 JL	22.5 JL	21.9 JL	33.9 JL	91.7 JL	86.8 JL
Iron	2650 J	23400	22300	8630	14400	16600	16500	14300	28300	29600
Lead	11	219	238	6.2	21.5	24.4	16.7	86.6	464	535
Magnesium	1690 J	6990	7720	3140	2760	5990	4860	3220	11200	12400
Manganese	47.0	719	533	181	267	376	250	347	808	698
Mercury	0.0004 U	0.66	0.49	0.06 U	0.07 U	0.08 U	0.05 U	0.14	1.7	0.97
Nickel	13.4	24.6	24.1	9.6 JB	10.5 JB	21.0	21.0	14.4	27.0	27.4
Potassium	447 J	2570 JL	2230 JL	763 JL	672 JB	1770 JL	1070 JB	1400 JL	2520 JL	2500 JL
Selenium	5.0 U	1.3 U	1.2 U	0.87 U	0.96 U	1.1 U	0.74 U	0.72 U	1.5 U	1.4 U
Silver	0.5 UJ	1.7 JB	1.6 JB	0.48 JB	0.71 JB	0.94 JB	0.85 JB	0.76 JB	2.7 JB	2.7 JB
Sodium		345 JB	359 JB	197 JB	200 JB	289 JB	231 JB	287 JB	406 JB	429 JB
Thallium	5.0 U	1.5 U	1.4 U	0.99 U	1.1 U	1.3 U	0.85 U	0.82 U	1.7 U	1.7 U
Vanadium	5.93	36.9	36.2	17.3	27.7	32.0	27.9	26.7	39.9	40.6
Zinc	26.9	523	600	36.8	77.9	99.0	90.9	230	1060	1210

Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01204119	01204120	01204121	01204122	01204124	01204125	01204126	01204127	01214102
CLP Inorganic ID		MJ08Z9	MJ0900	MJ0901	MJ0902	MJ09E2	MJ0904	MJ0905	MJ0908	MJ0907
CLP Organic ID		JX442	JX443	JX444	JX445	JX550	JX447	JX448	JX451	JX450
Station Location ID	Background	CS013	CS014	CS015	CS016	CS017	CS018	CS019	CS020	CS021
Metals (mg/kg)										
Aluminum		12800	15400	9120	13600	15600	8180	11900	6670	12800
Antimony	4 UJ	3 2 JB	4.1 JL	1 5 JB	1.5 JB	0.72 UJK	1.7 JL	2.1 JL	5 4 JB	3.6 JL
Arsenic	2 0 U	19.0	12.3	6.2	8.5	2.8	7.8	4 5 JB	6.8	9.5
Barium	27.2	755	468	229	261	175	422	231	180	364
Cadmium	0.47	11.1	7.5	3.4	3.8	143 JB	4.9	1 4 JB	1 8 JB	6.5
Calcium		27000	12100	7040	7150	5560	12400	9340	7630	8230
Chromium	12.0 J	25.9	38.0	21.1	28.6	9.4	18.9	20.4	17.0	33.1
Cobalt	2.1	7 4 JB	10 JB	5 9 JB	8 7 JB	4 0 JB	5 4 JB	7 4 JB	5 4 JB	9 2 JB
Copper	3.5	73.4 JL	111 JL	49.2 JL	73.0 JL	15.6 JL	40.6 JL	41.8 JL	66.7 JL	88.2 JL
Iron	2650 J	26800	29400	16800	23800	11500	17400	20400	15500	25200
Lead	11	841	440	190	162	26.8	232	64.9	72.7	441
Magnesium	1690 J	18100	10300	6130	7240	2970	8970	7000	5610	8200
Manganese	47.0	515	610	294	572	315	337	392	303	673
Mercury	0 0004 U	1.6	1.0	0.54	0.31	0.06 U	0.43	0 14 U	0 13 U	1.2
Nickel	13.4	21.9	28.5	16.5	24.0	9 2 JB	16.6	18 7 JB	13 6 JB	25.9
Potassium	447 J	1970 JL	2680 JL	1630 JL	2290 JL	1060 JB	1490	2020 JB	1270 JB	2440
Selenium	5 0 U	0 83 U	1 7 U	0 76 U	0 84 JB	0 82 U	0 77 U	1 9 U	1 9 U	1 5 U
Silver	0 5 UJ	1 9 JB	2 9 JB	1 4 JB	1 7 JB	0 32 JB	0 78 JB	0 75 JB	1 1 JB	2 0 JB
Sodium		301 JB	490 JB	249 JB	248 JB	381 JB	242 JB	480 JB	426 JB	471 JB
Thallium	5 0 U	0 95 U	1 9 U	0 87 U	0 80 U	0 94 U	0 89 U	2 2 U	2 2 U	1 8 U
Vanadium	5.93	38.5	42.4	25.8	37.2	19.2	24.2	26 7 JB	20 2 JB	35.8
Zinc	26.9	1460	1000	470	462	84.2	581	250	455	901

Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01214104	01214106	01234124	01214108	01214114	01214110	01214112	01214116	01214118
CLP Inorganic ID		MJ0909	MJ0910	MJ0BK4	MJ0911	MJ0914	MJ0912	MJ0913	MJ0915	MJ0916
CLP Organic ID		JX452	JX453	JX804	JX454	JX456	JX455	JX456	JX458	JX459
Station Location ID	Background	CS022	CS023	CS024	CS025	CS026	CS027	CS028	CS029	CS030
Metals (mg/kg)										
Aluminum		11600	10400	6430	9920	8000	9090	12400	7150	11200
Antimony	4 UJ	3.4 JL	1 0 JB	0 89 U	4 9 JB	4 8 JB	1 3 JB	3 9 JB	1 9 JB	4 7 JB
Arsenic	2 0 U	10.3	4.2	4.0	10.6	9.5	3 4 JB	9.7	7.0	11.1
Barium	27.2	240	190	49 4 JB	505	375	113	370	342	624
Cadmium	0.47	5.9	1.6	0 09 U	4.3	2.9	0 29 JB	2.8	3.2	7.2
Calcium		7740	5470	2280	21200	16600	4800	16100	11500	20500
Chromium	12.0 J	30.4	25.7	13.6	25.0	21.9	21.1	30.1	17.7	30.6
Cobalt	2.1	7 9 JB	8 2 JB	4 0 JB	7 9 JB	7 7 JB	6 0 JB	9 6 JB	5 0 JB	9 0 JB
Copper	3.5	67.6 JL	53.9 JL	8.8	120 JL	118 JL	25.0 JL	114 JL	65.7 JL	205 JL
Iron	2650 J	22400	18000	12900 JK	27500	23000	16000	29000	15900	26800
Lead	11	282	93.8	7.1	211	159	21.3	149	208	369
Magnesium	1690 J	7930	6150	3640	13800	11100	5190	11900	7940	14200
Manganese	47.0	392	392	191	528	411	284	589	256	388
Mercury	0 0004 U	0.90	0.25	0.08 U	0.49	0.20	0 09 U	0 17 JB	0.53	1.1
Nickel	13.4	23 2 JB	23.0	13.3	21.4	18.0	16.2	24.8	14.1	23.1
Potassium	447 J	2280 JB	2390	910 JB	1960 JB	1560 JB	1380 JB	2480	1250	1820
Selenium	5 0 U	2 0 U	0 68 U	1 0 U	1 8 U	1 2 U	1 3 U	1 6 U	0 68 U	1.1
Silver	0 5 UJ	1 5 JB	0 98 JB	0 47 JB	2 0 JB	1 8 JB	0 52 JB	1 7 JB	1 5 JB	3.1
Sodium		623 JB	186 JB	219 JB	483 JB	354 JB	385 JB	397 JB	200 JB	258 JB
Thallium	5 0 U	2 3 U	0 78 U	1.2 U	2 1 U	1 4 U	1 5 U	1 9 U	0 78 U	0 80 U
Vanadium	5.93	33.7	32.1	24.7	30.5	25.6	29.0	36.7	21.4	33.1
Zinc	26.9	617	280	34.5	855	940	104	787	600	1250

Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01214120	01214122	01214124	01214128	01214126	01214130	01214132	01214134	01214136
CLP Inorganic ID		MJ0917	MJ0918	MJ0919	MJ0921	MJ0920	MJ0922	MJ0923	MJ0924	MJ0925
CLP Organic ID		JX460	JX461	JX462	JX464	JX463	JX465	JX466	JX467	JX468
Station Location ID	Background	CS031	CS032	CS033	CS034	CS035	CS036	CS037	CS038	CS039
Metals (mg/kg)										
Aluminum		6940	9410	9240	8720	8540	8790	18900	12400 JL	4950 JL
Antimony	4 UJ	21.5 JL	4 7 JB	7 0 JB	5 7 JB	2 2 JB	10 8 JB	17.2 JL	10 4 JB	3 4 JB
Arsenic	2 0 U	11.5	8.7	13.0	10.7	7.9	10.4	26.9	17.3 JH	9.6 JH
Barium	27.2	533	295	618	391	255	438	1070	603 JK	768 JK
Cadmium	0.47	4.3	3.5	6.9	3.6	2.3	2.8	2.8	2.1	5.3
Calcium		26300	15400	26100	19600	10800	22300	49600	28900 JL	46900 JL
Chromium	12.0 J	29.9	26.4	29.4	25.8	23.4	28.1	59.1	35.1 JL	12.5 JL
Cobalt	2.1	10 7 JB	8 6 JB	9 0 JB	8 6 JB	7 3 JB	10.6	22.3	15.1 JL	4 1 JB
Copper	3.5	387 JL	387 JL	251 JL	156 JL	76.8 JL	309 JL	1460 JL	823	102
Iron	2650 J	36300	24700	28900	25500	19800	42300	176000	109000 JL	25000 JL
Lead	11	256	165	392	190	112	209	1590	784 JL	289 JL
Magnesium	1690 J	11800	10200	15300	12800	8570	10300	7230	5020 JL	25000 JL
Manganese	47.0	661	481	435	545	467	946	3390	2090 JL	442 JL
Mercury	0 0004 U	0.40	0.19	0.73	0.32	0.16	0.16	0 07 JB	0.13	0.29
Nickel	13.4	16.0	21.1	20.9	19.8	19.1	15.0	10.3	8.5	10.9
Potassium	447 J	1440 JB	1900	1620	1760	1610	1400	3620	2300 JL	883 JB
Selenium	5 0 U	1 6 JB	0 97 JB	1.2	0 69 U	0 68 U	1.4	0 68 U	4.2	0 82 JB
Silver	0 5 UJ	3.4	2 1 JB	3.2	2.2	1 2 JB	2.1	4.0	2.9	0 63 JB
Sodium		374 JB	266 JB	269 JB	207 JB	237 JB	384 JB	1310	723 JB	228 JB
Thallium	5 0 U	1 6 JB	0 84 U	0 92 U	0 79 U	0 78 U	0 81 JB	4.0	2.4	1 1 JB
Vanadium	5.93	23.6	29.4	30.2	28.6	28.3	27.1	39.0	29.5 JL	23.0 JL
Zinc	26.9	2560	1030	1660	1100	592	3090	24900	13900	1990

Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01214138	01214140	01214142	01214144	01224150	01224151	01224154	01224155	01224157
CLP Inorganic ID		MJ0926	MJ0927	MJ0928	MJ0929	MJ0930	MJ0931	MJ0932	MJ0933	MJ0934
CLP Organic ID		JX469	JX470	JX471	JX472	JX473	JX474	JX475	JX476	JX477
Station Location ID	Background	CS040	CS041	CS042	CS043	CS044	CS045	CS046	CS047	CS048
Metals (mg/kg)										
Aluminum		6520 JL	6550 JL	9280 JL	15500 JL	21100	4710	17400	17800	18100
Antimony	4 UJ	19.2 JL	17.2 JL	20.7 JL	27.1 JL	53.5	9 9 JB	57.5	45.2	34.9
Arsenic	2 0 U	9.1 JH	8.7 JH	13.9 JH	20.3 JH	25.5	7.6	30.3	21.6	30.3
Barium	27.2	452 JK	495 JK	632 JK	1140 JK	2160	486	1970	1690	1660
Cadmium	0.47	1.9	2.1	1.6	1.6	0 06 JB	4.8	0 07 U	0 19 JB	0 06 U
Calcium		24700 JL	28200 JL	26500 JL	46900 JL	69900	54000	57600	66400	58600
Chromium	12.0 J	27.1 JL	32.8 JL	44.8 JL	76.8 JL	142	20.7	135	112	113
Cobalt	2.1	12.0 JL	13.7 JL	17.7 JL	35.2 JL	59.0	8 4 JB	73.5	47.3	33.8
Copper	3.5	362	451	720	1550	2900 JL	245 JL	2520 JL	2160 JL	2160 JL
Iron	2650 J	37600 JL	48200 JL	79700 JL	137000 JL	239000	28000	176000	178000	179000
Lead	11	172 JL	175 JL	446 JL	1040 JL	316	199	409	417	317
Magnesium	1690 J	9750 JL	9960 JL	5520 JL	5780 JL	5770 JL	26600 JL	5040 JL	10000 JL	6030 JL
Manganese	47.0	743 JL	908 JL	1500 JL	3060 JL	4040	585	3680	3240	3130
Mercury	0 0004 U	0 08 JB	0 07 JB	0.13	0 06 JB	0 05 U	0 06 JB	0 06 U	0 05 U	0 05 U
Nickel	13.4	11.1	10.2	9.6	12.2	17.0	10.4	15.6	14.4	13.0
Potassium	447 J	1330 JL	1260 JL	1740 JL	3750 JL	4300	888 JB	3580	3490	3480
Selenium	5 0 U	1.8	2.1	3.2	4.5	0 68 UJK	0 67 UJK	1.4 JL	0 68 UJK	1.4 JL
Silver	0 5 UJ	2.1	2.2	3.9	5.7	7.5	1 6 JB	10.2	7.4	5.9
Sodium		377 JB	475 JB	666 JB	1660	2210	269 JB	2230	1610	1530
Thallium	5 0 U	1 2 JB	0 78 U	2.3	4.6	0 78 U	0 77 U	0 87 U	0 78 U	0 76 U
Vanadium	5.93	21.5 JL	21.4 JL	26.2 JL	39.2 JL	42.3	22.1	39.1	37.7	36.3
Zinc	26.9	2770	3760	8710	15000	20100	2430	17500	18200	16500

Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01224160	01224162	01224163	01224164	01264431	01264432	01264433	01264434	01264435
CLP Inorganic ID		MJ0935	MJ0936	MJ0937	MJ0938	MJ0GP0	MJ0GP1	MJ0GP2	MJ0GP3	MJ0GP4
CLP Organic ID		JX478	JX479	JX480	JX481	NA	NA	NA	NA	NA
Station Location ID	Background	CS049	CS050	CS051	CS052	NSSL01SD	NSSL02SD	NSSL03SD	NSSL04SD	NSSL05SD
Metals (mg/kg)										
Alumınum		18700	8170	21100	11000	6170	13400	15700	17800	19200
Antımony	4 UJ	7 4 JB	20.0	61.3	51.4	18.8 JL	40.1 JL	49.1 JL	44.9 JL	59.4 JL
Arsenıc	2 0 U	7.6	11.8	42.8	23.1	7.5	15	19.3	23.9	41.4
Barıum	27.2	681	763	2440	989	255	1270	1610	1910	2150
Cadmıum	0.47	0 06 U	2.4	0 06 U	0 07 U	1.6	0 81 JB	0 74 JB	1.5	1.7
Calcıum		46900	25300	72400	30800	29100 JL	47600 JL	56000 JL	63900 JL	70200 JL
Chromıum	12.0 J	64.0	30.2	165	72.0	18	85	103	121	139
Cobalt	2.1	15.0	7 9 JB	85.7	33.4	7 4 JB	34.6	41.1	45.9	54.2
Copper	3.5	997 JL	444 JL	3300 JL	1330 JL	238 JL	1540 JL	2070 JL	2530 JL	2960 JL
Iron	2650 J	165000	67100	245000	96900	25000	134000	167000	193000	212000
Lead	11	282	309	512	276	230 JK	246 JK	292 JK	388 JK	507 JK
Magnesıum	1690 J	5750 JL	8540 JL	5970 JL	3990 JL	12300 JK	6900 JK	5960 JK	5800 JK	5830 JK
Manganese	47.0	2950	1080	4360	1990	477	2540	3140	3630	4130
Mercury	0 0004 U	0 05 U	0.29	0 05 U	0 06 U	0 06 U	0 06 U	0 07 U	0 06 U	0 06 U
Nıckel	13.4	8 1 JB	12.5	19.4	13.6	8 4 JB	13.1	14.7	15.8	17.6
Potassıum	447 J	3770	1400	4330	2160	1170 JB	2800	3340	3870	4260
Selenıum	5 0 U	2.1 JL	1.4 JL	0 68 UJK	1.5 JL	0 85 U	0 91 U	0 91 U	0 89 U	0 86 U
Sılver	0 5 UJ	3.7	2.7	12.6	8.5	1 9 JB	7.8	7.8	8.2	10.3
Sodıum		1050	385 JB	2630	1000 JB	463 JB	1430	1760	1960	2400
Thallıum	5 0 U	0 79 U	0 91 U	0 78 U	0 89 U	1 3 U	1 4 U	1 4 U	1 3 U	1 3 U
Vanadıum	5.93	38.2	28.8	45.0	28.6	20.8	31.7	33.4	36.5	39.8
Zınc	26.9	15400	4900	22300	8820	1520	10500	13000	15100	16900

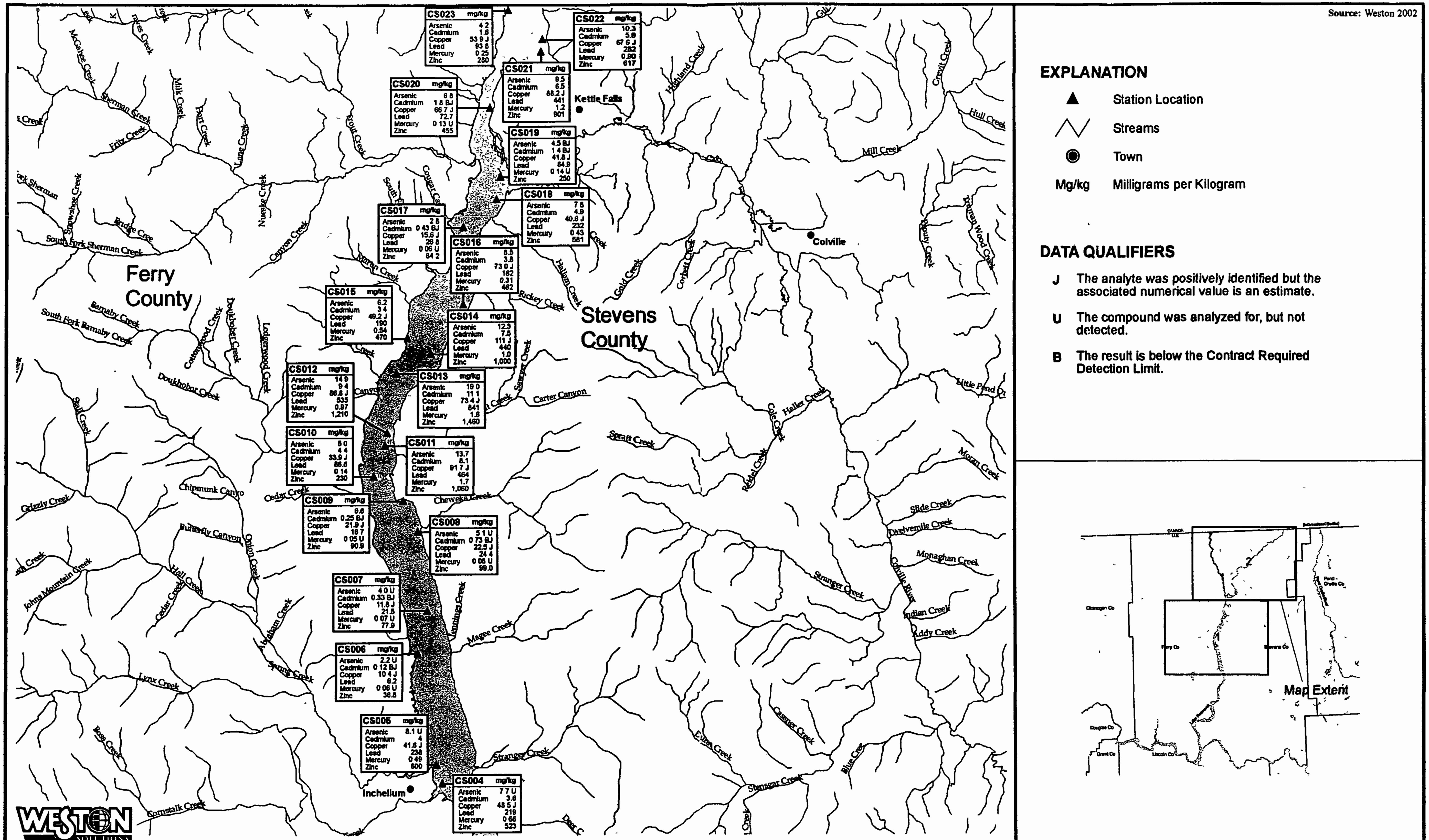
Table 6-1

COLUMBIA RIVER SEDIMENT SAMPLES ANALYTICAL RESULTS DATA SUMMARY
UPPER COLUMBIA RIVER EXPANDED SITE INSPECTION
STEVENS COUNTY, WASHINGTON

EPA Sample ID		01264436	01264437	01264438	01264439
CLP Inorganic ID		MJ0GP5	MJ0GP6	MJ0GP7	MJ0GP8
CLP Organic ID		NA	NA	NA	NA
Station Location ID	Background	NSSL06SD	NSSL07SD	NSSL07SD	NSSL08SD
Metals (mg/kg)					
Aluminum		7170	7250	7180	7530
Antimony	4 UJ	10.9 JB	19.2 JL	8 6 JB	9 4 JB
Arsenic	2 0 U	10.9	12.3	11.1	15.9
Barium	27.2	582	762	804	411
Cadmium	0.47	3.3	4.9	3.0	3.2
Calcium		33300 JL	40500 JL	38400 JL	21300 JL
Chromium	12.0 J	25.9	22.4	24.8	20
Cobalt	2.1	9 8 JB	8 8 JB	7 9 JB	11 4 JB
Copper	3.5	349 JL	257 JL	347 JL	357 JL
Iron	2650 J	44900	35900	54600	54200
Lead	11	470 JK	548 JK	597 JK	845 JK
Magnesium	1690 J	13900 JK	18700 JK	15500 JK	6680 JK
Manganese	47.0	864	617	1190	1170
Mercury	0 0004 U	0 08 JB	0 11 JB	0 08 JB	0.29
Nickel	13.4	10 5 JB	14.7	9 2 JB	12.8
Potassium	447 J	1570	1520	1450	1830
Selenium	5 0 U	0 99 U	0 91 U	1 1 JB	0 83 U
Silver	0 5 UJ	2 8 JB	2 3 JB	2.8	3.1
Sodium		807 JB	528 JB	695 JB	870 JB
Thallium	5 0 U	1 5 U	1 4 U	1 4 U	1 3 U
Vanadium	5.93	28.6	28.4	28.1	24.5
Zinc	26.9	3920	2800	5430	5280

Key

B	= Detected inorganic concentration is below the method reporting limit/contract required detection limit but is above the instrument detection limit.
CLP	= Contract Laboratory Program
EPA	= United Stated Environmental Protection Agency
H	= High bias
ID	= Identification
J	= The analyte was positively identified, but the associated numerical value is an estimated quantity because quality control criteria were not met or because concentrations reported are less then the quantitation limit or lowest calibration standard
J	= The analyte was positively identified The associated numerical result is an estimate (Ecology 2001)
K	= Unknown bias
L	= Low bias
mg/kg	= Milligrams per kilogram
U	= The compound was analyzed for, but was not detected
UJ	= The analyte was not detected at or above the reported estimated result (Ecology 2001)



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0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 6-1
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
RESULTS - ARSENIC, CADMIUM, COPPER, LEAD, MERCURY, AND ZINC
(SAMPLES CS004-CS023)

Date:	Drawn by	
10/14/02		10-START-2\01020028\fig 6-1

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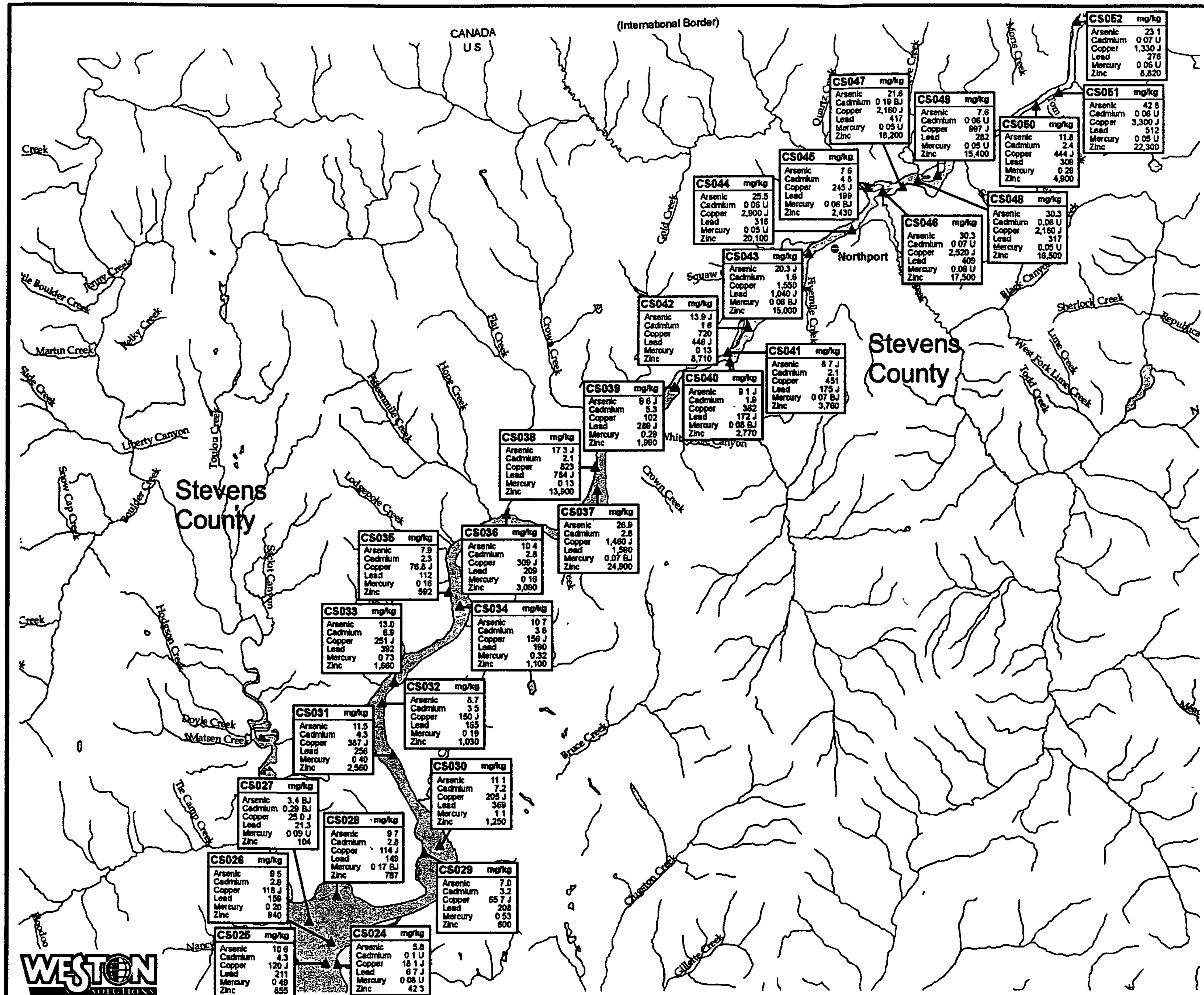
Source: Weston 2002



EXPLANATION

▲ Station Location

Streams

Town

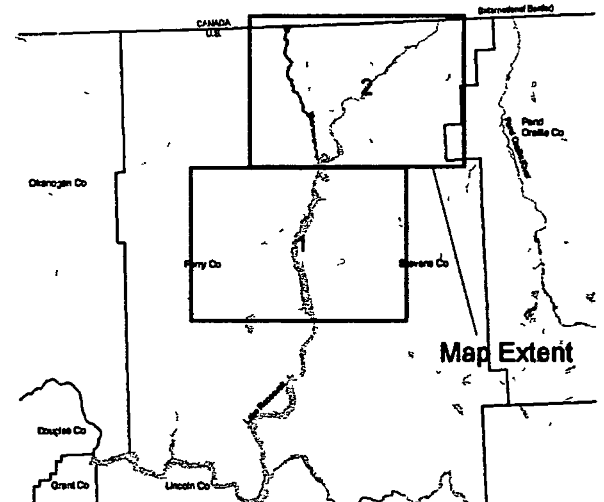
Mg/kg Milligrams per Kilogram

DATA QUALIFIERS

J The analyte was positively identified but the associated numerical value is an estimate.

U The compound was analyzed for, but not detected.

B The result is below the Contract Required Detection Limit.



02-0260 FigCS2of2 ai

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International Specialists in the Environment
Seattle, Washington

0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 6-2
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
RESULTS - ARSENIC, CADMIUM, COPPER, LEAD, MERCURY, AND ZINC
(SAMPLES CS024-CS052)

Date:	Drawn by:	
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7. TARGETS/RECEPTORS SURFACE WATER MIGRATION PATHWAY

7.1 SURFACE WATER MIGRATION PATHWAY

Sediment contamination in the upper Columbia River has been documented near the U.S.-Canada border at RM 745, and at sample intervals downstream to Inchelium, Washington, at RM 675. The surface water pathway target distance limit (TDL) is defined as the section of the upper Columbia River from RM 745 to RM 675. An observed release to the surface water migration pathway has been documented by sampling and analysis of sediments in the upper Columbia River by the EPA (Section 6)

The average annual precipitation is 17.20 inches in Colville, Washington (WRCC 2002). The 2-year, 24-hour rainfall event for the area ranges from 1.4 to 2.0 inches (NOAA 1973). The flow rate of the Columbia River at the U.S.-Canada border averages 116,500 cubic feet per second (USGS 2002). The upland drainage area is estimated to be 59,700 square miles (USGS 2002).

Surface water is used for domestic purposes, such as irrigation, livestock watering, fire protection, power generation, and commercial purposes within the surface water TDL (E & E 2000). The average number of people per housing unit in Stevens and Ferry counties is 2.64 and 2.49, respectively (USCB 2000). There are four domestic intakes from the river in Stevens County serving an estimated population of 11 people and seven domestic intakes in Ferry County serving an estimated population of 17 people (WSDH 2002). One municipal intake is present at Kettle Falls (WSDH 2002). This intake is not used for drinking water purposes, but is maintained for emergency use to augment fire suppression water supplies (Gassaway 2002). Since other listed surface water intake applications did not specify the source of the surface water, and therefore were not counted in this estimate, the actual number of people served by drinking water intakes on the Columbia River may be higher.

The whole of the upper Columbia River ESI study area is contained in the Lake Roosevelt National Recreation Area. The Lake Roosevelt National Recreation Area, comprising the lake and its shorelines, attracts more than 1 million visitors per year. Recreational activities include boating, swimming, hunting, fishing, and camping Lake Roosevelt, including the upper Columbia River and its tributaries in the Lake Roosevelt National Recreation Area, support a varied fish community that today is considerably different from the native fish community of the early 1900s. Changes over time were caused by the introduction of nonnative species and habitat alterations such as water pollution, the damming of rivers, and reservoir drawdowns Today, there are possibly 28 native and 12 nonnative species of fish that inhabit recreation area waters. (DOI 2000)

Between 1990 and 1996, the number of angler trips to Lake Roosevelt ranged from 171,725 to 594,508 per year Recreational fishing trips to Lake Roosevelt peaked in 1993 and have been declining since. The decline was partly attributed to the dewatering of boat ramps during the 1996 drawdown that prohibited anglers from accessing much of the reservoir. Walleye, rainbow trout, and kokanee were the fish most often caught and harvested by anglers (DOI 2000) The state of Washington only tracks sturgeon, salmon, and steelhead in its freshwater sport fishing data. They list that 4 sturgeon were harvested between Grand Coulee Dam and the Canadian border in 1998. No steelhead and salmon are reported to have been harvested during the same time (WSDFW 2001)

Tribally sensitive areas of central importance to the Colville Confederated Tribe include those areas used for ceremonial, cultural, traditional, subsistence or economic purposes. In 1891, the Colville Tribes ceded the North Half of the Reservation to the U.S., including a portion of the Columbia River, but expressly reserved hunting and fishing rights in these ceded lands and the river. Section I of the October 1996 Environmental Agreement between the Tribes and the EPA recognized these rights. Subsistence fish catch data for the tribe is not available. (E & E 2000)

The Spokane Tribe and the Colville Confederated Tribe, and the Washington Department of Fish and Wildlife are the primary agencies directly involved in managing the Lake Roosevelt fisheries. The Spokane Tribe is coordinating the development of a Lake Roosevelt fisheries plan, funded by the Bonneville Power Administration in cooperation with the Washington Department of Fish and Wildlife, the Colville Confederated Tribes, and other involved parties Two kokanee salmon hatcheries are operated by the Spokane Tribe and the Washington Department of Fish and Wildlife to support the resident fishery in Lake Roosevelt. The hatcheries produce thousands of kokanee for release into Lake Roosevelt annually. The Spokane Tribe also has initiated a program of rearing rainbow trout at its hatchery for release into Lake Roosevelt. (DOI 2000)

In addition to the hatchery operations, there are numerous rainbow trout pens on Lake Roosevelt. These fish-rearing pens provide thousands of trout annually to support the recreational fishery. The success of this project in providing catchable-size rainbow trout resulted in its expansion to more than 30 net pens in several locations on Lake Roosevelt by 1995. In addition, some of the net pens are now being used to rear kokanee before release. (DOI 2000)

Three species protected under the Endangered Speices Act are present in or along the upper Columbia River Of these, peregrine falcons (*Falco peregrinus*) are endangered, and the bald eagle

(*Haliaeetus leucocephalus*) and bull trout (*Salvelinus confluentus*) are threatened The state of Washington also lists peregrine falcons as endangered and the bald eagle as threatened (DOI 2000)

Peregrine nests have been found in the areas surrounding the Lake Roosevelt Reservoir. Use of the area by peregrines normally occurs during spring and fall migrations. Peregrine falcon foraging and nesting habitats are usually associated with tall cliffs near water. Their diet consists primarily of waterfowl, shorebirds, and passerine species commonly found on and around lakes and streams (DOI 2000)

Bald eagles maintain a large overwintering population in the area surrounding the Lake Roosevelt Reservoir from November through March annually. More than 21 bald eagle nests are in the vicinity of the project area and bald eagles appear to be becoming more productive each year. A maximum of 15 territories have been occupied in any one year. Bald eagle habitat is usually associated with large bodies of water that provide an abundant source of food. Eagles feed primarily on fish, waterfowl, and carrion. (DOI 2000)

Bull trout historically occupied a vast geographic area of the Columbia River. Today the remaining populations are isolated and remnant. Native bull trout have declined significantly in the last 10 years, in part due to predation by and competition with introduced species such as walleye. If bull trout are present, Lake Roosevelt and its tributaries can provide suitable habitat. Bull trout typically migrate from lakes in the fall to spawn in clear streams with flat gradient, uniform flow, and uniform gravel or small cobble. (DOI 2000)

Additional sensitive environments within the surface water TDL include 5.97 linear miles of wetland frontage (USFWS various dates).

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8. CONCLUSIONS AND RECOMMENDATIONS

In the spring and summer of 2001, the EPA and its authorized contractors conducted an investigation of hazardous substance contamination in the upper Columbia River beginning near Inchelium, Washington, and extending approximately 70 RMs upstream to the U.S.-Canada border. The site investigation involved an evaluation of 49 sediment samples collected along intervals within the upper Columbia River. The evaluation of the technical data was conducted using the EPA hazard ranking system model criteria as described in subsection 5.1 of this report.

Analytical data show that widespread contamination is present in lake and river sediments throughout the upper Columbia River between Inchelium, Washington and the U.S.-Canada border. An evaluation of the analytical data relative to background sediment shows elevated concentrations of arsenic, cadmium, copper, lead, mercury, and zinc in the majority of samples ranging from 48% of all samples for mercury to 97% of all samples for copper. The area of elevated contamination extends from sample point CS004 located near Inchelium, Washington to sample point CS052 at the U.S.-Canada border. Concentration gradient maps for copper, lead, and zinc are presented as Figures 8-1 through 8-6. These maps demonstrate that the concentrations of these three analytes tend to increase with distance upstream. The highest concentrations of copper and zinc were found near the U.S.-Canada border with elevated concentrations approximately two orders of magnitude over other elevated concentrations located further downstream. Concentrations of cadmium, lead, and mercury tend to be highest near the mining district located in upper Stevens County.

During the 2001 EPA sampling event, several sediment samples collected at the upper Columbia River consisted of a visibly dark glassy sandy mixture characterized by EPA field personnel as slag. Slag is a by-product of the smelting furnaces, principally black sand-size material, containing glassy particulate matter and metals. The presence of slag in upper Columbia River sediment has been documented by prior studies conducted by other federal and state agencies Canadian government staff and Cominco personnel observed deposits of slag during a 1991 boat trip into the U.S. conducted for purposes of examining slag and gypsum deposits in back eddy areas and on sand and gravel bars (BC Environment 1991) The largest deposit of what appeared to be predominantly slag in Washington state was observed on the southwest side of a large sand/gravel bar located just north of Northport Samples were collected at several locations for analysis (BC Environment 1991).

Potential sources of contamination to the upper Columbia River include industries such as mining, milling, smelting, pulp, and others that have discharged hazardous substances into the river. A discussion of operations and processes at the former Le Roi/Northport Smelter in Northport, Washington, the Cominco Smelter in Trail, B.C., and the Celgar Pulp Mill in Castlegar, B.C., is included in subsection 2.3. A discussion of active, inactive, and abandoned mines and mills in Stevens County and Pend Oreille County can be found in separate reports (E&E 2002; E&E 2001).

Other potential sources of contamination to the river include permitted waste discharges in the Columbia River from the municipal wastewater treatment facilities in Castlegar and Trail, B.C., seepage from an old landfill site and an old arsenic storage site located upstream of the Cominco Smelter, and the wastes from the cities of Colville and Chewelah, Washington, discharged to the Colville River tributary. (G3 Consulting 2001b)

Results of the EPA site investigation indicate that the Cominco smelter in Trail, B.C. is a primary source of contamination to the upper Columbia River. Smelter operations have been underway in Trail, B.C., since 1896 with the direct discharge of slag to the Columbia River discontinued in mid-1995. Up to 145,000 tons of slag had been discharged annually, which moved downstream to settle out in slower flowing, sandy areas. The environmental effects of slag discharge to the river includes both chemical and physical components. Chemical effects include increased loads of heavy metals and potential bioaccumulation and toxicity problems in river organisms. Physical effects include scouring of plant and animal life from river substrates, damage to gills and soft tissues of aquatic insects and fish, and smothering of habitat and food sources. (G3 Consulting 2001b)

Cominco's 1996 Environmental Report includes a trend graph of metals in effluents from the metallurgical operation from 1980 to 1996. According to the 1996 report, the average discharges for total dissolved metals were as high as 18 kilograms per day (kg/d) of arsenic, 62 kg/d of cadmium, 200 kg/d of lead, 4 kg/d of mercury, and 7,400 kg/d of zinc. Additionally, fertilizer plant operations contributed up to 4 kg/d of mercury and 350 kg/d of zinc. A new lead smelter was commissioned in 1997 and became fully operational in 1999, reportedly providing improved air emission and effluent treatment controls.

Eleven domestic intakes and two municipal intakes serving approximately 1,473 people are located within the area of contamination. Sport, subsistence, and commercial fishing is conducted within the area of actual contamination The federal-endangered peregrine falcon, and the federal-threatened bald eagle and bull trout use this area of the river Approximately 5 97 linear miles of wetlands are located within the area of contamination. Sediment contamination is present within the Lake Roosevelt National Recreation Area. The Lake Roosevelt National Recreation Area, comprising the lake and its shorelines, attracts more than 1 million visitors per year. Recreational activities include fishing, boating, swimming, and camping. Between 1990 and 1996, walleye, rainbow trout, and kokanee were the fish most often caught and harvested by anglers. In 1998, sturgeon were harvested between Grand Coulee Dam and the U.S.-Canada border The area is also of economic and cultural significance to Native American populations. Tribally sensitive areas of central importance to the tribes include areas used for cultural, ceremonial, traditional, subsistence, and economic purposes. Subsistence fishing may constitute a major portion of some residents' diets.

A 1994 study by USGS to determine concentrations of mercury and other metals in three fish species (walleye, smallmouth bass, and rainbow trout) found concentrations of mercury in the walleye samples, at concentrations ranging from 0.11 mg/kg to 0.44 mg/kg. While the Federal Food and Drug Administration standard of 1.0 parts per million was not exceeded, the USGS and the WSDH issued a fact sheet summarizing the study and advising the public to limit consumption of Lake Roosevelt walleye (E & E 2000).

Additional concerns include potential threats to human health posed by exposure to slag on beaches of the upper Columbia River from inhalation, dermal contact, ingestion of lake water, and direct ingestion of slag material; exposure to the contaminated sediments during low draw down periods, such as the potential human health effects resulting from dermal contact with the sediments, ingestion of sediments, or from inhalation of airborne sediment particles.

Based on an evaluation of hazardous substances found in sediment samples collected from the upper Columbia River, and a review of prior studies conducted documenting elevated levels of metals, dioxins and furans in sediment at several locations from the U.S.-Canada border leading into Lake Roosevelt, further detailed investigation of the upper Columbia River under CERCLA is recommended

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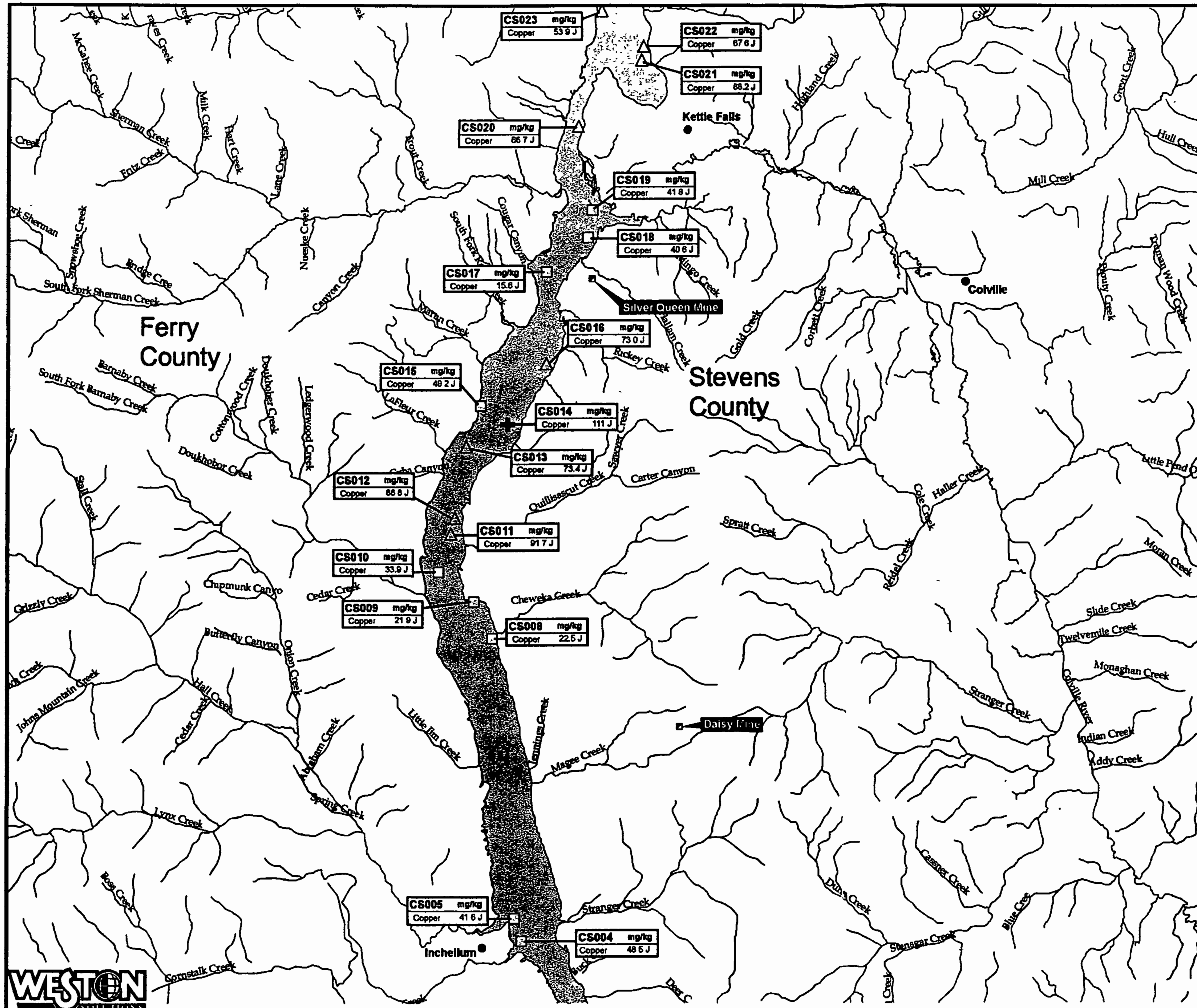


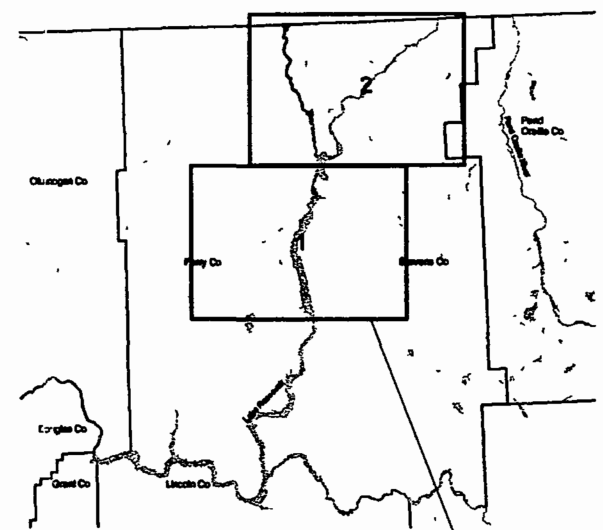
Source: Weston 2002.

EXPLANATION

- Streams
- Town
- Mg/kg — Milligrams per Kilogram
- □ 15.6 - 50 mg/kg
- △ 50 - 100 mg/kg
- ✚ 100 - 500 mg/kg
- ★ 500 - 3300 mg/kg

DATA QUALIFIERS

J — The analyte was positively identified but the associated numerical value is an estimate.



Map Extent

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0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 8-1
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
SIGNIFICANT/ELEVATED COPPER RESULTS (SAMPLES CS004-CS023)

Date:	Drawn by:	
10/14/02		10:START-2\01020028\fig 8-1

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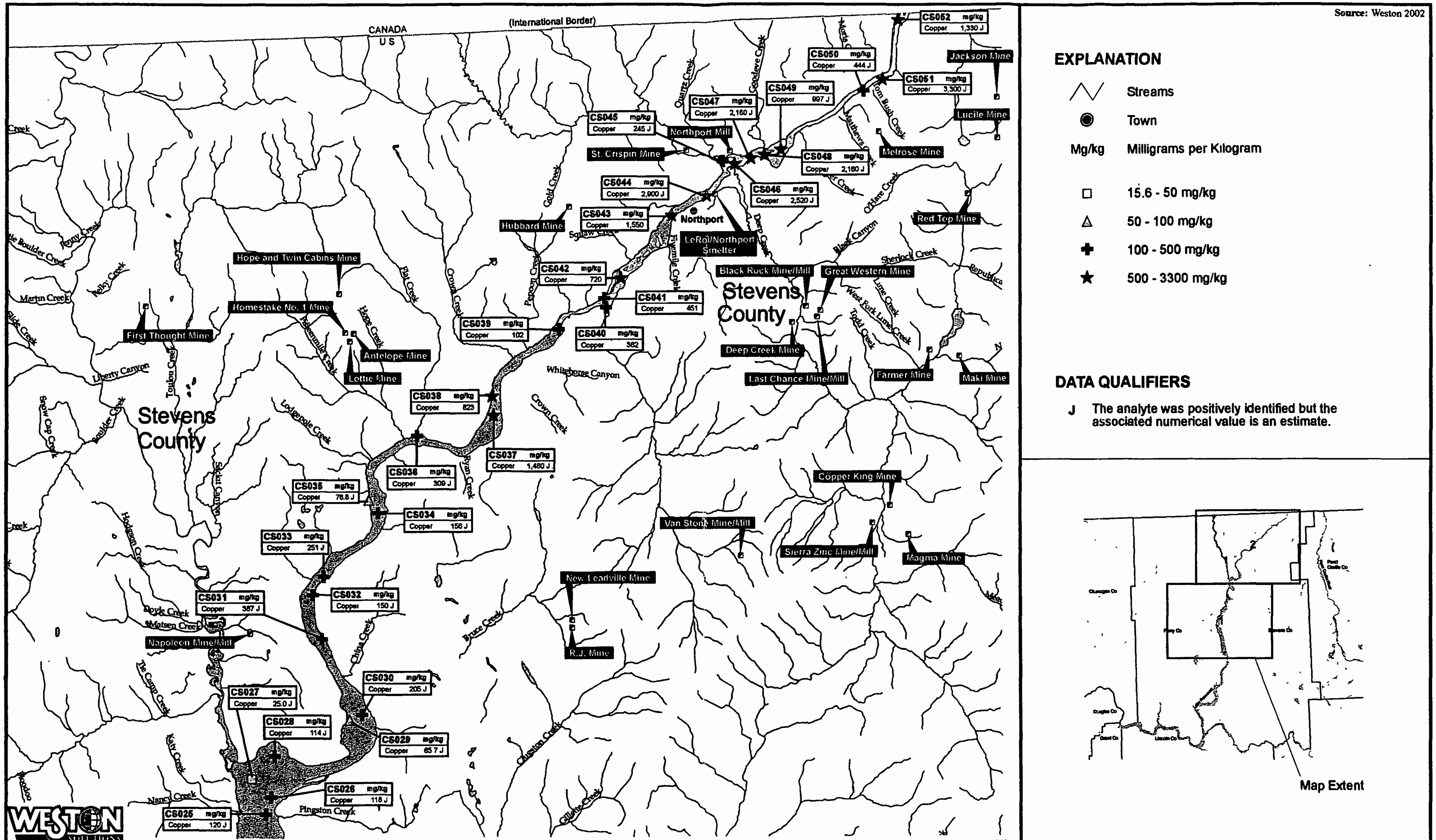

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Seattle, Washington

0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 8-2
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
SIGNIFICANT/ELEVATED COPPER RESULTS (SAMPLES CS025-CS052)

Date:	Drawn by:	
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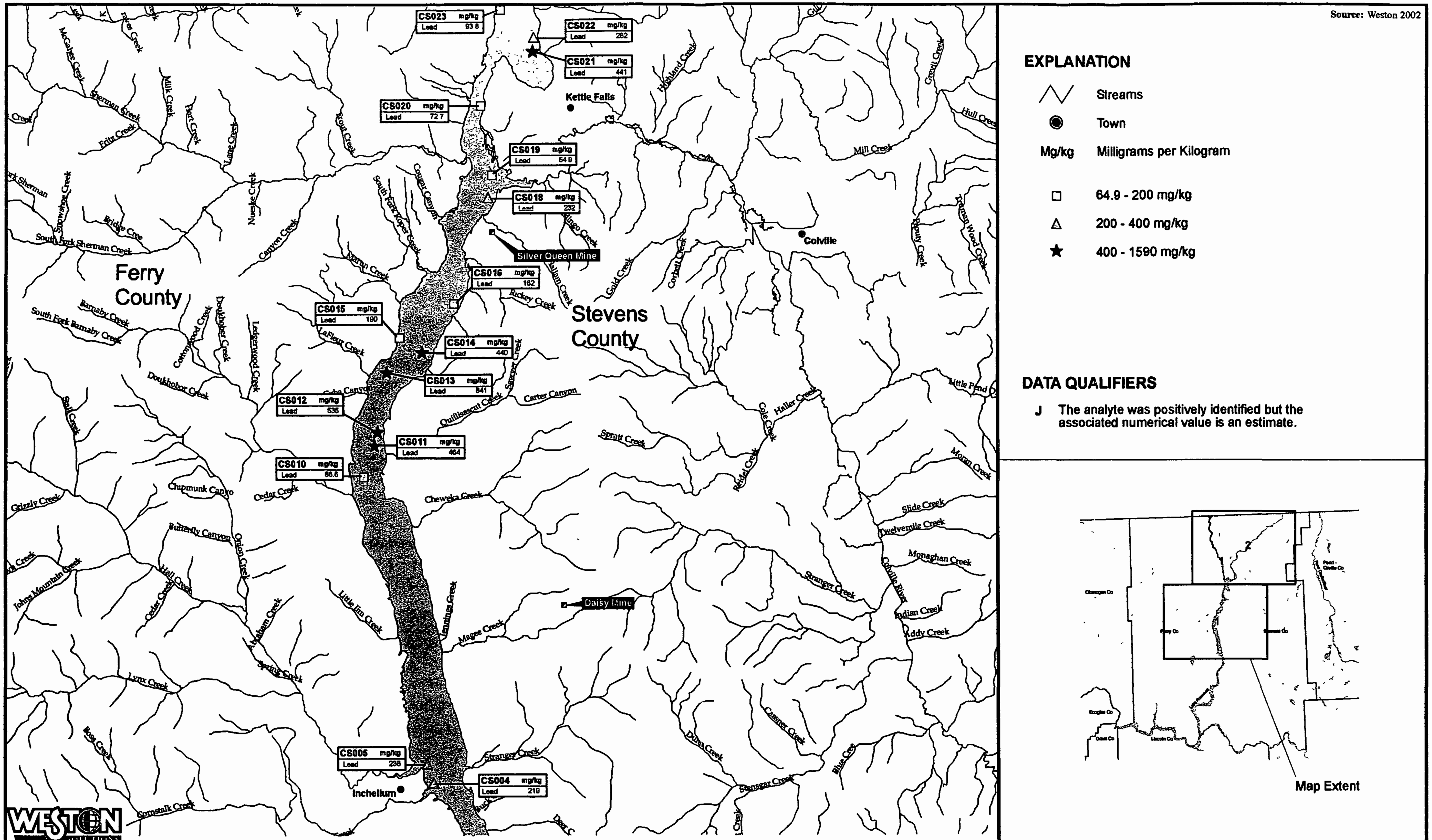

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Seattle, Washington

0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 8-3
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
SIGNIFICANT/ELEVATED LEAD RESULTS (SAMPLES CS004-CS023)

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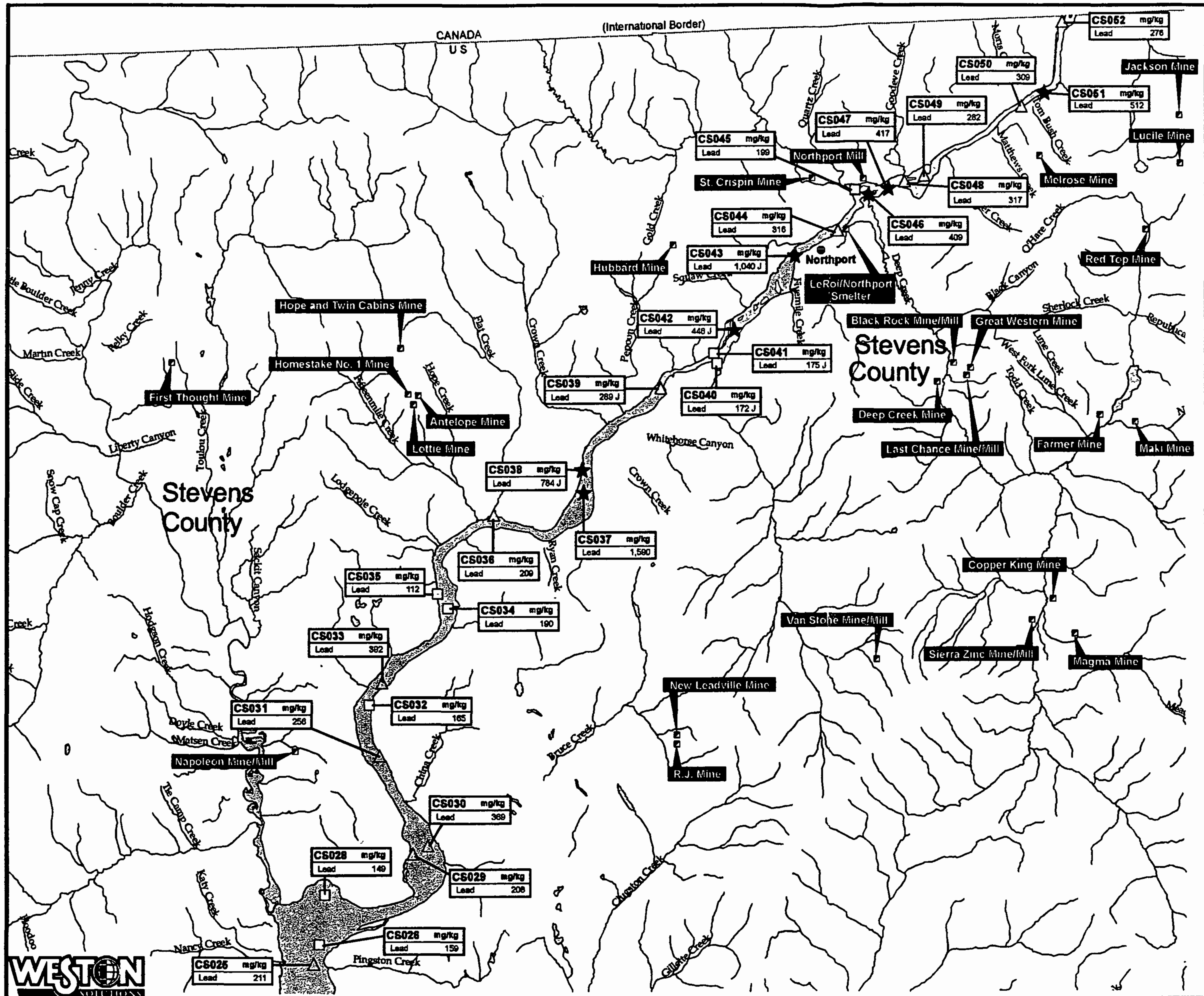
Source: Weston 2002

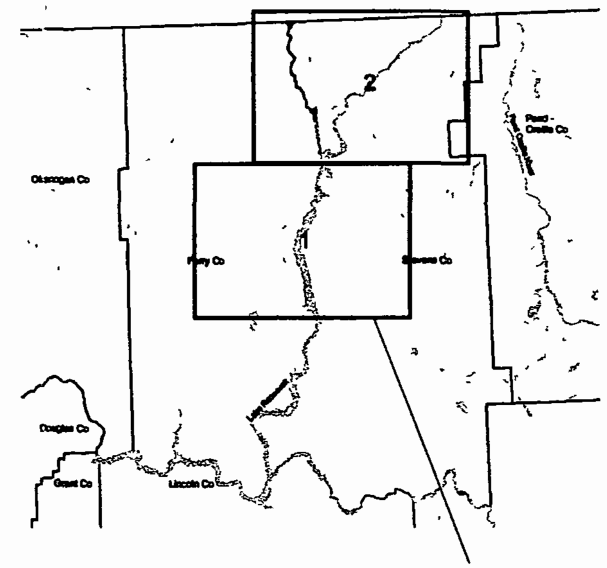


EXPLANATION

- Streams
- Town
- Mg/kg Milligrams per Kilogram
- □ 64.9 - 200 mg/kg
- △ 200 - 400 mg/kg
- ★ 400 - 1590 mg/kg

DATA QUALIFIERS

J The analyte was positively identified but the associated numerical value is an estimate.



Map Extent

ecology and environment, inc.
International Specialists in the Environment
Seattle, Washington

0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 8-4
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
SIGNIFICANT/ELEVATED LEAD RESULTS (SAMPLES CS025-CS052)

Date:	Drawn by:	
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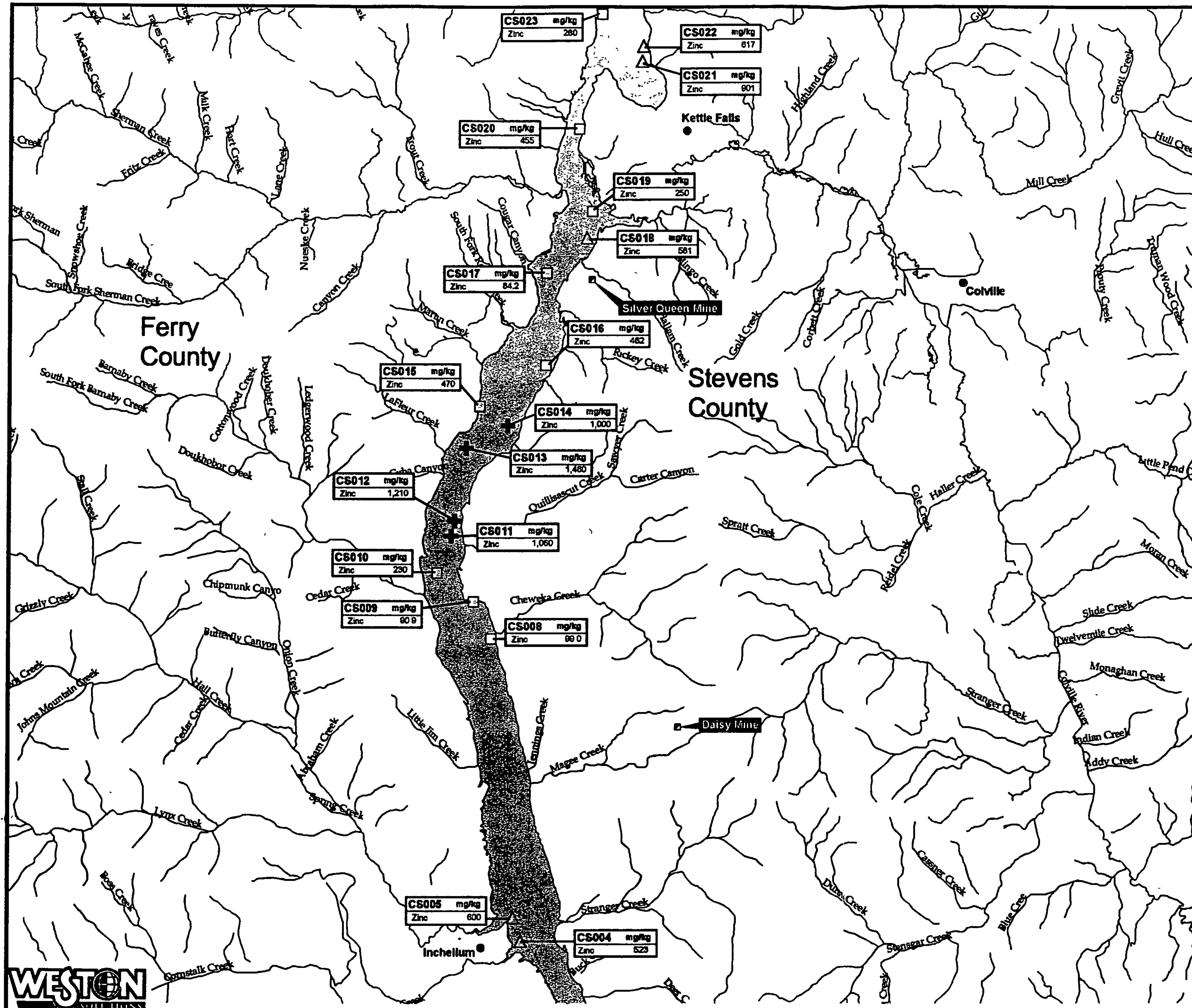


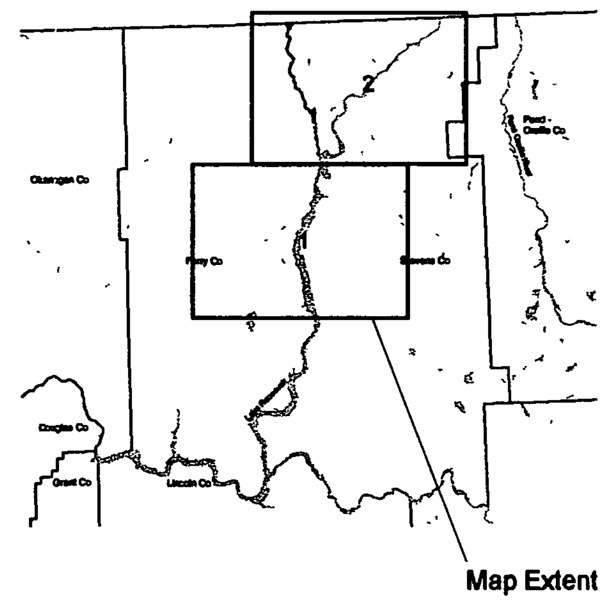
Source: Weston 2002

EXPLANATION

	Streams
●	Town
Mg/kg	Milligrams per Kilogram
□	84.2 - 500 mg/kg
△	500 - 1,000 mg/kg
✚	1,000 - 5,000 mg/kg
★	5,000 - 24,900 mg/kg

DATA QUALIFIERS

J The analyte was positively identified but the associated numerical value is an estimate.



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0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 8-5
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
SIGNIFICANT/ELEVATED ZINC RESULTS (SAMPLES CS004-CS023)

Date	Drawn by:	
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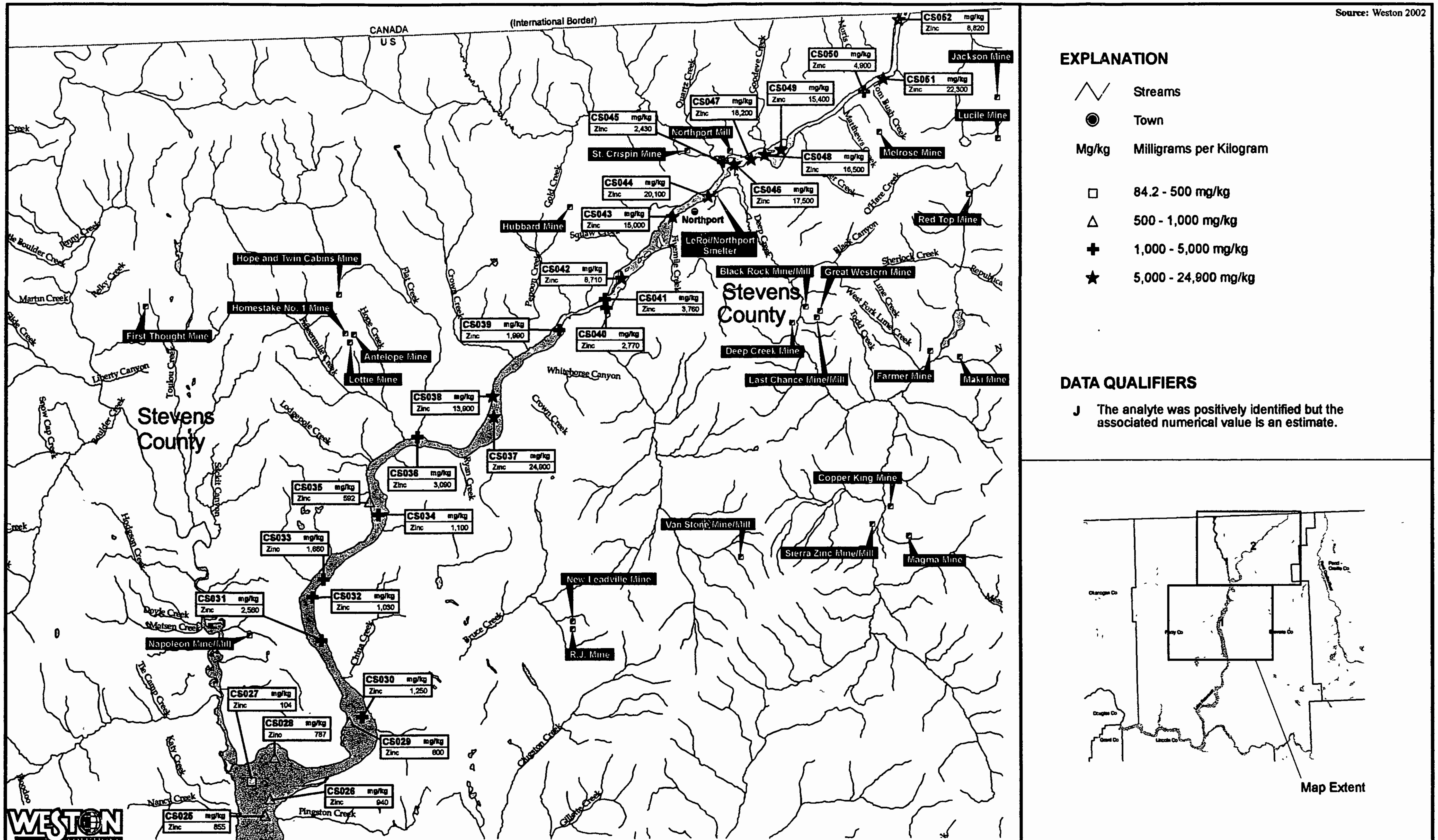

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0 7,000 14,000
Approximate Scale in Feet

UPPER COLUMBIA RIVER
EXPANDED SITE INSPECTION
Ferry and Stevens Counties, Washington

Figure 8-6
UPPER COLUMBIA RIVER SITE NORTHEASTERN WASHINGTON
SEDIMENT SAMPLE
SIGNIFICANT/ELEVATED ZINC RESULTS (SAMPLES CS025-CS052)

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APPENDIX A

PRELIMINARY ASSESSMENT PETITION

THE CONFEDERATED TRIBES
of
THE COLVILLE RESERVATION
POST OFFICE BOX 150-NESPELEM WASHINGTON 99155 PHONE (509) 634-4711

August 2, 1999

Regional Administrator
Region X
United States Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Re: **Petition for Assessment of Release**

Dear Mr. Clark:

I write in my capacity as the Chair of the Business Council of the Confederated Tribes of the Colville Indian Reservation, a sovereign entity whose government is recognized by the United States. This letter is also sent to you in furtherance of the October 1996 Environmental Agreement between EPA and the Tribes.

Enclosed herein a Petition of the Tribes for a Preliminary Assessment of the hazards to public health and the environment which are associated with the release or threatened release of a hazardous substance, pollutant, or contaminant on lands which include the Reservation.

As is set out in detail in the enclosed Petition, the upper Columbia River basin has been of great importance to the Colville Tribes since time immemorial. We have always occupied and utilized this area, from below the Columbia-Okanogan confluence up into what is now Canada, and the fish, wildlife, and plant materials of the upper Columbia basin have always been of central importance to the Tribes' subsistence and culture The

Tribe continues to hold reserved hunting and fishing rights in lands in the North half of the historic reservation lands, including the Columbia River, which are recognized in Section I of the October 1996 Environmental Agreement between the Tribes and EPA.

This matter is extraordinarily important to the Tribe. We respectfully request th you give this matter your full and careful attention.

Very truly yours,

CONFEDERATED TRIBES OF THE
COLVILLE INDIAN RESERVATION

Colleen F. Cawston

Colleen Cawston
Chair, Colville Business Council

cc: Members, Colville Business Council
Director, Office of Environmental Trust
Director, Office of the Reservation Attorney
Special Environmental Counsel

LAW OFFICES

SHORT CRESSMAN & BURGESS PLLC

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COUNSEL TO THE FIRM

** ADMITTED IN GEORGIA

August 5, 1999

Regional Administrator
Region X
United States Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101

Re: **Petition for Assessment of Release**

Dear Mr. Clark:

We represent the Confederated Tribes of the Colville Indian Reservation (Tribes). This Petition is submitted to the U.S. Environmental Protection Agency (EPA) on behalf of the Tribes, a sovereign entity whose government is recognized by the United States, and, through the Tribes' Office of Environmental Trust. The Tribal government, and the role of Environmental Trust, has been specifically recognized in the October 1996 Environmental Agreement between the Tribes and EPA. This Petition is submitted to EPA in furtherance of the Tribal/EPA Agreement. The Office of Environmental Trust is located at Post Office Box 150, Nespelem, WA 99155, and the telephone number is (509) 634-4711.

1. Petitioner/Location

Pursuant to Section 105(d) of CERCLA, 42 USC §9605(d), the Tribes, Petitioner herein, respectfully request that EPA Region X conduct a Preliminary Assessment of the hazards to public health and the environment which are associated with such release or threatened release of a hazardous substance, pollutant, or contaminant at the following location:

> The Upper Columbia River Basin from the Canadian Border, southward through Lake Roosevelt, to the Grand Coulee Dam, encompassing the water, river- and lake-beds, and banks[1]

2. <u>Petitioner is affected by the release</u>

Critical tribal resources, governance processes, and inter-governmental agreements have been and continue to be affected by these releases. As repeatedly confirmed by decisions of the federal courts, the upper Columbia River basin has been of great importance to the Colville Tribes since time immemorial. Predecessors of the Colville Tribes and its members have always occupied and utilized this area, from below the Columbia-Okanogan confluence up into what is now Canada. The fish, wildlife, and plant materials of the upper Columbia basin have always been of central importance to the Colville Tribes' subsistence and culture. When the Colville Reservation was established in 1872, the entire segment of the Columbia from the Okanogan confluence to the Canadian border, roughly 150 river miles, was included within the Reservation. In 1891, the Colville Tribes ceded the North Half of the Reservation to the United States, including a portion of the Columbia, but expressly reserved hunting and fishing rights in these ceded lands, including the Columbia River. The U.S. Supreme Court affirmed these rights in a 1975 decision, *Antoine v. Washington*, 420 U.S. 194, and Section I of the October 1996 Environmental Agreement between the Colville Tribes and EPA also recognizes these rights.

Grand Coulee and Chief Joseph Dams have eliminated anadromous fish from most of the Columbia within the Colville Reservation and former North Half, but the Tribes continues to rely heavily on the anadromous fisheries between Chief Joseph Dam and the Reservation boundary five miles downstream. In addition, the Tribes has come to rely increasingly on the resident fishery and water resources above the dams, both for subsistence and recreation and for economic development in the form of tourist and recreation enterprises.

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1 See Figure 1 - Lake Roosevelt and tributary waters attached as Exhibit A

Active Tribal environmental and fishery management programs, in coordination with other management entities on the system, struggle to maintain a viable, healthy ecosystem given the past environmental damages and current management constraints. It is also important to note that there is increasing recreational use of the Lake Roosevelt system along with increased population growth. The Tribes have established a marina, houseboat rental enterprise and related business in a continuing effort to create jobs and improve the quality of life for Tribal members and the broader community. Therefore, issues about contaminants in the system that raise serious human health questions are critically important to Petitioner and all members of the local population.

3. <u>Characteristics of the substances released</u>

Based upon information and belief, Petitioner asserts that the following hazardous substances have impacted the study area and should be included in the Assessment process:

3.1 metals (arsenic, cadmium, copper, lead, mercury, and zinc); primary source of the contamination appears to be a lead-zinc smelter on the Columbia River in British Columbia but may also come from the Spokane River[2]

3.2 blast furnace slag from Canadian smelters as well as from the LeRoi (Northport) Smelter site in Northport, Washington[3]

3.3 organochlorine compounds (dioxins, furans, and PCBs) believed to have originated from a pulp mill near Castlegar, British Columbia[4]

3.4 wood-pulp waste, urban runoff, and discharges from industrial activities[5]

3.5 contaminants released into the Upper Columbia from historic and

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2 *See* Exhibit A at 12.

3 *Id* at 12 and 14.

4 *Id* at 13

5 *See* Exhibit A generally

ongoing mining operations in the region[6]

3.6 contaminated fugitive dust caused by exposed sediments resulting from drawdowns of Lake Roosevelt

4. <u>Activities contributing to the releases</u>.

4.1 In the early 1980s, concerns about water quality in Lake Roosevelt and the upper Columbia River were first reported in a U.S. Fish and Wildlife study that reported elevated concentrations of arsenic, cadmium, lead, and zinc in fish . Follow up studies identified the primary source of the contamination to be a lead-zinc smelter on the Columbia River in British Columbia, 16 km upstream from the international boundary. Since the 1950s, the subject smelter had discharged several hundred tons of blast furnace slag and effluent per day into the Columbia River.

4.2 At the request of the U.S. Environmental Protection Agency (EPA) and Lake Roosevelt Water Quality Council (LRWQC), the U.S. Geological Survey (USGS) initiated a large-scale sediment quality study in 1992. The USGS reported that bed sediments were contaminated, as indicated by elevated concentrations of metals (arsenic, cadmium, copper, lead, mercury, and zinc), laboratory toxicity, and altered benthic invertebrate communities. In addition, a 1994 USGS study determined that mercury in sportfish was elevated to levels high enough to trigger a Washington Department of Health consumption advisory.

4.3 Due in part to the studies in Canada and Washington state, the subject lead/zinc smelter in Canada has apparently stopped discharging slag and has reduced its effluent discharge. While this is a significant improvement in the loadings of metals to the system, *large quantities of contaminated sediments remain in Lake Roosevelt,* and therefore studies are still in progress. For example, Petitioner is currently funding a USGS study to determine if the level of mercury found in the tissue of Walleye Pike has decreased since the 1994 study. In addition, the EPA is presently funding a USGS study in the Coeur d'Alene and Spokane River Basins as part of a Natural Resources Damage Assessment (NRDA) of the Coeur d'Alene system. The primary objective of that study is to determine the relative contribution of metals to the Spokane River from the Lake Coeur d'Alene system.

6 *Id* and *see Exhibit B*

4.4 While metals have received the most attention, organochlorine compounds, due to their persistence and established role in causing adverse environmental effects are also of concern. Human health effects of organochlorine compounds are controversial. The particular organochlorine of concern are dioxins, furans, and PCBs. In 1988 and 1990, Canadian studies reported large concentrations of furans in fish collected in the Columbia River downstream of a pulp mill near Castlegar, British Columbia. The Washington state Department of Ecology (Ecology) confirmed that fish from Lake Roosevelt contained elevated furan concentrations, but that concentrations of dioxins and furans generally decreased as one moves downstream away from Canada.

4.5 In a 1992 study, the USGS reported that dioxins and furans were present in suspended sediment collected from the Columbia River, but only a few of the 17 targeted isomers were detected. The form of dioxins most toxic to some laboratory animals was not detected. Aside from dioxins and furans, few of the many other organic compounds associated with wood-pulp waste, urban runoff, and industrial activities were detected in the bed sediments of Lake Roosevelt and its major tributaries.

4.6 There is generally less known about PCBs than about the dioxin and furan compounds. In 1993-94, Ecology reported that PCBs were detected in most fish samples from the Spokane River, and that concentration were highest in fish collected from the Spokane River above Spokane, but below the Idaho border. New data developed by EPA and other agencies indicates that heavy metals may also present risks to Lake Roosevelt and that further study of the risk of adverse impact to human health is needed. In general, there needs to be more study regarding how contamination sources located on the Spokane Indian Reservation may have impacted the Colville Reservation. In 1994, the EPA funded a study to determine the potential human health risks posed by concentrations of dioxins, furans, and PCBs in species of fish collected and consumed by people throughout Lake Roosevelt. That study did find that dioxins and furans were present in fish, but that concentrations did not differ from the upper Columbia River to the Grand Coulee Dam. There has been no human health statements released from the EPA PCB study.

4.7 In a current follow-up study, the USGS is presently determining if organochlorine compounds, including both dioxins and furans, and PCBs, have decreased in sportfish filets since the EPA study four years ago. This study was requested by the Lake Roosevelt Water Quality Council and Colville Confederated Tribes; the Spokane Tribe collected the fish as part of a joint (Colville Tribes, Spokane Tribe, Washington

Department of Fish and Wildlife) fisheries monitoring program in Lake Roosevelt.

4.8 The EPA performed a site inspection of the LeRoi Smelter site in 1993. The SI sampled only on-site surface soils, surface soils of an adjacent city park, and off-site (background) surface soils (a total of only 4 sampling sites) to gather data to evaluate potential soil problems associated with previous smelting operations on site. The sampling revealed that arsenic, antimony, lead and copper were detected on site at significant concentrations (exceeding Washington State Model Toxics Control Act Method B soil cleanup levels). Arsenic and copper were also detected at a significant level off site in the adjacent city park. No sampling of groundwater was conducted, nor was the site assessed with regard to the suspected release or threatened release of a hazardous substance, pollutant, or contaminant on site or from the site into the Columbia River or to groundwater. The report recommended further investigation of the site to evaluate any possible exposure via the air or soil pathway, but no additional investigation has occurred to date.

5. <u>Governmental officials contacted about the releases</u>

5.1 The Tribe has contacted: Chuck Rice and Elizabeth McKenna from the *United States Environmental Protection Agency*; Tony Grover, Carl Nuechterlein, David Knight, Guy Gregory, Bill Fees, and Flora Goldstein from the *Washington State Department of Ecology;* Tanya Barnett and Fritz Clarke from the *Washington Office of the Attorney General;* Mark Munn and Cindi Barton of the *United States Geological Survey;* Mary Verner Moore from the *Spokane Tribe of Indians;* and Congressman George Nethercutt from the *United States House of Representatives.*

5.2 The response from the State of Washington has been that Ecology recognizes that LeRoi is ranked as a No. 1 (most serious) on the State Hazardous Substances List. Ecology has conducted phase I of an assessment for remediation and had intended to undertake phase II work involving well-drilling and a sediment study in 1999. However, phase II of the remediation plan never occurred because Ecology did not have sufficient funds in its 1999 budget. Furthermore, Ecology has not considered the cumulative impact of the site in relation to the contribution by other sources to contamination of the Columbia River basin and Lake Roosevelt.

6. **Request for Preliminary Assessment**

In light of the foregoing, Petitioner herein, by and through the office of Environmental Trust respectfully request that EPA Region X undertake timely review of this matter and initiate the preliminary assessment of the releases described above. Please be advised that the Tribes would like to meet with you to review this Petition and discuss how EPA and the Tribes may work together to protect the Upper Columbia River environment.

Respectfully submitted this 6th day of August, 1999 by:

SHORT CRESSMAN & BURGESS PLLC

Richard A. Du Bey
Special Environmental Counsel to the
Confederated Tribes of the Colville Reservation

RAD:vh

cc: Members, Colville Business Council
Director, Office of Environmental Trust
Director, Water Quality Management
Director, Office of the Reservation Attorney
Elizabeth McKenna, EPA, ORC
Chuck Rice, EPA
Richard McAllister, EPA, ORC
Tony Grover, Department of Ecology
Tanya Barnett, Office of the Attorney General
Guy Gregory, Department of Ecology
Cindi Barton, USGS
Mary Verner Moore, Spokane Tribe of Indians
Congressman George Nethercutt

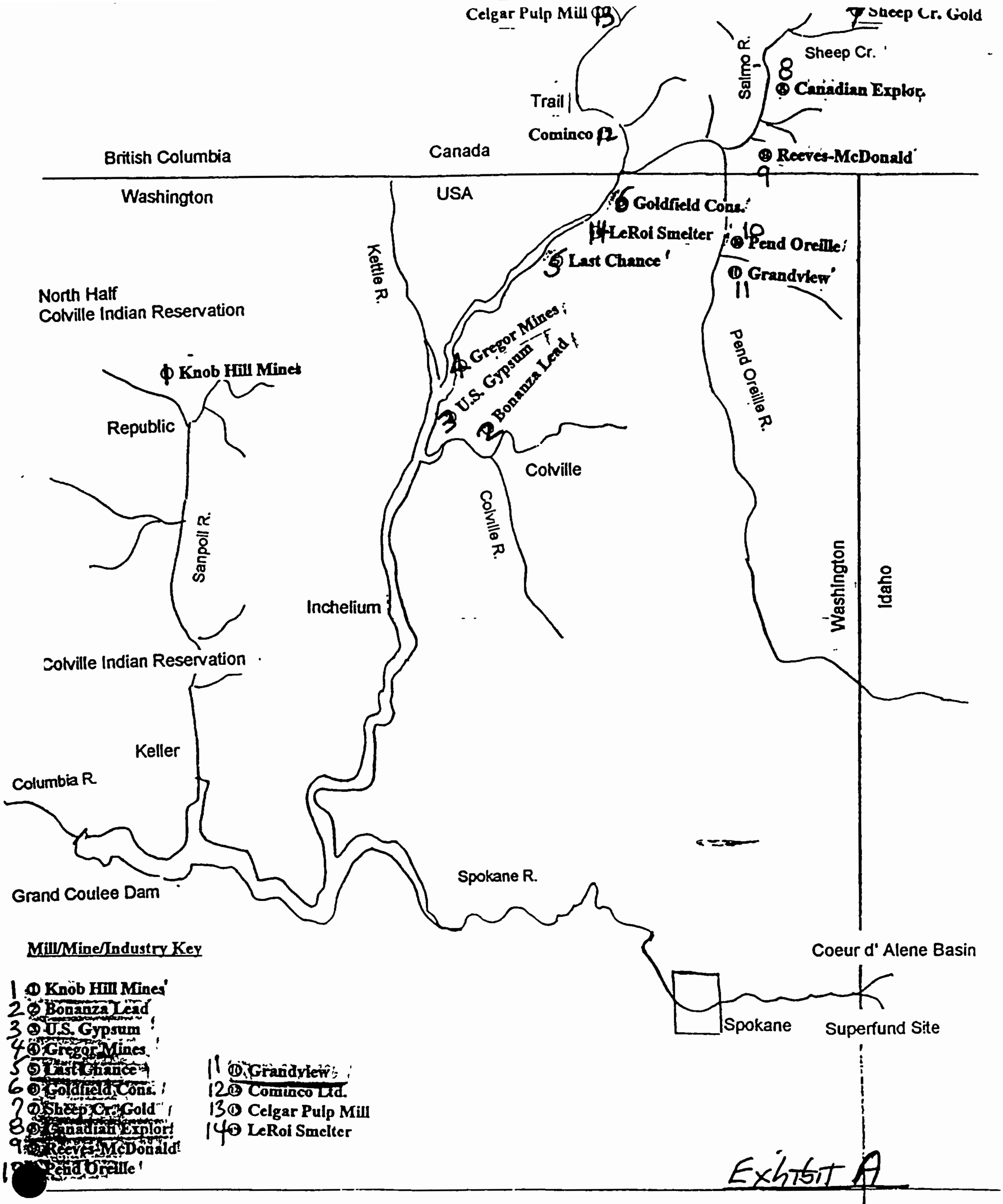


Figure 1 Lake Roosevelt and Tributary Rivers

Lead (Pb)-Zinc (Zn) Mining/Milling Operations with Discharges into Lake Roosevelt & Upper Columbia

Mill	Company	Location	Yrs. of Oper.	1950 Prod Rate	Planned Prod Rate (TPD-- Tons Per Day)	Effluent Notes	River
Josephine	Pend Oreille Mines and Metals Co.	Metalline Falls	1950	500 TPD	2400 TPD -- at new mill across the river (same company)	500,000 gal. per day 20-25% solids by weight 0.37 % Zn, trace of Pb	Pend Oreille River (via Flume Creek)
Grandview Mill	American Zinc, Lead and Smelting Co.	Metalline Falls	1950	700 TPD		490,000 gal. per day discharged direct to river via flume 0.3% Zn, 0.1% Pb	Pend Oreille River
Reeves-McDonald Mine	Pend Oreille Mines and Metals Co.	Brit. Col., a few miles north of border	1950	700 TPD	1000 TPD	Discharged direct to river; 0.5 % Zn, trace of Pb	Pend Oreille River
Bonanza Lead	Bonanza Lead Co.	Palmers	1950	80 TPD	150 TPD	no direct discharge, possibility of cyanide leaching	Colville River
	Gregor Mines, Inc.	Bossburg	1949	100 TPD		direct discharge of overflow	Lake Roosevelt
	Golfield Consolidated Mines Co.	above Northport	1949	225 TPD		drainage	Columbia River
	Last Chance Consolidated Mines, Inc.	below Northport	1949	60 TPD		drainage	Columbia River

Exhibit 8

Volume of Wastes Discharged to Pend Oreille River by Lead-Zinc Mills in NE Washington and British Columbia

Name of Mill/Mine	Discharge Volume (in gallons)
Josephine (1941-1950)	1.5 billion
Josephine II (1951-1960)	3.6 billion
Grandview (1941-1960)	2.9 billion
Reeves-McDonald (1941-1960)	3.6 billion

The combined total is 11.6 billion and would be enough to fill approximately 1,300 Kingdomes.

RESOLUTION

WHEREAS, it is the recommendation of the Natural Resources Committee to approve the attached proposed agreement between the Colville Confederated Tribes and U. S. EPA, and authorization that Chairman execute on behalf of the Tribes in connection with meeting with EPA region x administration on October 29, 1996 in Seattle. Agreement may enable tribes to qualify for additional funding in fY 97 (but does not guarantee any such funding). Agreement also promotes government to government relationship between CCT and EPA. Agreement recommended by Environmental Trust and Tribal Attorney.

THEREFORE, BE IT RESOLVED, that we, the Colville Business Council by authority delegated in Resolution 1991-431, this 28th day of OCTOBER, 1996, do hereby approve the recommendation of the Natural Resources Committee of the Business Council.

The foregoing was duly enacted by the Colville Business Council by a vote of 10 **FOR** 0 **AGAINST,** under authority contained in Article V, Section 1(a) of the Constitution of the Confederated Tribes of the Colville Reservation, ratified by the Colville Indians on February 26, 1938, and approved by the Commissioner of Indian Affairs on April 19, 1938.

ATTEST:

Mathew Dick

for Joseph A. Pakootas, Chairman
Colville Business Council

cc: Deb Louie, Chairman, Natural Resources Com.
Gary Passmore, Environmental Trust
Alan Stay, Tribal Attorney
Kathy Desautel, Financial Officer

ENVIRONMENTAL AGREEMENT
BETWEEN THE
ENVIRONMENTAL PROTECTION AGENCY, REGION 10
AND THE
CONFEDERATED TRIBES OF THE COLVILLE RESERVATION

I. PARTIES TO THE AGREEMENT AND ROLES

This Agreement reflects and affirms the government-to-government relationship between the United States of America and the Confederated Tribes of the Colville Reservation.

The Parties to this Tribal Environmental Agreement (hereinafter referred to as the "Agreement") are the Confederated Tribes of the Colville Reservation (hereinafter referred to as "Tribes"), represented by the Chairman of the Colville Business Council, and the United States Environmental Protection Agency (EPA), represented by the EPA Region 10 Regional Administrator.

The U.S. Environmental Protection Agency was created to provide coordinated and effective governmental action to assure the protection of the environment by abating and controlling pollution on a systematic basis.

Environmental Protection Agency, Region 10, is responsible for the execution of the Agency's programs within the boundaries of Alaska, Idaho, Oregon, and Washington.

The Parties recognize that the Colville Reservation established by Executive Order in 1872 is the permanent homeland of the Tribes and its members. The parties further recognize that the Tribes retains significant rights in the so-called North Half of the Reservation, which was ceded to the United States by an 1981 agreement reserving hunting and fishing rights for the Tribes and its members. The parties also recognize that the Tribes and its members owns lands, some of which are held in trust by the United States, outside the Reservation, both within the North Half and in other locations near the Reservation.

The parties further recognize that the Tribes possesses inherent sovereign authority to regulate environmental and natural resources matters within the Reservation, and that the Tribes desires to establish the scope of its authority over lands within the Reservation not owned by the Tribes.

This Agreement identifies the respective roles and governmental responsibilities of the Tribe and EPA for planning and undertaking environmental protection activities. The Tribe and EPA enter into this Agreement in order to ensure that tribal jurisdiction is preserved and protected, and furthermore, that the Tribe has substantial and meaningful involvement in environmental policy decisions impacting its Reservation, tribal members and tribal resources.

The Parties expect that the improved coordination that will result from this Agreement will maximize effective protection of the Tribe's environment and the fulfillment of the EPA's legislative mandate and trust responsibilities to the Tribe.

In furtherance of the expectations of the Parties, the following declarations are made and agreed to:

1. Pursuant to federal Indian law and policy, the Tribe is the government with primary jurisdiction and stewardship for its members and resources, and the Tribe has the right to a substantial and meaningful role in protecting the environment of its homeland.

2. The EPA is the federal agency with the primary responsibility for the protection of the environment in and of the United States. The EPA has a trust responsibility to use its legal authority to assist in the protection of the Tribal environment and the sovereignty of tribal government. The EPA is committed to assisting the Tribe in its development and implementation of an environmental protection and regulatory program which is consistent with EPA's regulatory authority.

II. VISION STATEMENT

A. Tribal Three Part Goal

The Tribes' strategic planning process is based on a 3-part holistic goal. Environmental programs on the reservation pursue their mission in accordance with this 3-part goal·

1. Quality of Life:

We want to maintain and build upon our unique culture, traditions, language, sovereignty and history; we want a healthy society, environment and economy; we will treat everyone with honor and respect, having the freedom to worship, live, work and play as we choose, accepting each Others diversity/uniqueness. We want to provide plentiful/affordable housing, meaningful/secure employment and educational opportunities. We want communities that are clean, self-sufficient, safe, wholesome and provide opportunities for family based recreation.

2. Forms of Production:

We will support our quality of life through sustainable wealth from diverse income opportunities, without waste or sacrifice of tradition, culture and values; we will emphasize the importance of involving the membership in developing their communities; we will provide opportunities/infrastructure to increase understanding/awareness of our culture, traditions, language, sovereignty and history throughout our communities, schools and workplaces, continuously promoting honor, respect and diversity

3. Future Resource Base:

We are and continue to be a self-sustaining sovereign entity, having flourishing enterprises, having healthy productive landscapes including rangelands, croplands, forests, riparian areas, streams and lakes, tribal decisions will include protection of tradition, culture, and aesthetic values; we will continue to provide improved/enhanced opportunities to communities/schools/workplace to increase understanding and awareness of our culture, values, tradition, language, sovereignty and history.

The reservation remains as a rural lifestyle and the population is in balance with an effective water, mineral, and energy cycle with bio-diversity resulting in and abundance of culture, medicinal and edible plants, clean air and water, springs and streams that flow year round, large trees, wildlife, fish and insects.

B. EPA National Guidance

1. The EPA "Indian Policy"

The EPA Policy for the Administration of Environmental Programs on Indian Reservations sets forth nine principles by which the EPA will pursue it's objective. Among the principles are a commitment to work with tribes on a government-to-government basis, to recognize tribes as the primary decision makers for environmental matters on reservation lands, to help tribes assume program responsibility for reservations, to remove existing legal and procedural impediments to tribal environmental programs, and to encourage tribal, state, and local government cooperation in areas of mutual concern. The Policy has been reaffirmed by every administrator since it's adoption, most recently by Administrator Carol Browner in 1994.

EPA's relationship with the Tribes is intended to be in accordance with its Indian and tribal policies first set forth in 1983 which emphasize respect for tribal rights to self government and self determination, a commitment to a co-equal government-to-government relationship, support and advocacy in behalf of tribal jurisdiction, and a recognition of the unique trust responsibility of the United States on behalf of Indian Tribes.

2. Government-to-Government Memorandum of 4/29/94.

President Clinton outlined principles intended to ensure that the federal government operates within a government-to-government relationship with federally recognized tribes in a manner which is "always respectful of tribal sovereignty."

3. Environmental Justice, Exec Order #12898, 2/11/94.

As a result of the Order, Administrator Browner convened an interagency Federal Working Group and established the National Environmental Justice Advisory Council, including tribal government representatives

4. Reinventing Environmental Regulations, 3/16/95

President Clinton and Vice-President Gore recognize as a principle of reinventing environmental protection that federal, state, tribal and local government must work as partners to achieve common environmental goals, with non-federal partners taking the lead when appropriate.

5. Congressional Recognition of Tribal Role.

Congress has amended the Safe Drinking Water Act, Comprehensive Environmental Response, Compensation and Liability Act, Clean Air Act, and Clean Water Act to clarify the role of tribal governments and enhance their ability to participate in the federal environmental regulatory scheme.

6. EPA's Administrative Support of Congress' Intent.

Consistent with its Indian Policy, the EPA has pursued its goal to eliminate statutory and regulatory barriers to the assumption of federal environmental programs by Indian tribes, including the amendment of environmental laws to include tribes. EPA has utilized its administrative authority under Resource Conservation and Recovery Act, the Federal Insecticide, Fungicide, and Rodenticide Act, and the Emergency Community Preparedness Right to know Act to include tribes as appropriate authorities even where an Act has been silent on the role of tribal governments.

III. OBJECTIVES

The Parties enter into this Agreement to accomplish the following objectives:

A. To Establish a Mechanism for Environmental Protection.

This Agreement is intended to establish a mechanism for determining the specific environmental priorities for the Colville Confederated Tribes, to identify the regulatory areas under the federal environmental laws for which the Tribes desire primacy, and to plan how all aspects of the reservation environment can be protected.

This Agreement shall form the basis for communication and programmatic assistance to the Tribe by the EPA. Program staff will provide assistance to the Tribe in accordance with the government-to-government relationship between the Parties, and as specified by the Specific Work plan attached to this Agreement.

B. To Implement the Government-to-Government Relationship.

This Agreement will provide a mechanism for implementing the government-to-government relationship by clarifying the roles, responsibilities, and relationships of EPA and the Tribe

C. To Build Tribal Capacity

This Agreement is intended to build Tribal environmental capacity so that the Tribe will be able to develop and implement an on-going environmental program. To the extent practical, given resource limitations, the EPA will provide training and information-sharing workshops for Tribal staff and Tribal government to build Tribal capacity and encourage the operation and management of Tribal programs by Tribal people.

D. To Provide Support for Tribal Regulatory Processes

This Agreement will provide support for the development and implementation of regulatory processes which will strengthen the ability of the Tribe to protect its cultural, religious and spiritual resources as it protects its environment.

E. To Build Tribal Environmental Programs

This Agreement will facilitate support for Tribal development of an environmental program, regulatory and otherwise, that will protect, conserve, and restore the reservation environment and the health of its citizens. This Agreement will also provide a mechanism for the effective enforcement of and compliance with federal and Tribal environmental laws.

F. To Institute Specific Procedures

This Agreement will provide a mechanism for the enhancement of communication, funding, technical assistance, training, capacity building, administration and the periodic reevaluation of this Agreement.

G. To Promote Stability

This Agreement shall be implemented to promote Tribal stability in funding, employment, capacity building, infrastructure development and other factors that assure acceptable levels of environmental protection on the reservation in perpetuity.

H. Long-Term Goals

This Agreement has been developed with the understanding that the long-term goal is to address, implement and maintain, where deemed necessary by the Tribes, the full range of EPA's activities and programs.

I. To Address the EPA Trust Responsibility

This Agreement will be used to identify procedures by which the EPA can uphold its federal trust responsibility to the Tribes, to protect both the environment of the reservation and to protect other lands and rights which the Tribes retain. In addition, such procedures shall be the basis for assistance by EPA in communicating trust responsibility concerns to other agencies whose activities affect the rights and interests of the Colville Tribes

J. To Ensure that Unique Tribal Concerns are Respected

This Agreement is intended to provide a framework for environmental protection which is respectful of Tribal cultural concerns, subsistence activities, traditional practices and resource protection. This Agreement will assist EPA and Tribal staff in assessing and providing an understanding of Tribal environmental needs and identify the areas under which the Tribe intends to assume program responsibility.

K. Provide a Flexible, Common-Sense Tool for Tribal Environmental Protection

This Agreement is intended to provide maximum flexibility so that Tribal specific needs can be accommodated. It should be interpreted as a flexible document that can be changed to meet Tribal environmental needs.

EPA will in a timely manner notify the Tribes of all revisions in EPA policies and regulations that may result in an impact to the Tribe will be communicated to the Tribe in a timely manner. The Parties will work together to utilize the policies and regulations in a manner which will most effectively facilitate the protection of the Tribe's environment in a manner consistent with the government-to-government relationship. To that end, this Agreement will be revisited periodically to keep it current with current legislation and regulations, expand flexibility into the future, and review the progress in using the provisions of the Agreement to provide a flexible, common-sense tool for Tribal environmental protection.

L. To Address a Full Range of Environmental Programs

This Agreement will provide the framework for the cooperative development, implementation, and maintenance of comprehensive Tribal environmental programs. EPA and Tribal staff are encouraged to identify all aspects of environmental protection that the Tribes may pursue to enhance its capacity to protect the Tribes' environment.

M. EPA Planning

This Agreement will assist the EPA in identifying areas where EPA will need to plan for and carry out direct implementation. This Agreement will provide a mechanism for including Tribal concerns in EPA planning. The EPA Tribal Office will coordinate efforts to involve the Tribe in EPA planning activities

IV. GUIDING PRINCIPLES

As these Agreements are developed, all principles included in the EPA's Indian Policy shall apply. These principles include recognition of the trust responsibility for environmental protection, the government-to-government relationship, and Tribal sovereignty.

A. Protocol

The government-to-government relationship shall be directly between the EPA and the Tribes. Grants, contracts, and official agreements between the two entities must be signed by Chairman of the Colville Business Council, or otherwise approved in accordance with tribal law, to commit the tribe to any official action or financial/performance requirement.

Training and technical assistance services for the Tribes by EPA will be initiated by initially contacting the Director of Environmental Trust or a delegated individual.

EPA will coordinate with the Tribes when entering the Reservation for the purposes of conducting enforcement activities and providing compliance and technical assistance. EPA will use its best efforts to notify the Director of the Tribes' Environmental Trust Department of enforcement inspections and investigations that take place on the Reservation. EPA will endeavor to afford tribal environmental officials an opportunity to accompany EPA officials on visits to facilities for inspections and investigations, and for compliance and technical assistance.

B. Communication

While implementing the Agreement, the EPA and the Tribe are committed to on-going, timely and open communication. EPA commits to providing timely advice on available grants and other sources of available funding, training and on-going meetings that affect Tribes. This also includes a timely transfer of state of the art technology as the Tribe seeks to build capacity. The Tribe commits to the identification of issues and problems at early stages of development in order to provide time to plan potential resolutions that EPA may be able to support or implement (or assist in implementing) in furtherance of this Agreement.

C. Environmental Justice

The principles of environmental justice shall apply to this Agreement. In general, these principles call for the EPA to assure that Tribes at a minimum are afforded all of the opportunities afforded States, including procedures for Tribal participation in EPA decision making. The unique aspects of tribal sovereignty and the federal trust responsibility may require that the Tribes be entitled to special opportunities as well. In addition, environmental justice principles call for a recognition of Tribal cultural concerns such as subsistence needs and traditional uses of natural resources.

V. TRIBAL AND EPA COORDINATION

A. Information Sharing

The parties agree to share information relating to their activities or decision-making that may directly or indirectly impact the environment of the Tribes. The Parties also agree that, to the extent possible, they will share information pertaining to impacts on the Tribal environment or Tribal resources.

B. Development of EPA Coordination Process

The Parties agree to maintain coordination efforts. Parties will communicate issues and concerns regarding the work that is required to coordinate efforts to protect the environment of the Tribes.

C. Planning

The Parties will use the partnership established herein to jointly plan and implement a strategy for effective environmental programs on the Reservation that are consistent with the general Goals and Objectives of the Agreement. Specific actions and time lines will be set forth in Appendix I to this agreement entitled "Action Plan."

1. Planning and Budget Cycles

For the purposes of this Agreement the Tribe, in coordination with the EPA, will identify the following:

a. EPA Resources Needed. The Parties will cooperatively identify resources needed from EPA.

b. Grant Schedule Information. EPA will identify and submit to the Tribe a schedule for submitting grant applications, and other such planning information.

c. Progress Toward Stable Funding. The Parties will seek to identify how stable sources of funding will be provided, including resources from EPA and from the Tribe. Project specific funding can be used to get started, but sources of long-term program implementation funding sources should be identified.

d. Linkage Between Short- and Long-Term Funding. The Tribe will attempt to explain in detail the linkage between long- terms goals and short-term resource needs so that the EPA can pursue adequate resources to assist with these longer-term objectives, without focusing on the year-to-year fluctuations to the budget.

e. Updated Information for National Budget Development. Updated key information for national budget development on rolling schedules should be submitted annually based on the Agreement, while maintaining key activities that lead to fulfillment of longer term goals.

2. Other Planning Considerations

To achieve a well-informed plan relating to community health and environmental quality, the parties may consider infrastructure issues such as housing, utility and energy development, road-building, transportation and community sanitation. Where both the State and EPA are engaged in such infrastructure changes, the EPA agrees to initiate and/or facilitate discussion as to the potential impacts the project will have on the Tribes, its members and residents, or its resources.

D. Visits by EPA Staff

To enhance coordination and the parties' working relationship, and to develop and implement the Work Plan, EPA agrees to meet with representatives of the tribal government or tribal staff at least once a year. The visits may focus on any or all of the objectives of this Agreement, including collateral activities consistent and supportive of this Agreement.

E. Legislation

To the extent permitted by law and possible by timeliness, EPA agrees to solicit Tribal comments on proposed legislation and regulatory activity which may impact the Tribe. The intent is to provide the Tribe with an opportunity to comment on legislation that may impact it and its ability to protect the Tribal environment.

VI. ENVIRONMENTAL COMPLIANCE

A. Compliance Education

EPA will design an educational program and educational information to promote environmental compliance on the Colville Indian Reservation, with respect to activities of the Tribes and its entities and other persons and entities that affect the environment and may be subject to federal or tribal environmental laws. The following will be addressed:

1. Tribal Participation and Comment

Invite Tribal participation and comment in the development of environmental legislation and regulations affecting the Tribe.

2. Existing Requirements

Inform the Tribe of existing environmental requirements, as stated in applicable laws and regulations

3. Advice to Attain Compliance

Advise and explain to the Tribe how to effectively achieve compliance in non-compliance situations.

4. Recognize Barriers to Compliance

Recognize when compliance may be delayed, and work to assure that public and environmental health risks are minimized until compliance is achieved.

B. Technical Assistance in Developing Tribal Policies and Regulations

EPA will provide technical assistance and/or written models to the Tribe to assist in the preparation and adoption of environmental policies and ordinances which are congruent with applicable federal laws.

C. Assistance in Identifying and Prioritizing Compliance Problems

EPA and the Tribe will work jointly to identify and prioritize non-compliance situations in the Colville Indian Reservation. An inventory of noncompliance issues will be developed each year after input from the Parties. Together, the Parties will decide upon strategies for correction, and include the correction strategy in the environmental Action Plan for the applicable area, along with a time line. EPA will coordinate with the Tribes if a federal enforcement response is planned for a non-compliance situation involving a private party. The Parties shall periodically re-evaluate the selected strategy, and their progress.

VII. TRIBAL CAPACITY-BUILDING

EPA recognizes that in order to achieve the Tribes' three part holistic goal environmental protection programs on the Colville Indian Reservation must in time be melded into a holistic, integrated program that reflects the values of the Tribes and meets or exceeds federal standards; recognizing that nature, unlike environmental laws and regulations, is not compartmentalized into discrete and independent parts.

The Tribes recognize that by embarking on this agreement process that they will be working with EPA to pioneer unique ways of protecting the environment, ways that do not necessarily fit the "state model" or discrete environmental media program model

EPA agrees to assist the Tribe in building its capacity and capability to assume responsibilities that are identified as priorities for the Tribal government through this Agreement. Until the Tribe is capable of assuming full programs or programs requiring EPA approval, EPA will retain responsibility for managing federal environmental programs in the Colville Indian Reservation.

A. Definition

This Agreement is intended to build Tribal environmental capacity so that the Tribe will be able to develop and implement on-going environmental programs. Tribal Capacity Building is the process of working through Tribal government to build tribally-controlled community programs which meet the needs of Tribal members and achieve the Tribes' 3-part goal. Tribal Capacity Building promotes Self-Determination by encouraging the development, implementation and operation of Tribal programs by the Tribes' government. Tribal Capacity Building will reduce reliance on federal program implementation and oversight. Under this Agreement, Tribal Capacity Building includes the development of environmental management capability. Management capability is composed of three primary components: technical/managerial, education/communication, and environmental monitoring.

B. Guiding Principles for Capacity Building

1. Technical and Fiscal Resource Commitment

EPA will support the Tribes' Tribal Capacity Building through the dedication of EPA human and fiscal resources (to the extent such resources are available or can be allocated), and through the adoption of policies and regulations which support Tribal Capacity Building. EPA will work with the Tribe and other federal agencies to identify long-term financial support for the implementation of Tribal environmental programs.

2. Cross-Cultural Training

EPA will support and implement cross-cultural training for its staff, to facilitate understanding tribal culture, goals, and values. The Tribes agrees to provide information and, to the extent feasible, technical assistance which will help EPA staff understand the unique history, circumstances and perspectives of the Tribe. This training is intended to enhance communication and cooperation between the Tribe and EPA staff and management. EPA will also develop a training module will which assist the Tribal government and staff in understanding the institutional culture of the EPA.

3. Management Training

Subject to available resources, EPA will develop and implement an administration and management training module which will assist Tribes in understanding the expectations and requirements of EPA for such purposes as grant development and application, financial management systems, grants compliance and reporting, program authorization requirements and other areas necessary to Tribal capacity building and success.

4. Commitment to Notification of Regulation Changes

EPA will provide the Tribe with proposed and final rules or regulations, as well as other documents, which pertain to Tribal environmental programs, or which are requested by the Tribes. EPA will assist the Tribes in conducting impact assessments of new or revised regulations, and in reviewing potential funding and assistance resources made available by EPA.

VIII. ADMINISTRATION OF AGREEMENT

A. Setting Priorities

On an annual basis, the Tribe will identify specific environmental priorities for the Reservation. The Parties will be guided by the following procedures.

1. Tribal Environmental Information Gathering

With technical assistance from EPA, the Tribes will gather information about Tribal environmental concerns. A focus of the information gathering will be to distinguish between environmental concerns being effectively addressed and those that need further emphasis in order to minimize current and/or future risks.

2. Tribal Assessment of Priorities

Based on the annual environmental review, the Tribe will determine which environmental concerns call for emphasis. The Tribe may also identify Tribal priorities for programs which it would like the EPA to implement on the Reservation.

3. Joint Review of Tribal Information and Priorities

The Tribe will communicate with EPA regarding the Tribe's identified priorities. The Parties will jointly review the priorities and identify a program implementation strategy. Both short and long-term action plans will be revisited or developed.

4. Plan for Attaining Priorities

As part of establishing priorities, the Parties will develop a plan for attaining each priority, which may include goals, tasks, responsibilities, and timelines for each specific matter. In addition, the Parties will jointly identify potential short-term and long-term funding sources.

5. **Progress Milestones**

The priorities and the identified progress milestones will be evaluated annually by staffs of EPA and the Tribes, and will be presented to managers of EPA and the Tribes at the annual review of this Agreement.

B. Implementation

The Parties concur that this Agreement provides a framework for each Party to act individually under its authorities, and in concert with the other Party, to meet the goals and objectives identified above.

1. Roles and Responsibilities of EPA.

EPA will, within available resource constraints:

a. Implement the EPA National Indian Policy and the policies of EPA Region 10.
EPA will take other actions in accordance with formal EPA policy, guidance and direction, with due consideration of the Tribes' views.

b. Protect the Tribal environment
EPA will protect the Tribal environment to the same degree as the non-Tribal environment, including spiritual and cultural sites, by ensuring effective implementation and enforcement of regulatory programs that meet or exceed applicable tribal, state and federal standards.

c. Retain EPA Jurisdiction on the Reservation
EPA will retain jurisdiction on the reservation for those federal environmental program components which are not either delegated to the Tribes or otherwise implemented by the Tribes.

d. Provide the Tribe with proposed and final Regulations
EPA will provide the Tribes with proposed and final regulations and policies, as well as other documents which are available to the general public, which pertain specifically to tribal environmental programs, or which are otherwise requested by the Tribes.

e. Provide Technical and Other Assistance to the Tribe
EPA will assist the Tribes in conducting: i) reservation environmental program needs assessments, ii) an impact assessment of new or revised regulations; iii) a priority assessment of existing and new program requirements, and iv) a review of potential funding and technical assistance sources

f. Cross-Cultural Training
EPA will provide cross-cultural and trust responsibility training opportunities for EPA staff and managers, with the assistance of the Tribes on request.

g. Participation in Ecosystem/Watershed Protection
EPA will assist and coordinate with the Tribes in the development of an ecosystem/watershed approach to environmental protection based on the Tribes' 3-part goal.

h. EPA Administrative & Management Training
EPA will provide training to facilitate the Tribes' understanding of the various EPA program administrative and management requirements.

2. Roles and Responsibilities of the Tribes.

The Tribes will, within available resource constraints:

a. Identify Tribal Priorities
The Tribes will identify the Tribe's specific environmental priorities.

b. Implement a Primacy Strategy
The Tribes will, to the extent reasonable for its circumstances, implement a strategy to achieve primacy for certain regulatory programs. As part of that strategy, the Tribes will work with EPA and other federal agencies to build the capacity of the Tribes to enforce and assure compliance with all necessary federal and Tribal environmental laws, regulations, and programs.

c. Assist EPA with Programs
The Tribes will assist in the implementation of those programs for which EPA retains the lead, and cooperate with EPA's efforts to enforce and assure compliance with all federal environmental regulations.

d. Identify Alternative Funding Options
The Tribes will explore and identify options for long-term funding, including an analysis of program fees, excise taxes and fines as a source of program funding.

e. Identify Tribal EPA Contacts
The Tribes agrees to identify a Tribal government representative and/or Tribal staff who will be responsible for receiving and distributing EPA notices, including requests for comment.

f Train EPA About Tribal Management
The Tribes will provide EPA with training and/or other information to facilitate EPA's

understanding of the Tribe's culture and its administrative/management requirements.

3. Other Federal Agencies, State, Regional and Local Governments.

a. Other Federal Agencies
The Parties will work with other Federal agencies to carry out their relevant responsibilities, sharing and coordinating the collection of information that pertains to the human and environmental health both in and near the Colville Indian Reservation.

b. Develop Relationships with Other Entities
Efforts to implement environmental protection for ecosystems will guide the development of working relationships and procedures with federal, state, regional, county and local agencies.

c. Assist in Educating Local Governments
EPA may assist in the Tribes' environmental program initiatives by helping to educate local governments about this Agreement, the joint planning of environmental protection on the Reservation, jurisdiction issues, the trust responsibility, and other aspects of EPA's government-to-government relationship with the Tribes.

d. Cooperative Agreements
Upon the Tribes' request, EPA will provide technical assistance in developing environmental cooperative agreements with state, regional, and local governments.

4. Funding and Technical Assistance.

Recognizing each of the Parties' resource limitations, the Parties will prioritize the environmental programs for which the Tribes seek financial assistance. EPA will endeavor, within the constraints of its resources, to provide technical and/or funding assistance requested by the Tribes for those priorities.

C. Communications

The Parties agree that communications will be conducted as follows:

1. Designated Key Contacts - Programmatic

EPA has designated ita Tribal Programs Coordinator (currently Larry Brockman) to serve as the primary contact for the Tribe. The Coordinator is responsible for assisting the Tribe, as necessary, in working with others throughout the Agency The Tribal staff is free to communicate with staff persons at the EPA who are responsible for the relevant program or subject matter In that instance, the EPA staff person is responsible for notifying the Tribal Coordinator of the communication so that at least one person in the EPA has the "big picture" of all EPA-Tribes activities. Tribal staff and management should also feel free to contact the Regional Tribal Program Manager regarding programmatic concerns.

The Tribe has identified its Director of Environmental Trust (currently Gary Passmore) as Tribal staff person who will serve as the primary contact for the EPA on programmatic issues and concerns, including but not limited to program development and implementation, grants development, grants management and for whatever other purposes the Parties agree to.

2. Designated Key Contacts - Policy

Tribal staff, management and government should feel free to contact the Regional Tribal Policy Director regarding policy matters. The Tribal Policy Director will provide timely policy information to the Tribe, either personally or through the Tribal Coordinator.

The Tribes will identify a tribal contact that the Regional Tribal Policy Director can call on for input on Regional tribal policy matters. When policy decisions that may impact the Tribal environment are being considered, the Tribal Policy Director will provide for meaningful Tribal government input, whenever possible.

3. Designated Key Contacts - Leadership

The Chairman of the Colville Business Council always has the option of contacting the Regional Administrator and/or Deputy Regional Administrator if a situation arises which warrants their involvement.

D. Issue Resolution

Both Parties will strive to address matters informally, at the staff level. In the event that staff are unable to resolve a dispute, the issue will be presented to immediate supervisors, who will attempt to resolve the dispute. If the dispute is not resolved, the staffs will present the matter to progressively higher levels of management until consensus is reached.

In the event consensus is not reached, the matter will be resolved by the Regional Administrator of the EPA and the Chairman of the Colville Business Council.

Other dispute mechanisms required by statute or regulation may apply to grants or program-specific issues

IX. EFFECT OF THIS AGREEMENT

This Agreement is intended solely to facilitate intergovernmental coordination between the parties, and grants no rights in third parties nor any right of judicial review. This Agreement is not intended as an enforcement document, and the Tribes disclaims any responsibility to act as an enforcement agency. The parties do not, by entering into this Agreement, waive any rights, powers, immunities or remedies otherwise available.

X. DURATION, RENEWAL AND MODIFICATION

A. Effective Date of Agreement

This Agreement is effective upon the date of signature by both parties

B. Duration & Renewal

This Agreement is self-renewing and will remain in effect until terminated by mutual agreement of the Parties; provided, however, that any Party to this agreement may withdraw from this agreement by providing thirty (30) days written notice to the other Party. Unless otherwise specifically provided, termination of this agreement will not in any way affect program delegations, funding agreements, or any other agreements between the Parties.

C. Modification & Amendment

This Agreement may be modified in writing upon the request of either party. All modifications must be mutually agreeable, in writing, and signed by the signatories or their duly appointed representatives. each party will keep the other informed of proposed and enacted modifications to relevant statutory or regulatory authority, forms, procedures, or priorities. The parties will endeavor to negotiate and make modifications to this agreement where it appears appropriate to do so in light of any such proposed or enacted modifications.

XI. SOVEREIGNTY AND DISCLAIMER

The parties to this Agreement recognize and respect the sovereignty and legal status of one another. The parties further recognize that each has and reserves all rights, powers, and remedies now or hereafter existing at law or in equity, or by statute, treaty or otherwise. This Agreement does not modify, diminish, or alter the rights and entitlement of the Parties. The Tribes' joinder to this Agreement shall not constitute a waiver of sovereign immunity by the Tribes. This Agreement does not modify or supersede agreements with other entities or other agreements with EPA unless expressly noted.

XII. SAVINGS CLAUSE

If any provisions or elements of the Agreement are held or decided by law to be invalid, all other provisions of the Agreement remain in full force and effect. If, in the interpretation of the Agreement, the parties have differing interpretations, an effort will be made to interpret the agreement in terms that are favorable to the protection of the Tribal environment.

A. Regulatory Legislation

If any provisions or elements of the Agreement are held legally or by regulatory legislation to be invalid, all other provisions of the Agreement remain in full force and effect.

B. Funding Legislation

If any provisions or elements of the Agreement are held or decided by funding legislation to be invalid, all other provisions of the Agreement remain in full force and effect.

C. State EPA Agreements

Nothing in this Agreement is intended to abrogate agreements EPA has with other entities. Conversely, agreements between EPA and other entities shall not abrogate this Agreement. In the event EPA has entered into conflicting agreements, EPA will be attempt to facilitate a resolution of the differences. Any elements of this Agreement that are designated as invalid shall not abrogate any provisions of the Agreement not in conflict with other EPA agreements.

FOR THE PARTIES

Matthew Dick

Joseph A. Pakootas, Chairman

Date

Chuck Clarke
Regional Administrator
Environmental Protection Agency,
Region 10

Date

APPENDIX B

LAKE ROOSEVELT COOPERATIVE MANAGEMENT AGREEMENT

LAKE ROOSEVELT
COOPERATIVE MANAGEMENT AGREEMENT

I. RECITALS

A. Whereas, the Bureau of Reclamation (hereinafter Reclamation) in connection with its responsibility for the construction, operation, and maintenance of the Columbia Basin Project has withdrawn or acquired lands or the right to use lands and may acquire additional land under the federal reclamation laws, Act of June 1902, 32 Stat. 388, and acts amendatory thereof or supplementary thereto, including the Act of March 10, 1973, 57 Stat. 14, and the Act of August 30, 1935, 49 Stat. 1028, 1039; and

B. Whereas the parties recognize (1) that some of the land acquired, withdrawn or used by Reclamation is located within the boundaries of the Colville Indian Reservation and the Spokane Indian Reservation; (2) that those reservation boundaries were not changed as a result of the acquisition or use of land within either reservation for the Columbia Basin Project; and, (3) that the Confederated Tribes of the Colville Reservation and the Spokane Tribe retain certain governmental authority and responsibility within the exterior boundaries of their respective reservations; and

C. Whereas, Congress and the President have each recognized certain sovereign and governmental powers of Indian tribes within their respective reservations, and support the tribal sovereignty of Indian tribes to exercise their full measure of governmental authority within their respective reservations; and

D. Whereas, on Lake Roosevelt, consistent with the express policies of the United States, the Colville and Spokane tribes have an interest in and certain regulatory authority within their reservations over fish and wildlife harvest and habitat protection, recreation, environmental protection, protection and management of cultural, historical and archaeological resources, and the development and utilization of resources on reservation, including economic development and management thereof; and

E. Whereas, the parties agree that the recreational and other natural resources of Lake Roosevelt and adjacent lands which through sound coordinated planning, development, and management of the Lake Roosevelt Management Area (LRMA), offer unusual opportunities for recreation and other activities for the people of the nation, and the members of the Confederated Tribes of the Colville Reservation and Spokane Indian Tribe; and

F. Whereas, lands acquired by Reclamation for Lake Roosevelt within the Colville and Spokane reservations are available for public recreation and other development; however, the management and development of those lands may pose unique and difficult problems because of the cultural, religious, and competing social uses to which the tribes have committed their reservations; and

G. Whereas, the parties recognize that development in areas of Lake Roosevelt located off the Colville and Spokane Reservations will affect and impact reservation lands and resources, and because the lake area was the ancestral home of the Colville and Spokane Indians, such development could impact off-reservation archaeological, historical or religious sites; likewise, reservation activity will affect similar sites off the reservation within the LRMA; and

H. Whereas, there is an inter-relationship between the development of recreational and other natural resources of the LRMA; and

I. Whereas, the Coulee Dam National Recreation Area is an existing unit of the National Park system and subject to all NPS laws, regulations, policies and guidelines; and,

J. Whereas, the National Park Service has special skills and experience in planning, developing, maintaining and managing areas devoted to recreational uses, and is authorized to coordinate with other federal agencies in developing recreational programs (16 U.S.C. §§ 17j-2(b), 4601-1); and

K. Whereas, the Confederated Tribes of the Colville Reservation and the Spokane Indian Tribe have significant interests in the use and development of those lands within the LRMA, particularly within their respective reservations, and have demonstrated the willingness, capability and experience to manage those lands and resources within their reservations for beneficial purposes including public recreational uses, and the conservation of the resources; and

L. Whereas, the respective parties to this Agreement are in a position to provide the services herein identified and, it has been determined to be in the interest of the United States Government to use such services, and the participation of the Confederated Tribes of the Colville Reservation, and the Spokane Tribe as set out herein is consistent with the Indian Self Determination Act of 1975, P.L. 93-638, as amended; and

M. Whereas, it is recognized and understood among the parties hereto, that nothing contained herein shall affect the authority of any party to commit federal funds as provided by law; and

N. Whereas, the protection, curation and ultimate disposition of archeological and historical resources (hereafter collectively resources) located within the LRMA is an important responsibility under this Agreement; and in several areas, investigation or preservation activities have occurred in the past but conditions have since changed; and the parties recognize it is important to learn more about these resources; and

O. Whereas, there exists a dispute on the extent of the Spokane Indian Reservation on the Spokane River Arm of Lake Roosevelt; and whereas, nothing in this Agreement shall be interpreted to affect that issue; and

P. Whereas, the Secretary of the Interior has a trust duty to tribes and has an obligation to exercise his/her authority consistent with statutory responsibilities and that trust duty, and to interact with tribes on a government-to-government basis.

NOW THEREFORE, the parties hereto, hereby mutually agree as follows:

II. AUTHORITY

1. This Agreement is entered into by the Department of the Interior pursuant to the authority of the Act of August 30,

1935, 49 Stat. 1028, 1039, the Act of March 10, 1943, 57 Stat. 14, 43 U.S.C. §§ 373, 485i (1982). Nothing in this Agreement shall be construed to modify or annul the Secretary's authority under these Acts.

2. The Confederated Tribes of the Colville Reservation has authority to enter into this Agreement pursuant to Article V, Section 1, Part (a) of the Colville Constitution, adopted February 26, 1938, and approved by the Secretary on April 19, 1938.

3. The Spokane Tribe has authority to enter into this Agreement pursuant to Article VIII of the Spokane Tribal Constitution, adopted June 27, 1951, as amended.

III. PURPOSE

The purpose of this Agreement is to allow the parties to coordinate the management of the Lake Roosevelt Management Area (hereinafter referred to as LRMA), and to plan and develop facilities and activities on Lake Roosevelt and its freeboard lands. The parties acknowledge and recognize management of the LRMA is subject to the right of the Bureau of Reclamation to accomplish the purposes of the Columbia Basin Project.

IV. GENERAL PROVISIONS

A. Parties:

The parties to this Agreement shall include as governmental parties the National Park Service (NPS), the Bureau of Reclamation (Reclamation), the Bureau of Indian Affairs (BIA), the Confederated Tribes of the Colville Reservation (Colville Tribes), and the Spokane Indian Tribe (Spokane Tribe). Unless the context of the Agreement requires otherwise, the Colville and Spokane tribes shall be referred to collectively as "tribes."

B. Area Subject to Agreement:

This Agreement shall cover the management of the LRMA as depicted in Exhibit 1 attached hereto. The LRMA includes Grand Coulee Dam and its appurtenances on Lake Roosevelt, the surface area of Lake Roosevelt up to elevation 1290 msl (hereinafter Lake area) and all freeboard lands surrounding Lake Roosevelt above elevation 1290 msl owned by or used by the United States pursuant to any agreement for purposes of the Columbia Basin Project.

C. Management Zones:

For the purpose of coordinating the management of the LRMA, and for allocating the appropriate use of resources available in and around Lake Roosevelt, three management zones shall be established.

1. Reclamation Zone: That part of the LRMA surrounding Grand Coulee Dam as set out in Exhibit 1 and marked in blue.

2. Recreation Zone: That part of the LRMA lying outside of the Reclamation and Reservation Zones as set out in Exhibit 1 and marked in green.

3. Reservation Zone: That part of the LRMA lying within the boundaries of the Colville Indian Reservation or Spokane Indian Reservation all as set out in Exhibit 1 and marked in orange. Provided, that for purposes of management only, in those areas where the Colville Indian Reservation and Spokane Indian Reservation lie across from each other and on the Spokane River arm, there shall be a right of navigational passage. This right shall be defined as the right to pass through that portion of the Reservation Zone defined in this Part to a destination point outside that portion of the Reservation Zone.

D. Management and Regulation of the LRMA:

The parties to this Agreement agree that the management and regulation of the LRMA set out below are not intended to nor shall they interfere with or be inconsistent with the purposes for which the Columbia Basin Project was established, is operated and maintained; those purposes being primarily flood control, improved navigation, streamflow regulation, providing for storage and for the delivery of stored waters thereof for the reclamation of public and private lands and Indian reservations, for the generation of electrical power and for other beneficial uses, nor is it intended to modify or alter any obligations or authority of the parties. Consistent with the above statement, the management and regulation of the LRMA shall be as follows:

1. Reclamation shall have exclusive operational control of the flow and utilization of water at the Grand Coulee Dam and Project facilities operated by Reclamation, and of all access to the Grand Coulee Dam and Project facilities operated by Reclamation; and complete and exclusive jurisdiction within the Reclamation Zone, including authority over and responsibility for the Grand Coulee Dam and Project facilities operated by Reclamation, and such project lands adjacent thereto as the Commissioner of Reclamation with the approval of the Secretary determines to be necessary for Project purposes. Provided, that the parties shall retain the right to take any action otherwise available to challenge any action undertaken by Reclamation under the authority recognized under this Part, including but not limited to action dealing with irrigation, lake level, flows, and storage.

2. NPS shall manage, plan and regulate all activities, development, and uses that take place in the Recreation Zone in accordance with applicable provisions of federal law and subject to the statutory authorities of Reclamation, and consistent with the provisions of this Agreement subject to Reclamation's right to make use of the Recreation Zone as required to carry out the purposes of the Columbia Basin Project.

3. The tribes shall manage as follows:

    a. The Colville Tribes shall manage, plan and regulate all activities, development and uses that take place within that portion of the Reservation Zone within the Colville Reservation in accordance with applicable provisions of federal and tribal law, and subject to the statutory authorities of Reclamation, and consistent with the provisions of this Agreement subject to Reclamation's right to make use of such areas of the Reservation Zone as required to carry out the purposes of the Columbia Basin Project.

b. The Spokane Tribe shall manage, plan and regulate all activities, development, and uses that take place within that portion of the Reservation Zone within the Spokane Reservation in accordance with applicable provisions of federal and tribal law, and subject to the statutory authorities of Reclamation, and consistent with the provisions of this Agreement subject to Reclamation's right to make use of such areas of the Reservation Zone as required to carry out the purposes of the Columbia Basin Project.

c. In those portions of the Reservation Zone where the Colville Indian Reservation and Spokane Reservation abut, the tribes shall determine as between themselves the allocation of management responsibility.

4. The BIA shall assist the tribes in carrying out the tribes' management of the Reservation Zone, and undertake such other activities as are authorized by law in support of the tribes.

E. Coordination of LRMA.

1. Each party to this Agreement shall designate a representative who will meet periodically with representatives of the other parties to coordinate the independent management of each within the LRMA, consistent with this Agreement.

2. The Parties shall:

a. Review, coordinate, communicate and standardize the management plans, regulations and policies developed by the tribes and NPS for their respective management areas to manage and regulate (1) recreation activities, (2) commercial and private development, including major new or significantly expanded development, and (3) the protection of the environment of the LRMA, all consistent with the special interests identified by the parties for their respective management areas, to the extent possible.

b. Develop a method to incorporate the plans developed by the tribes and NPS to provide to the extent practicable uniform management in the LRMA. Implementation of such plans shall be carried out consistent with the purposes of the Columbia Basin Project.

c. Review, coordinate, communicate and standardize use permits within the LRMA to the extent practicable, taking into account the cultural and religious interests of the tribes and other parties, and the need to have the standards uniformly applicable in the LRMA.

d. Monitor, once per year, compliance with this Agreement.

e. Involve and receive the comments from other interested state, local, county or regional governmental entities and private individuals, or citizen groups or entities with respect to activities related to the management of the LRMA.

f. Coordinate the development of annual operating budgets and proposals for funding.

g. Undertake such other Lake Roosevelt activities that the Parties agree to undertake consistent with applicable law.

3. <u>Dispute Resolution Process</u>:

a. Any party to this Agreement that is aggrieved by any action of another party related to this Agreement, or the failure of a party to act consistent with this Agreement may request that the issue be resolved under this part.

b. Any party shall prior to initiating any procedure under Part c of this Part, request: (1) a meeting of all Area/Regional Directors and tribal council representatives, to see if the problem can be resolved, and (2) if the process under Part (1) of this subpart is not successful any party may request that officials of the next higher level of BIA, NPS and Reclamation and area/regional

Directors meet with tribal council representatives to consider the issue and attempt to resolve it.

c. The aggrieved party or parties may request that a mediator be appointed to help resolve the issue. The parties shall agree on a mediator, or in the absence of agreement, the presiding Judge of the United States District Court for the Eastern District of Washington shall be requested to appoint a mediator. The parties shall develop procedures to insure that mediation is expeditious.

d. The dispute resolution process set out in this part shall be in addition to any other rights of a party to seek enforcement or interpretation of this Agreement.

F. <u>Funding</u>:

1. All parties shall cooperate in the development of all budget components and cost data and in the sharing of the necessary technical information so that each party can make realistic budget estimates necessary for that party to adequately manage the LRMA.

2. Each party to the Agreement shall seek funding for its share of this Agreement. The Superintendent of the Coulee Dam National Recreation Area, the Project Manager of Grand Coulee Dam and the Colville and Spokane Agency Superintendents of the Bureau of Indian Affairs will make a good faith effort to request funds needed by them to manage the LRMA. The BIA agency superintendents shall request funds needed by the tribes to adequately carry out their management responsibilities as identified under this Agreement. These requests shall only be developed and proposed consistent with and subject to budgetary practices and procedures of the United States, including, but not limited to the direction and policies of the President, OMB, and the Secretary of the Interior. Except as required under this paragraph or applicable law, parties to this Agreement shall support the need to provide adequate funding to the tribes to allow the tribes to carry out their responsibilities under this Agreement.

3. Upon approval of the requests for submission to the Congress as part of the President's budget, each party shall to the extent practicable, identify these funds in their respective congressional justifications and continue to support their own and each other's funding requests when testifying before Congress to the extent that such requirements are identified in the President's budget.

4. This Agreement shall not create an obligation on the part of any party hereto to expend funds that have not been lawfully appropriated by Congress or the Colville or Spokane tribes. The failure to take action otherwise required because funds were not appropriated shall not constitute a breach of this Agreement.

5. Nothing in this part shall prohibit or limit the right of the tribes to independently seek funding from whatever source is available to carry out their management and regulation within the Reservation Zone.

6. To the extent allowed by law, and consistent with the activity being undertaken and the terms of the Agreement, if additional funds from sources other than congressional appropriation become available to Reclamation, NPS or the BIA for purposes of undertaking any activity addressed by this Agreement, the agencies shall attempt to assure an equitable portion of those funds will be available to the tribes for compliance with this Agreement.

7. When the BIA submits its proposed budget it shall specifically identify for the Colville and Spokane tribes funds to cover the Lake Roosevelt Management Agreement.

8. Funding for the curation of any Indian resources transferred to the Colville and Spokane tribes will be included in the tribes' budget for management of LRMA unless other means become available for curation.

G. <u>Coordination of Recreation</u>:

1. The NPS and tribes shall coordinate their respective activities to the end that in the implementation of

their independent management and regulation of the LRMA they achieve to the extent practicable, a uniform system of recreation management including law enforcement throughout the LRMA taking into account the special needs or circumstances identified by the tribes or the NPS within the Reservation or Recreation Zones, respectively.

2. The NPS and tribes shall develop and implement a procedure that informs the recreating public of all facilities, resources, and concessions located within the LRMA, and the limitations on their use, and further informs the recreating public of the rules applicable in the various Management Areas of the LRMA, including anti-pollution rules.

3. The NPS and tribes shall work with Reclamation in the development of any recreation management or resource plans for the LRMA consistent with Federal law.

H. <u>Development and Utilization of Resources</u>:

1. The tribes shall retain within those parts of the Reservation Zone within their respective reservations the right to beneficially develop and utilize the natural resources and to develop economic enterprises that are compatible within the character of the LRMA, subject to federal statutory requirements. Use of the freeboard lands as allowed under this subpart H.1. shall be with the permission of the United States, which shall not be unreasonably withheld.

2. Should operations of the Columbia Basin Project cause damage to the natural resources on the freeboard lands within the Reservation Zone for which mitigation is required by law, the mitigation shall take place on the Reservation within which the damage took place to the extent practicable. Nothing in this part shall relieve any party from liability for past impacts to the natural resources of any party on either the Colville or Spokane Reservations.

I. <u>Reservation of Rights</u>:

This Agreement shall not be construed as waiving any rights the parties have under any applicable Act of Congress, Executive Order, treaty, regulation, court decision or other authority.

J. Protection and Retention of Historical, Cultural and Archaeological Resources:

1. The parties to this Agreement shall prepare a Cultural Resources Management Plan that provides for the identification, and protection of Indian archaeological and historical resources (as identified in 16 U.S.C. 470bb(1), and 16 U.S.C. § 470w(5) (hereafter Indian Resources) located within the LRMA, and a procedure for the most expeditious transfer of title and return to the tribes of Indian Resources removed from the LRMA by the United States or with the United States' authority and which are within the United States' possession or under its control, consistent with the tribes' ability to properly curate or provide for the curation of the Indian Resources as required by law.

2. The Cultural Resources Plan shall contain provisions requiring the Federal parties to notify and consult with the tribes during the planning process and prior to authorizing or undertaking any survey, monitoring, or removal of Indian Resources from the LRMA, and shall provide an opportunity for the tribes to participate in, or if consistent with the activity to undertake any such activity.

K. Duty to Comply:

It shall be a violation of this Agreement for any party to take any action or authorize any other person or entity to take any action that is inconsistent with or in violation of the terms and conditions of this Agreement, or to fail to take any action otherwise required by this Agreement.

V. MISCELLANEOUS PROVISIONS

A. Effective Date:

This Agreement shall become effective on the date it is approved by the Secretary of the Interior.

B. Modification of Agreement:

This Agreement may be modified only in writing, signed by all the parties and approved by the Secretary.

C. Termination:

This Agreement shall remain in effect until terminated by the Secretary of the Interior. Any party may request that the Secretary terminate this Agreement. Within 30 days of the receipt of a request to terminate, the Secretary shall establish a mechanism to assist the parties to the Agreement in reconciling differences under this Agreement or to negotiate a new Agreement. The Secretary shall terminate this Agreement 180 days after the mechanism required under this part is established if no agreement between the parties is reached.

D. Judicial Enforcement:

Without regard to any other dispute resolution process set out in this Agreement, any party may seek review of any provision of this Agreement to determine the rights or obligations of the parties under this Agreement or to seek judicial enforcement of any provision of this Agreement or of a party's failure to carry out any duty provided for under this Agreement. Nothing in this Agreement shall be interpreted or construed as a limitation upon any party's right to seek judicial or administrative enforcement or review of any matter based upon treaty, Federal or state law or Executive Order, or to take any other action allowed by law.

E. Implementation of Agreement:

1. The tribes and the NPS shall independently exercise their individual and separate management and regulation of the Reservation and Recreation Zones respectively, consistent with the consultation and coordination responsibilities set out in this Agreement, and consistent with the legislated purposes of the Columbia Basin Project and applicable Reclamation Law.

2. Reclamation, in exercising its statutory oversight authority in the LRMA, shall not interfere with the management and regulation of the tribes or NPS as set

out in Part IV.D of this Agreement except where the actions of either the tribes, the NPS, or both are inconsistent with the legislated purposes of the Columbia Basin Project or interfere with the ability of Reclamation to carry out its legislated responsibility for the Columbia Basin Project.

F. Visitor Center:

Reclamation shall work with the tribes and NPS to incorporate their suggestions into the development of an interpretive program to the extent of available resources, for changes to the visitor's presentations. The resulting program should depict the purpose and operation of the Columbia Basin Project, the Indian history, government, and culture of the area, the impact of the Columbia Basin Project on the tribes, and the available recreational resources and benefits. This may include the display and distribution of literature/information applicable to the LRMA.

G. Contracting:

There are or may be activities carried out by contract by the Federal parties that take place within the LRMA under this Agreement that could be contracted by the tribes. The Federal parties will provide notice to the tribes of all contracting opportunities within the LRMA and will coordinate on contracting options, which may be available to tribes, either directly or through another Federal agency, within the LRMA, prior to the obligation of appropriated funds consistent with their statutory authorities. The parties to this Agreement shall use their best efforts to contract with the tribes consistent with the continued execution of their agency directed duties, to the extent allowed by statutory authority. Likewise, there may be opportunities for the tribes to contract for services or

APPROVED:

DATED: APR 20 1990

Jude C. Stensgar
Chairperson
Colville Business Council

DATED: APR 20 1990

John M. Sayre
Assistant Secretary for
Water and Science

DATED: APR 20 1990

Joe V. Flett
Chairperson
Spokane Indian Tribe

DATED: APR 11 1990

Constance Harriman
Assistant Secretary for
Fish, Wildlife and Parks

DATED: APR 10 1990

Jame M. Ridenour
Director
National Park Service

DATED: APR 20 1990

Dennis Underwood
Commissioner
Bureau of Reclamation

DATED: APR 2 . . .

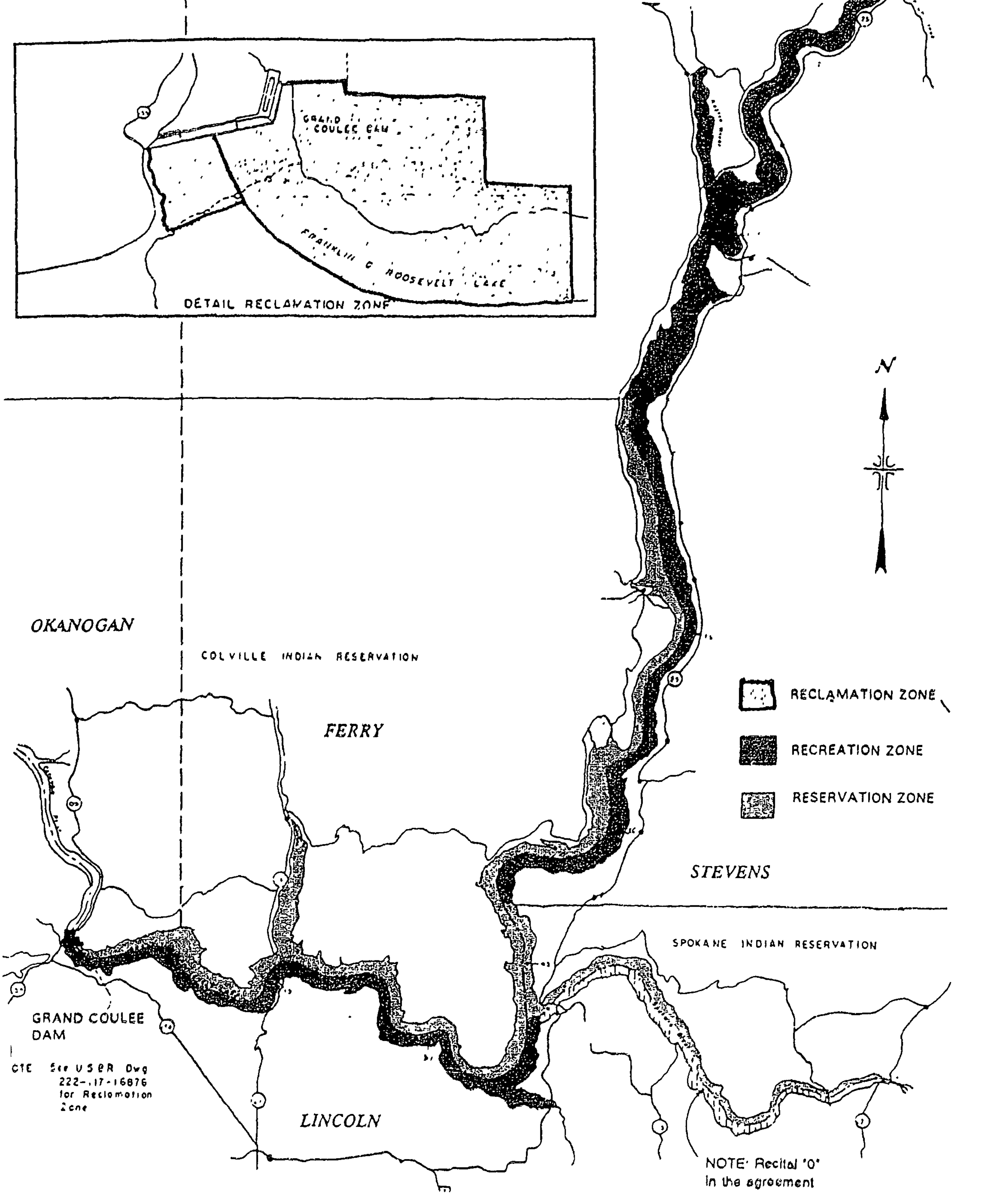
Dr. Eddie F. Brown
Assistant Secretary for the
Bureau of Indian Affairs

DATED: APR 05 1990

Manuel Lujan, Jr., Secretary
Department of Interior

Cooperative Agreement Zonning Map
Lake Roosevelt National Recreation Area

Department of the Interior / National Park Service
DSC / 606 / August 1998 / 20,039



APPENDIX C

SUMMARY OF COMPOUNDS DETECTED IN SEDIMENT AND SURFACE WATER SAMPLES

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS001	CS002	CS003	CS004	CS005	CS006
Sample ID:	CR-003-SD	CR-001-SD	CR-004-SD	CR-005-SD	CR-006-SD	CR-007-SD
Sample Date.	05/14/2001	05/14/2001	05/15/2001	05/17/2001	05/17/2001	05/17/2001
Constituent / Depth (feet):	0 in to 3 in	0 in to N/A	0 in to 4 in	0 in to 4 in	0 in to 4 in	0 in to 4 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)	4 2 U	4 1 U	4 5 U	5 4 U	5 4 U	3 9 U
4,4'-DDT (p,p'-DDT)	4 2 U	4 1 U	4 5 U	5 4 U	5 4 U	3 9 U
Alpha-chlordane	2 2 U	2 1 U	2.3 U	2 8 U	2 8 U	2 0 U
Beta-BHC	2 2 U	2 1 U	2 3 U	2 8 U	2 8 U	2 0 U
Endrin	4 2 U	4 1 U	4 5 U	5 4 U	5 4 U	3 9 U
Endrin Aldehyde	4 2 U	4 1 U	4 5 U	5 4 U	5 4 U	3 9 U
Methoxychlor	22 U	21 U	23 U	28 U	28 U	20 U
PCB-1254 (Aroclor 1254)	42 U	11 JQ	45 U	54 U	54 U	39 U
PCB-1260 (Aroclor 1260)	42 U	5 9 JQ	45 U	54 U	54 U	39 U
Inorganics (Total) (mg/kg)						
Aluminum	11300	6270	8730	13700	12100	4430
Antimony	1 3 BJL	0.74 UJK	0.81 BJL	1 5 BJL	1 6 BJL	0 76 UJK
Arsenic	6 7	4.5 U	4.0 U	7 7 U	8 1 U	2 2 BU
Barium	136	79 6	113	230	269	42 2 B
Beryllium	0 66 B	0 45 B	0 71 B	0 69 B	0 63 B	0 21 B
Cadmium	0.08 U	0.62 B	0.08 U	3 6	4 0	0 12 B
Calcium	7150	3090	5760	5970	7670	4420
Chromium	16.4	7 7	8 8	30 1	29 8	8 8
Cobalt	8.4 B	5.2 B	7.2 B	8 5 B	8 1 B	3 3 B
Copper	17 3 JL	9 8 JL	11.1 JL	48 5 JL	41 6 JL	10 4 JL
Iron	22900	16700	23000	23400	22300	8630

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS001	CS002	CS003	CS004	CS005	CS006
Sample ID:	CR-003-SD	CR-001-SD	CR-004-SD	CR-005-SD	CR-006-SD	CR-007-SD
Sample Date:	05/14/2001	05/14/2001	05/15/2001	05/17/2001	05/17/2001	05/17/2001
Constituent / Depth (feet):	0 in to 3 in	0 in to N/A	0 in to 4 in	0 in to 4 in	0 in to 4 in	0 in to 4 in
Lead	11.4	22 3	6.1	219	238	6 2
Magnesium	6540	3460	4340	6990	7720	3140
Manganese	475	434	387	719	533	181
Nickel	15 6	8.0 B	8 5 B	24 6	24 1	9 6 B
Potassium	2470 JL	1250 JL	1840 JL	2570 JL	2230 JL	763 BJL
Selenium	0.87 U	0 84 U	0.91 U	1.3 U	1 2 U	0 87 U
Silver	1.2 B	0 80 B	1 0 B	1 7 B	1 6 B	0 48 B
Sodium	259 B	184 B	532 B	345 B	359 B	197 B
Thallium	1.0 U	0.97 U	1.0 U	1 5 U	1 4 U	0 99 U
Total Mercury	0 07 U	0 06 U	0 06 U	0.66	0 49	0 06 U
Vanadium	36 1	30.0	51 3	36 9	36 2	17 3
Zinc	77.9	149	54.3	523	600	36 8
Conventional Parameters						
Total Organic Carbon (mg/kg)	2150	8830	1000 U	8060	8900	1420
Grain Size (%)						
Percent Gravel	5 <	0	0	0	0	5 <
Percent Sand	30	30	0	0	0	90 >
Percent Silt	30	40	70	60	60	5 <
Percent Clay	35	30	30	40	40	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS007	CS008	CS009	CS010	CS011	CS012
	Sample ID:	CR-008-SD	CR-009-SD	CR-010-SD	CR-011-SD	CR-012-SD	CR-013-SD
	Sample Date:	05/17/2001	05/17/2001	05/17/2001	05/17/2001	05/17/2001	05/18/2001
	Depth (feet):	0 in to 2 in	0 in to 4 in	0 in to 7 in	0 in to 0 5in	0 in to 2 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		4 9 U	5.0 U	3 6 U	3 6 U	6 2 U	6 2 U
4,4'-DDT (p,p'-DDT)		4 9 U	5.0 U	3 6 U	3.6 U	6 2 U	6 2 U
Alpha-chlordane		2 5 U	2.6 U	1 9 U	1 8 U	3 2 U	3 2 U
Beta-BHC		2 5 U	2 6 U	1 9 U	1 8 U	3 2 U	3 2 U
Endrin		4 9 U	5.0 U	3 6 U	3 6 U	6 2 U	6 2 U
Endrin Aldehyde		4 9 U	5.0 U	3 6 U	3 6 U	6 2 U	6 2 U
Methoxychlor		25 U	26 U	19 U	18 U	32 U	32 U
PCB-1254 (Aroclor 1254)		49 U	50 U	36 U	36 U	62 U	38 JQ
PCB-1260 (Aroclor 1260)		49 U	50 U	36 U	36 U	62 U	17 JQ
Inorganics (Total) (mg/kg)							
Aluminum		4700	8240	7440	21200	14300	14300
Antimony		0 85 UJK	0.97 BJL	0.65 UJK	0.63 UJK	3 6 BJL	3 3 BJL
Arsenic		4.0 U	5.1 U	6 6	5 0	13 7	14 9
Barium		57 4	105	61 1	227	512	596
Beryllium		0 24 B	0.42 B	0 29 B	0.84 B	0 77 B	0 78 B
Cadmium		0.33 B	0.73 B	0.25 B	4 4	8 1	9 4
Calcium		2510	13200	3350	4920	14100	15900
Chromium		15.7	23.3	20.4	14 0	35 7	35 9
Cobalt		3.6 B	6.9 B	6.7 B	5.8 B	9 4 B	9 4 B
Copper		11.8 JL	22.5 JL	21.9 JL	33.9 JL	91 7 JL	86 8 JL
Iron		14400	16600	16500	14300	28300	29600

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS007	CS008	CS009	CS010	CS011	CS012
Sample ID:	CR-008-SD	CR-009-SD	CR-010-SD	CR-011-SD	CR-012-SD	CR-013-SD
Sample Date:	05/17/2001	05/17/2001	05/17/2001	05/17/2001	05/17/2001	05/18/2001
Constituent / Depth (feet):	0 in to 2 in	0 in to 4 in	0 in to 7 in	0 in to 0 5in	0 in to 2 in	0 in to 3 in
Lead	21 5	24 4	16 7	86 6	464	535
Magnesium	2760	5990	4860	3220	11200	12400
Manganese	267	376	250	347	808	698
Nickel	10 5 B	21.0	21 0	14.4	27 0	27 4
Potassium	672 BJL	1770 JL	1070 BJL	1400 JL	2520 JL	2500 JL
Selenium	0 96 U	1.1 U	0.74 U	0 72 U	1 5 U	1 4 U
Silver	0.71 B	0 94 B	0 85 B	0.76 B	2 7 B	2 7 B
Sodium	200 B	289 B	231 B	287 B	406 B	429 B
Thallium	1 1 U	1.3 U	0 85 U	0 82 U	1 7 U	1 7 U
Total Mercury	0 07 U	0.08 U	0 05 U	0.14	1 7	0 97
Vanadium	27.7	32 0	27.9	26.7	39 9	40 6
Zinc	77.9	99.0	90 9	230	1060	1210
Conventional Parameters						
Total Organic Carbon (mg/kg)	2040	9250	1000 U	29400	17200	13400
Grain Size (%)						
Percent Gravel	0	0	0	0	0	0
Percent Sand	65	60	90	0	0	0
Percent Silt	15	30	5	60	60	60
Percent Clay	20	10	5	40	40	40

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS013	CS014	CS015	CS016	CS017	CS017
Sample ID:	CR-014-SD	CR-015-SD	CR-016-SD	CR-017-SD	CR-018-SD	CR-066-SD
Sample Date:	05/18/2001	05/18/2001	05/18/2001	05/18/2001	05/18/2001	05/18/2001
Constituent / Depth (feet):	0 in to 4 in	0 in to 4 in	0 in to 8 in	0 in to 1 in	0 in to 6 in	18 in to 24 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)	4 1 U	7.2 U	3 8 U	3 5 U	4 2 U	4 1 U
4,4'-DDT (p,p'-DDT)	4.1 U	7 2 U	3 8 U	3 5 U	4 2 U	4 1 U
Alpha-chlordane	2.1 U	3.7 U	2.0 U	1.8 U	2 2 U	2 1 U
Beta-BHC	2.1 U	3 7 U	2.0 U	1 8 U	2 2 U	2 1 U
Endrin	4.1 U	7 2 U	3 8 U	3 5 U	4 2 U	4 1 U
Endrin Aldehyde	4 1 U	7.2 U	3.8 U	3 5 U	4 2 U	4 1 U
Methoxychlor	21 U	37 U	20 U	18 U	22 U	21 U
PCB-1254 (Aroclor 1254)	41 U	72 U	38 U	35 U	42 U	41 U
PCB-1260 (Aroclor 1260)	41 U	72 U	38 U	35 U	42 U	41 U
Inorganics (Total) (mg/kg)						
Aluminum	12800	15400	9120	13600	9540	15600
Antimony	3 2 BJL	4.1 BJL	1 5 BJL	1 5 BJL	2 4 BJL	0 72 UJK
Arsenic	19 0	12.3	6 2	8 5	13 1	2 8
Barium	755	468	229	261	1030	175
Beryllium	0 64 B	0 83 B	0.46 B	0.71 B	0 53 B	0 55 B
Cadmium	11 1	7.5	3.4	3.8	8 6	0 43 B
Calcium	27000	12100	7040	7150	34900	5560
Chromium	25.9	38.0	21 1	28 6	25 2	9 4
Cobalt	7 4 B	10 B	5 9 B	8.7 B	6 5 B	4 0 B
Copper	73 4 JL	111 JL	49.2 JL	73 0 JL	67 7 JL	15 6 JL
Iron	26800	29400	16800	23800	25900	11500

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS013	CS014	CS015	CS016	CS017	CS017
Sample ID:	CR-014-SD	CR-015-SD	CR-016-SD	CR-017-SD	CR-018-SD	CR-066-SD
Sample Date:	05/18/2001	05/18/2001	05/18/2001	05/18/2001	05/18/2001	05/18/2001
Constituent Depth (feet):	0 in to 4 in	0 in to 4 in	0 in to 8 in	0 in to 1 in	0 in to 6 in	18 in to 24 in
Lead	841	440	190	162	439	26 8
Magnesium	18100	10300	6130	7240	21400	2970
Manganese	515	610	294	572	420	315
Nickel	21 9	28 5	16 5	24 0	22 7	9 2 B
Potassium	1970 JL	2680 JL	1630 JL	2290 JL	1590 JL	1060 B
Selenium	0.83 U	1.7 U	0 76 U	0 84 B	0 86 U	0 82 U
Silver	1 9 B	2.9 B	1.4 B	1 7 B	1 8 B	0 32 B
Sodium	301 B	490 B	249 B	248 B	276 B	381 B
Thallium	0 95 U	1 9 U	0 87 U	0 80 U	0 98 U	0 94 U
Total Mercury	1 6	1.0	0 54	0 31	0 93	0 06 U
Vanadium	38.5	42.4	25.8	37 2	33 9	19 2
Zinc	1460	1000	470	462	1180	84 2
Conventional Parameters						
Total Organic Carbon (mg/kg)	11900	22600	8630	23100	16600	10400
Grain Size (%)						
Percent Gravel	5 <	0	0	0	0	10
Percent Sand	1 <	0	20	5 <	20	20
Percent Silt	35	40	40	40	50	40
Percent Clay	60	60	40	55	30	30

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS018	CS019	CS020	CS021	CS022	CS023
	Sample ID:	CR-019-SD	CR-020-SD	CR-023-SD	CR-022-SD	CR-024-SD	CR-025-SD
	Sample Date:	05/19/2001	05/19/2001	05/19/2001	05/21/2001	05/21/2001	05/21/2001
	Depth (feet):	0 in to 6 5in	0 in to 5 in	0 in to 4 in	0 in to 4 in	0 in to 4 in	0 in to 25in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		3.8 U	7 8 U	8.2 U	6.7 U	8 7 U	3 3 U
4,4'-DDT (p,p'-DDT)		3 8 U	7.8 U	8.2 U	6.7 U	8 7 U	3 3 U
Alpha-chlordane		1.9 U	4.0 U	4.2 U	3.5 U	4 5 U	1 7 U
Beta-BHC		1 9 U	4 0 U	4 2 U	3 5 U	4 5 U	1 7 U
Endrin		3.8 U	7 8 U	8 2 U	6 7 U	8 7 U	3 3 U
Endrin Aldehyde		3 8 U	7.8 U	8.2 U	6 7 U	8 7 U	3 3 U
Methoxychlor		19 U	40 U	42 U	35 U	45 U	17 U
PCB-1254 (Aroclor 1254)		38 U	78 U	82 U	67 U	87 U	33 U
PCB-1260 (Aroclor 1260)		38 U	78 U	82 U	67 U	87 U	33 U
Inorganics (Total) (mg/kg)							
Aluminum		8180	11900	6670	12800	11600	10400
Antimony		1.7 BJL	2.1 BJL	5.4 BJL	3 6 BJL	3 4 BJL	1 0 BJL
Arsenic		7 8	4.5 B	6.8	9 5	10 3	4 2
Barium		422	231	180	364	240	190
Beryllium		0 43 B	0.62 B	0.39 B	0.69 B	0 60 B	0 63 B
Cadmium		4.9	1.4 B	1.8 B	6.5	5 9	1 6
Calcium		12400	9340	7630	8230	7740	5470
Chromium		18 9	20.4	17.0	33 1	30 4	25 7
Cobalt		5.4 B	7.4 B	5.4 B	9.2 B	7 9 B	8 2 B
Copper		40 6 JL	41.8 JL	66 7 JL	88 2 JL	67 6 JL	53 9 JL
Iron		17400	20400	15500	25200	22400	18000

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS018	CS019	CS020	CS021	CS022	CS023
Sample ID:	CR-019-SD	CR-020-SD	CR-023-SD	CR-022-SD	CR-024-SD	CR-025-SD
Sample Date:	05/19/2001	05/19/2001	05/19/2001	05/21/2001	05/21/2001	05/21/2001
Constituent — Depth (feet):	0 in to 6 5in	0 in to 5 in	0 in to 4 in	0 in to 4 in	0 in to 4 in	0 in to 25in
Lead	232	64 9	72 7	441	282	93 8
Magnesium	8970	7000	5610	8200	7930	6150
Manganese	337	392	303	673	392	392
Nickel	16 6	18 7 B	13 6 B	25.9	23 2 B	23 0
Potassium	1490	2020 B	1270 B	2440	2280 B	2390
Selenium	0 77 U	1 9 U	1.9 U	1.5 U	2 0 U	0 68 U
Silver	0.78 B	0.75 B	1.1 B	2.0 B	1 5 B	0 98 B
Sodium	242 B	480 B	426 B	471 B	623 B	186 B
Thallium	0 89 U	2 2 U	2 2 U	1.8 U	2 3 U	0 78 U
Total Mercury	0 43	0.14 U	0.13 U	1.2	0 90	0 25
Vanadium	24.2	26 7 B	20.2 B	35 8	33 7	32 1
Zinc	581	250	455	901	617	280
Conventional Parameters						
Total Organic Carbon (mg/kg)	10700	21500	26400	12600	10200	15500
Grain Size (%)						
Percent Gravel	0	0	0	0	0	0
Percent Sand	40	1 <	10	1 <	0	50
Percent Silt	40	60	50	60	60	40
Percent Clay	20	40	40	40	40	10

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS024	CS025	CS026	CS027	CS028	CS029
	Sample ID:	CR-062-SD	CR-026-SD	CR-029-SD	CR-027-SD	CR-028-SD	CR-030-SD
	Sample Date:	06/08/2001	05/21/2001	05/21/2001	05/21/2001	05/21/2001	05/21/2001
	Depth (feet):	18 in to 24 in	0 in to 3 in	0 in to 3 in	0 in to 4 in	0 in to 2 in	0 in to 2 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		5 0 U	7.8 U	5.4 U	5.5 U	7 2 U	3 4 U
4,4'-DDT (p,p'-DDT)		5 0 U	7.8 U	5.4 U	5.5 U	7 2 U	3 4 U
Alpha-chlordane		2 6 U	4 0 U	2 8 U	2.8 U	3 7 U	1 7 U
Beta-BHC		2 6 U	4 0 U	2.8 U	2 8 U	3 7 U	1 7 U
Endrin		5 0 U	7.8 U	5.4 U	5 5 U	7 2 U	3 4 U
Endrin Aldehyde		5 0 U	7.8 U	5 4 U	5.5 U	7 2 U	3 4 U
Methoxychlor		26 U	40 U	52	28 U	37 U	17 U
PCB-1254 (Aroclor 1254)		50 U	78 U	54 U	55 U	72 U	34 U
PCB-1260 (Aroclor 1260)		50 U	78 U	54 U	55 U	72 U	34 U
Inorganics (Total) (mg/kg)							
Aluminum		6810	9920	8000	9090	12400	7150
Antimony		1.6 BUJK	4.9 BJL	4.8 BJL	1.3 BJL	3 9 BJL	1 9 BJL
Arsenic		5.8	10.6	9 5	3 4 B	9 7	7 0
Barium		147	505	375	113	370	342
Beryllium		0.29 B	0.54 B	0.44 B	0 58 B	0 67 B	0 37 B
Cadmium		0.10 U	4.3	2.9	0.29 B	2 8	3 2
Calcium		162000	21200	16600	4800	16100	11500
Chromium		12.9	25 0	21.9	21 1	30 1	17 7
Cobalt		4.7 B	7.9 B	7.7 B	6.0 B	9 6 B	5 0 B
Copper		18 1 JL	120 JL	118 JL	25 0 JL	114 JL	65 7 JL
Iron		11700	27500	23000	16000	29000	15900

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS024	CS025	CS026	CS027	CS028	CS029
	Sample ID:	CR-062-SD	CR-026-SD	CR-029-SD	CR-027-SD	CR-028-SD	CR-030-SD
	Sample Date:	06/08/2001	05/21/2001	05/21/2001	05/21/2001	05/21/2001	05/21/2001
	Depth (feet):	18 in to 24 in	0 in to 3 in	0 in to 3 in	0 in to 4 in	0 in to 2 in	0 in to 2 in
Lead		6 7 JL	211	159	21.3	149	208
Magnesium		5090	13800	11100	5190	11900	7940
Manganese		327	528	411	284	589	256
Nickel		14 3	21 4	18 0	16.2	24 8	14 1
Potassium		1330 B	1960 B	1560 B	1380 B	2480	1250
Selenium		1.2 U	1 8 U	1.2 U	1.3 U	1 6 U	0 68 U
Silver		0.32 BU	2.0 B	1.8 B	0.52 B	1 7 B	1 5 B
Sodium		337 BU	483 B	354 B	385 B	397 B	200 B
Thallium		1 3 U	2 1 U	1.4 U	1 5 U	1 9 U	0 78 U
Total Mercury		0.08 U	0.49	0.20	0 09 U	0 17 B	0 53
Vanadium		16 6 B	30.5	25.6	29.0	36 7	21 4
Zinc		42 3	855	940	104	787	600
Conventional Parameters							
Total Organic Carbon (mg/kg)		15800	24600	13700	18100	21200	11900
Grain Size (%)							
Percent Gravel		1	0	0	0	0	0
Percent Sand		45	25	35	35	25	30
Percent Silt		45	40	40	40	40	40
Percent Clay		10 <	35	25	25	35	30

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS030	CS031	CS032	CS033	CS034	CS035
Sample ID:	CR-031-SD	CR-032-SD	CR-033-SD	CR-034-SD	CR-036-SD	CR-035-SD
Sample Date:	05/21/2001	05/21/2001	05/22/2001	05/22/2001	05/22/2001	05/22/2001
Constituent / Depth (feet):	0 in to 1 in	0 in to 2 in	0 in to 1 in	0 in to 5 in	0 in to 1 in	0 in to 25in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)	3 4 U	5 2 U	3 6 U	4 0 U	3 5 U	3 4 U
4,4'-DDT (p,p'-DDT)	3 4 U	5 2 U	3 6 U	4 0 U	3 5 U	3 4 U
Alpha-chlordane	1 8 U	2.7 U	1 8 U	2 1 U	1 8 U	1 7 U
Beta-BHC	1 8 U	2.7 U	1 8 U	2 1 U	1 8 U	1 7 U
Endrin	3.4 U	5.2 U	3.6 U	4 0 U	3 5 U	3 4 U
Endrin Aldehyde	3 4 U	5.2 U	3.6 U	4 0 U	3 5 U	3 4 U
Methoxychlor	18 U	27 U	18 U	21 U	18 U	17 U
PCB-1254 (Aroclor 1254)	34 U	52 U	36 U	40 U	35 U	34 U
PCB-1260 (Aroclor 1260)	34 U	52 U	36 U	40 U	35 U	34 U
Inorganics (Total) (mg/kg)						
Aluminum	11200	6940	9410	9240	8720	8540
Antimony	4.7 BJL	21 5 JL	4.7 BJL	7 0 BJL	5 7 BJL	2 2 BJL
Arsenic	11 1	11.5	8.7	13 0	10 7	7 9
Barium	624	533	295	618	391	255
Beryllium	0.62 B	0 38 B	0 54 B	0 51 B	0 49 B	0 45 B
Cadmium	7 2	4.3	3.5	6 9	3 6	2 3
Calcium	20500	26300	15400	26100	19600	10800
Chromium	30 6	29 9	26 4	29 4	25 8	23 4
Cobalt	9.0 B	10 7 B	8 6 B	9.0 B	8 6 B	7 3 B
Copper	205 JL	387 JL	150 JL	251 JL	156 JL	76 8 JL
Iron	26800	36300	24700	28900	25500	19800

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS030	CS031	CS032	CS033	CS034	CS035
Sample ID:	CR-031-SD	CR-032-SD	CR-033-SD	CR-034-SD	CR-036-SD	CR-035-SD
Sample Date:	05/21/2001	05/21/2001	05/22/2001	05/22/2001	05/22/2001	05/22/2001
Constituent / Depth (feet):	0 in to 1 in	0 in to 2 in	0 in to 1 in	0 in to 5 in	0 in to 1 in	0 in to 25in
Lead	369	256	165	392	190	112
Magnesium	14200	11800	10200	15300	12800	8570
Manganese	388	661	481	435	545	467
Nickel	23 1	16 0	21.1	20 9	19 8	19 1
Potassium	1820	1440 B	1900	1620	1760	1610
Selenium	1 1	1.6 B	0.97 B	1 2	0 69 U	0 68 U
Silver	3.1	3.4	2.1 B	3 2	2 2	1 2 B
Sodium	258 B	374 B	266 B	269 B	207 B	237 B
Thallium	0.80 U	1.6 B	0 84 U	0 92 U	0 79 U	0 78 U
Total Mercury	1.1	0.40	0.19	0 73	0 32	0 16
Vanadium	33.1	23.6	29.4	30 2	28 6	28 3
Zinc	1250	2560	1030	1660	1100	592
Conventional Parameters						
Total Organic Carbon (mg/kg)	27800	9170	29300	20900	18700	15800
Grain Size (%)						
Percent Gravel	0	0	0	0	0	5
Percent Sand	30	70	30-40	40	30	30
Percent Silt	40	27	60	45	40	55
Percent Clay	30	3	10 <	15	25	10

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS036	CS037	CS038	CS039	CS040	CS041
	Sample ID:	CR-037-SD	CR-038-SD	CR-039-SD	CR-040-SD	CR-041-SD	CR-042-SD
	Sample Date:	05/22/2001	05/22/2001	05/23/2001	05/23/2001	05/23/2001	05/23/2001
	Depth (feet):	0 in to 2 in	0 in to 2 in	0 in to 3 in	0 in to 4 in	0 in to 2 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		3 4 U	3.4 U	3 4 U	3 5 U	3 4 U	3 3 U
4,4'-DDT (p,p'-DDT)		3 4 U	3 4 U	3 4 U	3 5 U	3 4 U	3 3 U
Alpha-chlordane		1.8 U	1.7 U	1.7 U	1.8 U	1 7 U	1 7 U
Beta-BHC		1 8 U	1.7 U	1 7 U	1 8 U	1 7 U	1 7 U
Endrin		3 4 U	3 4 U	3 4 U	3 5 U	3 4 U	3 3 U
Endrin Aldehyde		3 4 U	3 4 U	3 4 U	3 5 U	3 4 U	3 3 U
Methoxychlor		18 U	17 U	17 U	18 U	17 U	17 U
PCB-1254 (Aroclor 1254)		34 U	34 U	34 U	35 U	34 U	33 U
PCB-1260 (Aroclor 1260)		34 U	34 U	34 U	35 U	34 U	33 U
Inorganics (Total) (mg/kg)							
Aluminum		8790	18900	12400 JL	4950 JL	6520 JL	6550 JL
Antimony		10 8 BJL	17.2 JL	10 4 BJL	3 4 BUJ	19 2 JL	17 2 JL
Arsenic		10 4	26 9	17 3 JH	9 6 JH	9 1 JH	8 7 JH
Barium		438	1070	603 JK	768 JK	452 JK	495 JK
Beryllium		0 39 B	0.74 B	0 53 B	0.28 B	0 34 B	0 32 B
Cadmium		2 8	2 8	2.1	5.3	1 9	2 1
Calcium		22300	49600	28900 JL	46900 JL	24700 JL	28200 JL
Chromium		28 1	59.1	35.1 JL	12 5 JL	27 1 JL	32 8 JL
Cobalt		10.6	22.3	15.1 JL	4 1 BJL	12 0 JL	13 7 JL
Copper		309 JL	1460 JL	823	102	362	451
Iron		42300	176000	109000 JL	25000 JL	37600 JL	48200 JL

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS036	CS037	CS038	CS039	CS040	CS041
Sample ID:	CR-037-SD	CR-038-SD	CR-039-SD	CR-040-SD	CR-041-SD	CR-042-SD
Sample Date:	05/22/2001	05/22/2001	05/23/2001	05/23/2001	05/23/2001	05/23/2001
Constituent / Depth (feet):	0 in to 2 in	0 in to 2 in	0 in to 3 in	0 in to 4 in	0 in to 2 in	0 in to 3 in
Lead	209	1590	784 JL	289 JL	172 JL	175 JL
Magnesium	10300	7230	5020 JL	25000 JL	9750 JL	9960 JL
Manganese	946	3390	2090 JL	442 JL	743 JL	908 JL
Nickel	15 0	10 3	8.5	10 9	11 1	10 2
Potassium	1400	3620	2300 JL	883 BJL	1330 JL	1260 JL
Selenium	1 4	0 68 U	4 2	0.82 B	1 8	2 1
Silver	2 1	4.0	2 9	0 63 B	2 1	2 2
Sodium	384 B	1310	723 B	228 B	377 B	475 B
Thallium	0 81 B	4 0	2.4	1 1 B	1 2 B	0 78 U
Total Mercury	0.16	0.07 B	0 13	0.29	0 08 B	0 07 B
Vanadium	27.1	39.0	29.5 JL	23.0 JL	21 5 JL	21 4 JL
Zinc	3090	24900	13900	1990	2770	3760
Conventional Parameters						
Total Organic Carbon (mg/kg)	9450	1380	1680	4830	5510	3460
Grain Size (%)						
Percent Gravel	1 <	5	15	0	1	1 <
Percent Sand	60	60	55	65-70	74	90
Percent Silt	40	30	30	30	25	10
Percent Clay	1 <	5	0	5 <	0	1 <

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS042	CS043	CS044	CS045	CS046	CS047
Sample ID:	CR-043-SD	CR-044-SD	CR-045-SD	CR-046-SD	CR-047-SD	CR-048-SD
Sample Date:	05/23/2001	05/23/2001	05/31/2001	05/31/2001	05/31/2001	05/31/2001
Constituent / Depth (feet):	0 in to 2 in	0 in to 2 in	0 in to 4 in	0 in to 3 in	0 in to 1 in	0 in to 1 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)	3 3 U	3.4 U	3 3 U	3 3 U	3 6 U	3 3 U
4,4'-DDT (p,p'-DDT)	3 3 U	3 4 U	3 3 U	3 3 U	3 6 U	3 3 U
Alpha-chlordane	1 7 U	1 7 U	1 7 U	1.7 U	1 9 U	1 7 U
Beta-BHC	1 7 U	1.7 U	1.7 U	1 7 U	1 9 U	1 7 U
Endrin	3 3 U	3 4 U	3.3 U	3.3 U	3 6 U	3 3 U
Endrin Aldehyde	3 3 U	3 4 U	3 3 U	3 3 U	3 6 U	3 3 U
Methoxychlor	17 U	17 U	17 U	17 U	19 U	17 U
PCB-1254 (Aroclor 1254)	33 U	34 U	33 U	33 U	36 U	33 U
PCB-1260 (Aroclor 1260)	33 U	34 U	33 U	33 U	36 U	33 U
Inorganics (Total) (mg/kg)						
Aluminum	9280 JL	15500 JL	21100	4710	17400	17800
Antimony	20 7 JL	27.1 JL	53 5	9 9 B	57 5	45 2
Arsenic	13 9 JH	20.3 JH	25.5	7 6	30 3	21 6
Barium	632 JK	1140 JK	2160	486	1970	1690
Beryllium	0.43 B	0 69 B	0 99 B	0 27 B	0 86 B	0 77 B
Cadmium	1.6	1.6	0 06 U	4.8	0 07 U	0 19 B
Calcium	26500 JL	46900 JL	69900	54000	57600	66400
Chromium	44 8 JL	76 8 JL	142	20.7	135	112
Cobalt	17.7 JL	35.2 JL	59.0	8 4 B	73 5	47 3
Copper	720	1550	2900 JL	245 JL	2520 JL	2160 JL
Iron	79700 JL	137000 JL	239000	28000	176000	178000

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	CS042	CS043	CS044	CS045	CS046	CS047
Sample ID:	CR-043-SD	CR-044-SD	CR-045-SD	CR-046-SD	CR-047-SD	CR-048-SD
Sample Date:	05/23/2001	05/23/2001	05/31/2001	05/31/2001	05/31/2001	05/31/2001
Constituent / Depth (feet):	0 in to 2 in	0 in to 2 in	0 in to 4 in	0 in to 3 in	0 in to 1 in	0 in to 1 in
Lead	446 JL	1040 JL	316	199	409	417
Magnesium	5520 JL	5780 JL	5770 JL	26600 JL	5040 JL	10000 JL
Manganese	1500 JL	3060 JL	4040	585	3680	3240
Nickel	9 6	12 2	17 0	10 4	15 6	14 4
Potassium	1740 JL	3750 JL	4300	888 B	3580	3490
Selenium	3 2	4 5	0 68 UJK	0 67 UJK	1 4 JL	0 68 UJK
Silver	3 9	5 7	7 5	1 6 B	10 2	7 4
Sodium	666 B	1660	2210	269 B	2230	1610
Thallium	2 3	4 6	0 78 U	0 77 U	0 87 U	0 78 U
Total Mercury	0 13	0 06 B	0 05 U	0.06 B	0 06 U	0 05 U
Vanadium	26 2 JL	39.2 JL	42 3	22 1	39 1	37 7
Zinc	8710	15000	20100	2430	17500	18200
Conventional Parameters						
Total Organic Carbon (mg/kg)	1950	1000 U	1000 U	5250	1210	2160
Grain Size (%)						
Percent Gravel	0	10	0	1	5	1 <
Percent Sand	90	90	90-100	80	95	99-100
Percent Silt	10	0	10 <	20 <	0	0
Percent Clay	0	0	0	0	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS048	CS049	CS050	CS051	CS052	TS001
	Sample ID:	CR-049-SD	CR-050-SD	CR-051-SD	CR-052-SD	CR-053-SD	TR-056-SD
	Sample Date:	05/31/2001	06/01/2001	06/01/2001	06/01/2001	06/01/2001	06/05/2001
	Depth (feet):	0 in to 3 in	0 in to 2 in	0 in to 2 in	0 in to 4 in	0 in to 3 in	0 in to 2 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		3 3 U	3.4 U	3 9 U	3 3 U	3 8 U	
4,4'-DDT (p,p'-DDT)		3 3 U	3.4 U	3 9 U	3 3 U	3 8 U	
Alpha-chlordane		1 7 U	1 8 U	2 0 U	1 7 U	1 9 U	
Beta-BHC		1 7 U	1 8 U	2.0 U	1 7 U	1 9 U	
Endrin		3 3 U	3 4 U	3.9 U	3 3 U	3 8 U	
Endrin Aldehyde		3 3 U	3 4 U	3.9 U	3 3 U	3 8 U	
Methoxychlor		17 U	18 U	20 U	17 U	19 U	
PCB-1254 (Aroclor 1254)		33 U	34 U	39 U	33 U	38 U	
PCB-1260 (Aroclor 1260)		33 U	34 U	39 U	33 U	38 U	
Inorganics (Total) (mg/kg)							
Aluminum		18100	18700	8170	21100	11000	13600
Antimony		34 9	7.4 B	20 0	61.3	51.4	1 1 B
Arsenic		30 3	7 6	11.8	42.8	23 1	6 2
Barium		1660	681	763	2440	989	172
Beryllium		0.75 B	0.71 B	0.38 B	1 0 B	0 57 B	0 67 B
Cadmium		0 06 U	0 06 U	2.4	0 06 U	0 07 U	0 52 B
Calcium		58600	46900	25300	72400	30800	5080
Chromium		113	64.0	30.2	165	72 0	24 8
Cobalt		33 8	15.0	7.9 B	85.7	33 4	7 8 B
Copper		2160 JL	997 JL	444 JL	3300 JL	1330 JL	19 0
Iron		179000	165000	67100	245000	96900	18700 JK

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	CS048	CS049	CS050	CS051	CS052	TS001
	Sample ID:	CR-049-SD	CR-050-SD	CR-051-SD	CR-052-SD	CR-053-SD	TR-056-SD
	Sample Date:	05/31/2001	06/01/2001	06/01/2001	06/01/2001	06/01/2001	06/05/2001
	Depth (feet):	0 in to 3 in .	0 in to 2 in	0 in to 2 in	0 in to 4 in	0 in to 3 in	0 in to 2 in
Lead		317	282	309	512	276	37 7
Magnesium		6030 JL	5750 JL	8540 JL	5970 JL	3990 JL	5060
Manganese		3130	2950	1080	4360	1990	588
Nickel		13 0	8.1 B	12 5	19 4	13 6	20 1
Potassium		3480	3770	1400	4330	2160	3100 JL
Selenium		1 4 JL	2.1 JL	1 4 JL	0 68 UJK	1 5 JL	0 89 B
Silver		5 9	3 7	2 7	12 6	8 5	0 67 B
Sodium		1530	1050	385 B	2630	1000 B	258 B
Thallium		0.76 U	0 79 U	0 91 U	0 78 U	0 89 U	0 92 U
Total Mercury		0 05 U	0.05 U	0 29	0 05 U	0 06 U	0 06 U
Vanadium		36.3	38.2	28.8	45 0	28 6	31 0
Zinc		16500	15400	4900	22300	8820	85 8
Conventional Parameters							
Total Organic Carbon (mg/kg)		1000 U	1000 U	8720	1000 U	3130	
Grain Size (%)							
Percent Gravel		0	0	1	0	0	0
Percent Sand		100	100	74	100	85	5
Percent Silt		0	0	25	0	15	90
Percent Clay		0	0	1 <	0	0	5

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date. / Depth (feet):	TS002	TS003	TS004	TS005	TS006	TS007
	Sample ID:	TR-057-SD	TR-058-SD	TR-059-SD	TR-061-SD	TR-062-SD	TR-060-SD
	Sample Date.	06/05/2001	06/03/2001	06/05/2001	06/03/2001	06/05/2001	06/04/2001
	Depth (feet):	0 in to 0 5in	0 in to 3 in	0 in to 3 in	0 in to 2 in	0 in to 2 in	0 in to 4 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)				13 U	4 6 U		3 1 JQ
4,4'-DDT (p,p'-DDT)				13 U	4 6 U		3 7 U
Alpha-chlordane				6.8 U	2.4 U		0 73 JQ
Beta-BHC				5.9 JQ	2 4 U		1 9 U
Endrin				13 U	4 6 U		3 7 U
Endrin Aldehyde				13 U	4 6 U		1 5 JQ
Methoxychlor				68 U	27		19 U
PCB-1254 (Aroclor 1254)				130 U	46 U		37 U
PCB-1260 (Aroclor 1260)				130 U	46 U		37 U
Inorganics (Total) (mg/kg)							
Aluminum		12900	14400	8360	3170	7830	12500
Antimony		0 89 B	0.76 UJK	2 9 U	0 94 UJK	1 0 U	0 68 UJK
Arsenic		6 6	6 2 U	4 6 B	3 7 U	4 7	5 7 U
Barium		155	159	130 B	49 3 B	140	151
Beryllium		0 69 B	0 72 B	0.45 B	0 20 B	0 40 B	0 55 B
Cadmium		0 30 B	0.08 U	0.29 U	0.09 U	0 10 U	0 38 B
Calcium		9080	7180	13400	1630	15800	31800
Chromium		32 0	29.4	19 8	8 9	18 3	24 5
Cobalt		9 4 B	9.0 B	6 1 B	2 4 B	5 3 B	7 6 B
Copper		23.9	25.2 JL	12 8 B	4.7 BJL	9 9	21 6 JL
Iron		21800 JK	21700	17000 JK	6600	12800 JK	17200

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS002	TS003	TS004	TS005	TS006	TS007
Sample ID:	TR-057-SD	TR-058-SD	TR-059-SD	TR-061-SD	TR-062-SD	TR-060-SD
Sample Date:	06/05/2001	06/03/2001	06/05/2001	06/03/2001	06/05/2001	06/04/2001
Constituent — Depth (feet):	0 in to 0 5in	0 in to 3 in	0 in to 3 in	0 in to 2 in	0 in to 2 in	0 in to 4 in
Lead	27.7	14.8	8.6	2.9	8 1	26 6
Magnesium	7920	6720	3520 B	1580	3590	5030
Manganese	546	612	939	172	907	453
Nickel	27.5	25 3	15 7 B	6 4 B	14 4	21 3
Potassium	3100 JL	3530	1560 BJL	629 B	1590 BJL	2810
Selenium	1 1 B	1.1 BJH	3.7 B	1.1 U	2 2	0 82 BJH
Silver	0.75 B	0 66 B	0.77 U	0.25 U	0 61 B	0 48 B
Sodium	344 B	326 B	685 B	265 BU	394 B	309 B
Thallium	0 90 U	0.99 U	3 7 U	1 2 U	1 3 U	0 88 U
Total Mercury	0.05 U	0 06 U	0.24 U	0 08 U	0 08 U	0 06 U
Vanadium	41 4	37.7	19 4 B	8 5 B	19 9	23 8
Zinc	84.5	85 8	49 2	19.5	49 1	73 5
Conventional Parameters						
Total Organic Carbon (mg/kg)			19300	2710		18400
Grain Size (%)						
Percent Gravel	0	5	0	0	0	5
Percent Sand	1 <	30	30	90	60	75
Percent Silt	100	65	70	10	40	20
Percent Clay	0	0	1 <	0	1 <	0

A blank call indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date: / Depth (feet):	TS008	TS009	TS010	TS011	TS012	TS013
	Sample ID:	TR-064-SD	TR-063-SD	TR-065-SD	TR-066-SD	TR-068-SD	TR-067-SD
	Sample Date:	06/05/2001	06/04/2001	06/04/2001	06/05/2001	06/03/2001	06/04/2001
	Depth (feet):	0 in to 1 in	0 in to 3 in	0 in to 3 in	0 in to 2 in	0 in to 3 in	0 in to 4 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)							
4,4'-DDT (p,p'-DDT)							
Alpha-chlordane							
Beta-BHC							
Endrin							
Endrin Aldehyde							
Methoxychlor							
PCB-1254 (Aroclor 1254)							
PCB-1260 (Aroclor 1260)							
Inorganics (Total) (mg/kg)							
Aluminum		12100	14000	3770	13100	13200	5060
Antimony		0 95 B	0.80 BJL	1 3 U	0 89 B	0 81 BJL	1 0 UJK
Arsenic		4 6	6 2	4.6	3.7	3 5 U	5 4 U
Barium		160	201	157	218	108	106
Beryllium		0 60 B	0.64 B	0.20 B	0 66 B	0 65 B	0 22 B
Cadmium		0 79 B	0.07 U	0.18 B	0.70 B	0 08 B	0 10 B
Calcium		6970	31200	131000	32200	6460	65700
Chromium		22 7	29 9	21 0	27.5	30 5	15 3
Cobalt		6 7 B	8 5 B	2.5 B	6.6 B	7.0 B	3 4 B
Copper		18 8	23.7 JL	9 4 B	24.4	22 2 JL	9 3 JL
Iron		17200 JK	19900	5460 JK	18100 JK	19100	10300

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS008	TS009	TS010	TS011	TS012	TS013
	Sample ID:	TR-064-SD	TR-063-SD	TR-065-SD	TR-066-SD	TR-068-SD	TR-067-SD
	Sample Date:	06/05/2001	06/04/2001	06/04/2001	06/05/2001	06/03/2001	06/04/2001
	Depth (feet):	0 in to 1 in	0 in to 3 in	0 in to 3 in	0 in to 2 in	0 in to 3 in	0 in to 4 in
Lead		44 9	15.9	5.6	53 4	14 8	6 4
Magnesium		5010	9140	2700	6800	6740	3290
Manganese		540	482	170	652	249	122
Nickel		17 6	24.9	10 B	20 2	20 6	14 3
Potassium		3890 JL	3770	830 BJL	3180 JL	2720	818 B
Selenium		0 76 U	0.78 U	3.6	0 82 U	0 81 U	1 1 U
Silver		0 59 B	0 50 B	0 36 U	0.53 B	0 60 B	0 27 U
Sodium		295 B	372 B	411 B	370 B	376 B	341 BU
Thallium		0 87 U	0.89 U	1.7 U	0 94 U	0 93 U	1 3 U
Total Mercury		0 06 U	0.06 U	0 11 U	0 06 U	0.06 U	0 08 U
Vanadium		28 1	32.9	9 2 B	32 8	28 8	13 6 B
Zinc		127	68 8	30 9	81 8	71 0	35 2
Conventional Parameters							
Total Organic Carbon (mg/kg)							
Grain Size (%)							
Percent Gravel		0	0	20	0	0	0
Percent Sand		15	100	80	10	40	75
Percent Silt		85	0	0	80	60	25
Percent Clay		0	0	0	10	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS014	TS015	TS016	TS017	TS018	TS019
Sample ID:	TR-069-SD	TR-070-SD	TR-071-SD	TR-072-SD	TR-073-SD	TR-074-SD
Sample Date:	06/04/2001	06/03/2001	06/05/2001	06/05/2001	06/06/2001	06/06/2001
Constituent / Depth (feet):	0 in to 3 in	0 in to 2 in	0 in to 1 in	0 in to 1 in	0 in to 1 in	0 in to 2 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)						
4,4'-DDT (p,p'-DDT)						
Alpha-chlordane						
Beta-BHC						
Endrin						
Endrin Aldehyde						
Methoxychlor						
PCB-1254 (Aroclor 1254)						
PCB-1260 (Aroclor 1260)						
Inorganics (Total) (mg/kg)						
Aluminum	5890	5940	5600	11800	10800	6920
Antimony	1.4 U	1 5 UJK	0 96 BUJK	1 0 BJL	0 71 UJK	0 66 UJK
Arsenic	2.8 B	9.5 U	10	3.8	3 3	3 8
Barium	144	90 8 B	68.9	139	120	71 3
Beryllium	0 34 B	0.28 B	0.28 B	0.58 B	0 51 B	0 29 B
Cadmium	0 14 U	0 15 B	0 07 U	0 07 U	0 07 U	0 07 U
Calcium	168000	8190	3720 JK	4650 JK	16100 JK	10800 JK
Chromium	14 1	20 8	12 2	21.8	23 6	17 1
Cobalt	3 5 B	6 0 B	4.2 B	6 5 B	6 0 B	5 5 B
Copper	11 9	15 6 JL	18.0 JL	17 1 JL	19 1 JL	14 1 JL
Iron	8310 JK	14200	10800	16200	15700	15000

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent						
Station ID:	TS014	TS015	TS016	TS017	TS018	TS019
Sample ID:	TR-069-SD	TR-070-SD	TR-071-SD	TR-072-SD	TR-073-SD	TR-074-SD
Sample Date:	06/04/2001	06/03/2001	06/05/2001	06/05/2001	06/06/2001	06/06/2001
Depth (feet):	0 in to 3 in	0 in to 2 in	0 in to 1 in	0 in to 1 in	0 in to 1 in	0 in to 2 in
Lead	5 8	8 0	10 2 JH	17.3 JH	11 7 JH	8 4 JH
Magnesium	4500	3890	2930	4900	7110	4930
Manganese	292	1130	284	438	397	297
Nickel	11 4 B	15 3 B	12 4	17.5	17 7	23 8
Potassium	1580 BJL	1090 B	1420	3110	3420	1730
Selenium	1.6 B	1.7 U	0.74 U	0 76 U	0 80 U	0 75 U
Silver	0 37 U	0.52 B	0 32 B	0.49 B	0 34 B	0 39 B
Sodium	472 B	544 B	204 B	260 B	295 B	198 B
Thallium	1.8 U	2.0 U	0 85 U	0 87 U	0 92 U	0 86 U
Total Mercury	0.12 U	0.12 U	0 06 U	0 06 U	0 06 U	0 06 U
Vanadium	14 8 B	21 1 B	19 1	25 8	26 4	18 9
Zinc	30 7	46 9	45.6	64 1	60 6	43 9
Conventional Parameters						
Total Organic Carbon (mg/kg)						
Grain Size (%)						
Percent Gravel	0	0	0	0	0	20
Percent Sand	90	60	50	20	10	65
Percent Silt	10	40	50	80	80	15
Percent Clay	0	0	1 <	0	10	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date: / Depth (feet):	TS020	TS021	TS022	TS023	TS024	TS025
	Sample ID:	TR-075-SD	TR-076-SD	TR-077-SD	TR-078-SD	TR-079-SD	TR-080-SD
	Sample Date:	06/03/2001	06/03/2001	06/06/2001	06/06/2001	06/06/2001	06/06/2001
	Depth (feet):	0 in to 2 5in	0 in to 1 5in	0 in to 2 in	0 in to 1.5in	0 in to 3 in	0 in to 5 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)				5 0 U			
4,4'-DDT (p,p'-DDT)				5 0 U			
Alpha-chlordane				2 6 U			
Beta-BHC				2 6 U			
Endrin				5 0 U			
Endrin Aldehyde				5 0 U			
Methoxychlor				26 U			
PCB-1254 (Aroclor 1254)				50 U			
PCB-1260 (Aroclor 1260)				50 U			
Inorganics (Total) (mg/kg)							
Aluminum		6450	11400	7770	10100	13400	9340
Antimony		2 1 BJL	0 84 BJL	1 5 BJL	1 3 UJK	1 1 BUJK	1 1 BUJK
Arsenic		4 4 BU	6 6	3 5 B	5 3	4 9	4 5
Barium		78 6 B	146	173	201	143	74 5
Beryllium		0 35 B	0 58 B	0 37 B	0 55 B	0 70 B	0 41 B
Cadmium		0.15 U	0.29 B	0 13 B	0.13 U	0 06 U	0 06 U
Calcium		10900	13300	34300 JK	83500 JK	5340 JK	3400 JK
Chromium		17 6	26 8	20 9	23 6	35 1	20 5
Cobalt		3 4 B	7 5 B	5.3 B	7 1 B	10 8	6 9 B
Copper		12 9 JL	23 3 JL	13 4 JL	21.1 JL	26 7 JL	16 9 JL
Iron		9740	19300	13800	16200	24100	16100

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS020	TS021	TS022	TS023	TS024	TS025
	Sample ID:	TR-075-SD	TR-076-SD	TR-077-SD	TR-078-SD	TR-079-SD	TR-080-SD
	Sample Date:	06/03/2001	06/03/2001	06/06/2001	06/06/2001	06/06/2001	06/06/2001
	Depth (feet):	0 in to 2 5in	0 in to 1.5in	0 in to 2 in	0 in to 1 5in	0 in to 3 in	0 in to 5 in
Lead		8 5	24.9	8 6 JH	11.0 JH	14 7 JH	16 8 JH
Magnesium		3070	7320	4150	7170	7090	4660
Manganese		291	439	363	414	594	359
Nickel		10 2 B	24 7	19.8	21 1	31 9	19 6
Potassium		1300 B	2980	1430 B	2580	3950	1900
Selenium		2.2 BJH	0 71 U	1.3 U	1 4 U	0 72 U	0 72 U
Silver		0 40 U	0 63 B	0.38 B	0 36 B	0 78 B	0 49 B
Sodium		480 BU	337 B	378 B	476 B	197 B	188 B
Thallium		2 0 U	0.82 U	1 5 U	1.7 U	0 83 U	0 83 U
Total Mercury		0.12 U	0.05 U	0.09 U	0 11 U	0 05 U	0 05 U
Vanadium		16 2 B	40.6	27 5	31.8	36 9	24 6
Zinc		50 2	110	63 1	77.1	82 8	68 8
Conventional Parameters							
Total Organic Carbon (mg/kg)				20400			
Grain Size (%)							
Percent Gravel		0	0	0	0	1 <	0
Percent Sand		10	20	60	10	30	65
Percent Silt		50	55	30	90	65	35
Percent Clay		40	25	10	1 <	5 <	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	TS026	TS027	TS028	TS029	TS030	TS031
Sample ID:	TR-081-SD	TR-082-SD	TR-083-SD	TR-084-SD	TR-085-SD	TR-086-SD
Sample Date.	06/03/2001	06/04/2001	06/06/2001	06/03/2001	06/06/2001	06/06/2001
Depth (feet):	0 in to 2 in	0 in to 3 in	0 in to 2 in	0 in to 1 in	0 in to 1 5in	0 in to 8 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)						4 5 U
4,4'-DDT (p,p'-DDT)						10 JL
Alpha-chlordane						2 3 U
Beta-BHC						2 3 U
Endrin						4 5 U
Endrin Aldehyde						4 5 U
Methoxychlor						23 U
PCB-1254 (Aroclor 1254)						45 U
PCB-1260 (Aroclor 1260)						45 U
Inorganics (Total) (mg/kg)						
Aluminum	4500	8890	8550	6760	6090	3010
Antimony	1 1 UJK	1 4 B	1.7 BJL	0 73 BJL	0 67 UJK	4 9 BJL
Arsenic	3 1 BU	4.1	7 2	5 7 U	4 2	5 8
Barium	46 1 B	160	164	74 5	59 4	72 5
Beryllium	0.25 B	0 44 B	0.39 B	0 23 B	0 27 B	0 13 B
Cadmium	0 11 U	0.15 B	0 16 U	13.1	0 17 B	2 4
Calcium	2340	7610	22800 JK	136000	4500 JK	7750 JK
Chromium	7 6	14.8	18 6	11.7	13 4	5 2
Cobalt	1 9 B	6.0 B	7.1 B	4 3 B	4 4 B	2 2 B
Copper	3.7 BJL	14 5	21 8 JL	18 6 JL	13 4 JL	11 8 JL
Iron	6280	12600 JK	16300	12100	11000	5420

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS026	TS027	TS028	TS029	TS030	TS031
	Sample ID:	TR-081-SD	TR-082-SD	TR-083-SD	TR-084-SD	TR-085-SD	TR-086-SD
	Sample Date:	06/03/2001	06/04/2001	06/06/2001	06/03/2001	06/06/2001	06/06/2001
	Depth (feet):	0 in to 2 in	0 in to 3 in	0 in to 2 in	0 in to 1 in	0 in to 1 5in	0 in to 8 in
Lead		3.1	16.7	18 3 JH	17 9	8 6 JH	115 JH
Magnesium		1670 B	3650	4510	4870	3200	1450
Manganese		106	2020	1010	183	285	157
Nickel		5 1 B	14.4 B	22 1	45 6	13 7	6 8 B
Potassium		868 B	1790 BJL	1680 B	1110 B	1050 B	1280 B
Selenium		1.2 U	2.2	1 8 U	0 76 U	0 76 U	1 4
Silver		0.32 B	0.59 B	0.55 B	0 22 B	0 31 B	0 25 B
Sodium		358 BU	334 B	427 B	253 B	168 B	228 B
Thallium		1 4 U	1.4 U	2.1 U	0.87 U	0 88 U	1 1 U
Total Mercury		0 08 U	0 09 U	0 13 U	0.06 U	0 06 U	0 13 B
Vanadium		9.1 B	20 7	22 5 B	29 0	17 8	8 8 B
Zinc		21.4	62.5	90.4	727	54 7	180
Conventional Parameters							
Total Organic Carbon (mg/kg)							328000
Grain Size (%)							
Percent Gravel		10	0	0	40	0	0
Percent Sand		40	35	60	30	65	100
Percent Silt		50	65	40	30	20	0
Percent Clay		0	0	1 <	1 <	15	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS032	TS033	TS034	TS035	TS036	TS037
	Sample ID:	TR-087-SD	TR-088-SD	TR-089-SD	TR-128-SD	TR-129-SD	TR-090-SD
	Sample Date:	06/07/2001	06/03/2001	06/07/2001	06/09/2001	06/09/2001	06/04/2001
	Depth (feet):	0 in to 2 in	0 in to 2 in	0 in to 3 in	0 in to 4 in	0 in to 6 in	0 in to 4 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)						3 6 U	
4,4'-DDT (p,p'-DDT)						3 6 U	
Alpha-chlordane						1 9 U	
Beta-BHC						1 9 U	
Endrin						3 6 U	
Endrin Aldehyde						3 6 U	
Methoxychlor						19 U	
PCB-1254 (Aroclor 1254)						36 U	
PCB-1260 (Aroclor 1260)						36 U	
Inorganics (Total) (mg/kg)							
Aluminum		6880	12200	4270	8030	20000	5010
Antimony		0 69 UJK	3 4 UJK	0.67 UJK	0.82 UJK	0 67 UJK	1 0 B
Arsenic		4.6	8.5 BU	1.7 B	6 4 JL	5 5 JL	3 2
Barium		73 1	188 B	50.1	163	301	45 1
Beryllium		0 33 B	0.64 B	0 22 B	0.35 B	0 98 B	0 27 B
Cadmium		0 07 U	0.94 B	0 07 U	0.33 B	0 20 B	0 47 B
Calcium		17800 JK	23100	9770 JK	151000	7790	5320
Chromium		12 0	16.3	9 6	15 8	40 1	10 3
Cobalt		5.0 B	4.9 B	3.1 B	5.2 B	14 1	3 0 B
Copper		15 8 JL	21 7 BJL	7.9 JL	17 9 JL	39 9 JL	8 3
Iron		13700	14600	8030	12300	27800	7960 JK

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS032	TS033	TS034	TS035	TS036	TS037
Sample ID:	TR-087-SD	TR-088-SD	TR-089-SD	TR-128-SD	TR-129-SD	TR-090-SD
Sample Date:	06/07/2001	06/03/2001	06/07/2001	06/09/2001	06/09/2001	06/04/2001
Constituent / Depth (feet):	0 in to 2 in	0 in to 2 in	0 in to 3 in	0 in to 4 in	0 in to 6 in	0 in to 4 in
Lead	8.8 JH	14.5	5.1 JH	12.2 JL	37 3 JL	23 7
Magnesium	3760	3860 B	3170	4860	8670	2150
Manganese	251	548	194	348	836	213
Nickel	16.7	17.4 B	9.3	18.0	38 4	7 9 B
Potassium	1200	1740 B	944 B	1620	6120	1100 JL
Selenium	0.78 U	4.8 BJH	0.76 U	1 5	0 76 U	0 74 U
Silver	0 41 B	0.91 U	0.18 B	0 26 B	0 99 B	0 38 B
Sodium	189 B	1010 BU	182 B	299 B	279 B	181 B
Thallium	0 90 U	4 4 U	0.87 U	1 1 U	0 87 U	0 84 U
Total Mercury	0.06 U	0 27 U	0.06 U	0 07 U	0 06 U	0 05 U
Vanadium	17 2	24 7 B	14.0	20 6	44 8	13 7
Zinc	53 0	95 8	33 6	61.2	120	67 7
Conventional Parameters						
Total Organic Carbon (mg/kg)					35000	
Grain Size (%)						
Percent Gravel	5	0	0	1 <	1 <	0
Percent Sand	80	10	100	60	5	100
Percent Silt	15	80	0	35	65	0
Percent Clay	0	10	0	5 <	30	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date: / Depth (feet):	TS038	TS039	TS040	TS041	TS042	TS043
	Sample ID:	TR-091-SD	TR-093-SD	TR-094-SD	TR-095-SD	TR-096-SD	TR-097-SD
	Sample Date:	06/04/2001	06/07/2001	06/07/2001	06/07/2001	06/07/2001	06/04/2001
	Depth (feet):	0 in to 3 in	0 in to 2 in	0 in to 3 in	0 in to 2 in	0 in to 1 in	0 in to 4 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		3 5 U					
4,4'-DDT (p,p'-DDT)		3 5 U					
Alpha-chlordane		1 8 U					
Beta-BHC		1 8 U					
Endrin		3 5 U					
Endrin Aldehyde		3 5 U					
Methoxychlor		18 U					
PCB-1254 (Aroclor 1254)		35 U					
PCB-1260 (Aroclor 1260)		35 U					
Inorganics (Total) (mg/kg)							
Aluminum		14800	4430	5120	5610	8280	3500
Antimony		1.6 BJL	0.84 UJK	0 81 BJL	0.86 UJK	2 6 BUJK	1 1 BJL
Arsenic		19 3	1.4 B	2 4	3 5	5 6	2 9 U
Barium		315	43 3 B	51 5	54.7 B	153	30 3 B
Beryllium		0.71 B	0.21 B	0.23 B	0.28 B	0 39 B	0 16 B
Cadmium		0 74 B	0.08 U	0.06 U	0 09 U	0.70 B	2 0
Calcium		6750	6760 JK	9240	3690 JK	61100 JK	1780
Chromium		35.1	8 8	9 4	12 8	11 4	6 1
Cobalt		13.5	2.2 B	3.0 B	3 8 B	5 2 B	1 7 B
Copper		39.6 JL	6.5 BJL	7.9 JL	9 6 JL	18 7 JL	5 5 JL
Iron		30100	7670	8670	10800	12800	5010

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS038	TS039	TS040	TS041	TS042	TS043
Sample ID:	TR-091-SD	TR-093-SD	TR-094-SD	TR-095-SD	TR-096-SD	TR-097-SD
Sample Date:	06/04/2001	06/07/2001	06/07/2001	06/07/2001	06/07/2001	06/04/2001
Constituent — Depth (feet):	0 in to 3 in	0 in to 2 in	0 in to 3 in	0 in to 2 in	0 in to 1 in	0 in to 4 in
Lead	95 6	5 1 JH	6.7 JL	5.6 JH	11 5 JH	34 9
Magnesium	6710	2650	4470	3320	4950	1240
Manganese	803	152	146	326	235	670
Nickel	41.6	6.9 B	8.2 B	11.3 B	18 3 B	3 8 B
Potassium	3920	791 B	1180	1070 B	1620 B	595 B
Selenium	0 74 U	0 95 U	0 72 U	0 97 U	2 7	0 74 U
Silver	1 0 B	0.25 B	0 37 BU	0.30 B	0 41 B	0 28 B
Sodium	259 B	245 B	212 BU	221 B	453 B	219 BU
Thallium	0.85 U	1.1 U	0.82 U	1.1 U	1 8 U	0 84 U
Total Mercury	0 11	0 07 U	0.05 U	0 07 U	0 12 U	0 05 U
Vanadium	48 5	19.2	14.4	18 1	24 4	9 2 B
Zinc	147	46.4	37.3	35.0	99 4	739
Conventional Parameters						
Total Organic Carbon (mg/kg)	43600					
Grain Size (%)						
Percent Gravel	10	5	0	0	0	0
Percent Sand	70	95	100	60	50	70
Percent Silt	20	0	0	40	50	30
Percent Clay	0	0	0	0	0	1

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date: / Depth (feet):	TS044	TS045	TS046	TS047	TS048	TS049
	Sample ID:	TR-104-SD	TR-105-SD	TR-106-SD	TR-107-SD	TR-098-SD	TR-099-SD
	Sample Date:	06/06/2001	06/04/2001	06/04/2001	06/04/2001	06/04/2001	06/07/2001
	Depth (feet):	0 in to 4 in	0 in to 7 in	0 in to 1 5in	0 in to 2 in	0 in to 2 in	0 in to 2 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		1 7 JQ	4 2 U	6.1 U	6 3 U	3 8 U	
4,4'-DDT (p,p'-DDT)		3 8 U	4.2 U	3 5 JQ	6 3 U	3 8 U	
Alpha-chlordane		2 0 U	2 2 U	3.1 U	3 3 U	1 9 U	
Beta-BHC		2 0 U	2 2 U	3 1 U	3.3 U	1 9 U	
Endrin		3 8 U	4.2 U	6 1 U	6 3 U	3 8 U	
Endrin Aldehyde		3 8 U	4 2 U	6 1 U	6 3 U	3 8 U	
Methoxychlor		20 U	22 U	31 U	33 U	19 U	
PCB-1254 (Aroclor 1254)		38 U	42 U	61 U	63 U	38 U	
PCB-1260 (Aroclor 1260)		38 U	42 U	61 U	63 U	38 U	
Inorganics (Total) (mg/kg)							
Aluminum		8460	7050	11700	8700	1550	3870
Antimony		0.73 UJK	1.1 BJL	2 2 BJL	1 2 U	0 76 U	0 63 UJK
Arsenic		5.9 JL	5.3 U	9 6 U	3 9 BU	1 4 BU	1 7 B
Barium		145	202	101	132	9 7 B	33 5 B
Beryllium		0 33 B	0.28 B	0 45 B	0 46 B	0 10 B	0 23 B
Cadmium		0 58 B	0.51 B	0.14 U	0 12 U	0 08 U	0 06 U
Calcium		98700	152000	43400	10900	1150 B	2440 JK
Chromium		13 0	10.5	24 7	12.8	2 0 B	5 9
Cobalt		4 6 B	3 9 B	10.4 B	5 0 B	0 53 B	2 1 B
Copper		17.5 JL	21.2 JL	26.8 JL	10 4	2 1 B	9 9 JL
Iron		11900	10100	23400	14000 JK	3220 JK	5980

A blank cell indicates analysis was not performed or the result was rejected during analysis

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Table 2-1 - Sediment Sample Detected Concentrations

Constituent	TS044	TS045	TS046	TS047	TS048	TS049
Sample ID:	TR-104-SD	TR-105-SD	TR-106-SD	TR-107-SD	TR-098-SD	TR-099-SD
Sample Date:	06/06/2001	06/04/2001	06/04/2001	06/04/2001	06/04/2001	06/07/2001
Depth (feet):	0 in to 4 in	0 in to 7 in	0 in to 1.5in	0 in to 2 in	0 in to 2 in	0 in to 2 in
Lead	17 9 JL	12.4	13 2	11 0	1 2	6 8 JH
Magnesium	6770	3310	7910	4850	646 B	1780
Manganese	257	431	372	390	47 4	126
Nickel	14.3	12.6	24.1	11.8 B	1 2 B	5 1 B
Potassium	1640	1540	1700 B	1390 BJL	422 BJL	790 B
Selenium	1 7	1.1 BJH	1.6 U	1.3 U	0 86 U	0 72 U
Silver	0 43 B	0.30 B	0 73 B	0 65 B	0 20 U	0 17 U
Sodium	287 B	345 B	479 BU	391 B	209 B	169 B
Thallium	0 94 U	1.0 U	1.9 U	1.5 U	0 99 U	0 83 U
Total Mercury	0 06 U	0.06 U	0.21 B	0.10 U	0 06 U	0 05 U
Vanadium	23 7	17.4	40.9	21.3	5 4 B	12 6
Zinc	92 3	68.2	71.9	57.3	7 5	23 2
Conventional Parameters						
Total Organic Carbon (mg/kg)	44700	48200	23100	20300	1000 U	
Grain Size (%)						
Percent Gravel	0	1	1 <	1	20	0
Percent Sand	90	5 <	40	15	80	100
Percent Silt	10	90	60	40	1 <	0
Percent Clay	0	5	0	44	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS050	TS051	TS052	TS053	TS054	TS055
	Sample ID:	TR-125-SD	TR-100-SD	TR-101-SD	TR-102-SD	TR-103-SD	TR-108-SD
	Sample Date:	06/09/2001	06/07/2001	06/07/2001	06/07/2001	06/07/2001	06/04/2001
	Depth (feet):	0 in to 3 in	0 in to 3 in	0 in to 4 in	0 in to 2 in	0 in to 2 in	0 in to 1 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)							
4,4'-DDT (p,p'-DDT)							
Alpha-chlordane							
Beta-BHC							
Endrin							
Endrin Aldehyde							
Methoxychlor							
PCB-1254 (Aroclor 1254)							
PCB-1260 (Aroclor 1260)							
Inorganics (Total) (mg/kg)							
Aluminum		3760	8560	2040	3080	3670	3740
Antimony		1 1 BUJK	0.91 BJL	0.66 UJK	0.70 UJK	0 60 UJK	0 88 U
Arsenic		1.1 U	2.1 B	1 7 B	1.5 B	1 2 B	2 8 BU
Barium		25 9 B	87.4	36.8 B	25 8 B	42 4	72 2
Beryllium		0 15 B	0 41 B	0.14 B	0.20 B	0 22 B	0 23 B
Cadmium		0.08 U	0 56 B	0.07 U	0.07 U	0 06 U	0 09 U
Calcium		1850	10100	2490 JK	1420	2470	13800
Chromium		9 4	21 5	3.9	5 9	8 4	9 9
Cobalt		1 9 B	4 6 B	1 9 B	1 9 B	3 7 B	2 6 B
Copper		13 6 JL	27 0 JL	6 7 JL	6 4 JL	7 3 JL	5 7 B
Iron		5970	11200	5480	5700	6800	7270 JK

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

	Station ID:	TS050	TS051	TS052	TS053	TS054	TS055
	Sample ID:	TR-125-SD	TR-100-SD	TR-101-SD	TR-102-SD	TR-103-SD	TR-108-SD
	Sample Date:	06/09/2001	06/07/2001	06/07/2001	06/07/2001	06/07/2001	06/04/2001
Constituent	Depth (feet):	0 in to 3 in	0 in to 3 in	0 in to 4 in	0 in to 2 in	0 in to 2 in	0 in to 1 in
Lead		5.8 JL	34.0 JL	8 4 JH	3.9 JL	6 0 JL	3 9
Magnesium		1920	3580	1210	1430	2440	2310
Manganese		77.5	338	449	109	243	288
Nickel		5 8 B	12.3	3 8 B	4 8 B	8 4	7 5 B
Potassium		576 B	1870	581 B	792 B	1120	937 BJL
Selenium		0 91 U	1 3 B	0 75 U	0 79 U	0 68 U	1 0 U
Silver		0.45 BU	0.60 BU	0 18 U	0 23 BU	0 38 BU	0 34 B
Sodium		303 BU	255 BU	139 B	178 BU	193 BU	315 B
Thallium		1 0 U	1.0 U	0.86 U	0.91 U	0 79 U	1 1 U
Total Mercury		0 07 U	0 07 U	0 06 U	0 06 U	0 05 U	0 07 U
Vanadium		10 6 B	22 4	6 7 B	10 7 B	12 8	12 0 B
Zinc		20 7	65.8	17.5	15 8	22 4	24 8
Conventional Parameters							
Total Organic Carbon (mg/kg)							
Grain Size (%)							
Percent Gravel		1 <	0	0	0	0	0
Percent Sand		70	70	100	85	100	90
Percent Silt		20	30	0	15	0	5
Percent Clay		10	0	0	0	0	5

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID.	TS056	TS057	TS058	TS059	TS060	TS061
	Sample ID:	TR-109-SD	TR-110-SD	TR-111-SD	TR-112-SD	TR-113-SD	TR-123-SD
	Sample Date:	06/06/2001	06/06/2001	06/06/2001	06/09/2001	06/06/2001	06/06/2001
	Depth (feet):	0 in to 1.5in	0 in to 3 in	0 in to 4 in	0 in to 5 in	0 in to 1 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		3 9 U	4 1 U				
4,4'-DDT (p,p'-DDT)		3 9 U	4 1 U				
Alpha-chlordane		2 0 U	2.1 U				
Beta-BHC		2 0 U	2.1 U				
Endrin		3 9 U	4.1 U				
Endrin Aldehyde		3.9 U	4.1 U				
Methoxychlor		20 U	21 U				
PCB-1254 (Aroclor 1254)		39 U	41 U				
PCB-1260 (Aroclor 1260)		39 U	41 U				
Inorganics (Total) (mg/kg)							
Aluminum		5370	4340	1210	4410	8190	8100
Antimony		0 74 UJK	0.78 UJK	0.84 UJK	0.91 BUJK	1 0 BJL	1 9 BUJK
Arsenic		4.3 JL	4.5 JL	1 1 UJK	1.4 B	25 5	30 0
Barium		114	71.2	11 0 B	57 4	75 4	110
Beryllium		0.21 B	0.11 B	0 07 B	0.22 B	0 34 B	0 45 B
Cadmium		0 07 U	0 08 U	0 08 U	0.08 U	0 06 U	2 1
Calcium		161000	82800	910 B	22800	16700	10800 JK
Chromium		9 8	9.5	1.6 B	15 8	31 4	16 1
Cobalt		3 4 B	2.7 B	0.60 B	2.5 B	7 0 B	9 3 B
Copper		12 2 JL	7 5 JL	1 7 BJL	8.2 JL	15 6 JL	29 9 JL
Iron		8940	11300	2040	8030	17300	19500

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS056	TS057	TS058	TS059	TS060	TS061
	Sample ID:	TR-109-SD	TR-110-SD	TR-111-SD	TR-112-SD	TR-113-SD	TR-123-SD
	Sample Date:	06/06/2001	06/06/2001	06/06/2001	06/09/2001	06/06/2001	06/06/2001
	Depth (feet):	0 in to 1.5in	0 in to 3 in	0 in to 4 in	0 in to 5 in	0 in to 1 in	0 in to 3 in
Lead		8 0 JL	4 7 JL	1 5 UJK	6 5 JL	7 8 JL	18 0 JH
Magnesium		4540	3740	569 B	2780	5960	4530
Manganese		220	172	64.4	134	296	599
Nickel		9 6 B	9.5 B	1 2 B	7.4 B	28 4	24 9
Potassium		1170 B	607 B	298 B	767 B	1020	1390
Selenium		0 84 U	1.1 B	0 95 U	0.92 B	0 69 U	0 76 U
Silver		0 20 U	0.21 B	0 22 U	0 34 BU	0 60 BU	0 64 B
Sodium		274 B	201 B	203 B	254 BU	216 BU	188 B
Thallium		0.96 U	1 0 U	1.1 U	1 0 U	0 79 U	0 87 U
Total Mercury		0 06 U	0 06 U	0.07 U	0 07 U	0 05 U	0 06 U
Vanadium		12 8	12.8 B	3.4 B	13.3	28 0	25 7
Zinc		55.5	34.4	7.0	32.2	55 6	540
Conventional Parameters							
Total Organic Carbon (mg/kg)		33200	1310				
Grain Size (%)							
Percent Gravel		0	0	0	10	15	5
Percent Sand		80	80	100	70	75	90
Percent Silt		20	20	0	10	10	5
Percent Clay		0	0	0	10	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS062	TS063	TS064	TS065	TS066	TS067
	Sample ID:	TR-124-SD	TR-126-SD	TR-037-SD	TR-038-SD	TR-039-SD	TR-114-SD
	Sample Date:	06/06/2001	06/08/2001	06/08/2001	06/08/2001	06/08/2001	06/05/2001
	Depth (feet):	0 in to 7 in	0 in to 4 in	0 in to 3 5in	0 in to 1 in	0 in to 1 5in	0 in to 2 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)			3.4 U	4 2 U	3.8 U		4 1 U
4,4'-DDT (p,p'-DDT)			3.4 U	4.2 U	3.8 U		4 1 U
Alpha-chlordane			1.7 U	2.2 U	1 9 U		2 1 U
Beta-BHC			1.7 U	2.2 U	1 9 U		2 1 U
Endrin			3.4 U	4.2 U	3 8 U		4 1 U
Endrin Aldehyde			3.4 U	4 2 U	3 8 U		4 1 U
Methoxychlor			17 U	22 U	19 U		21 U
PCB-1254 (Aroclor 1254)			34 U	42 U	38 U		41 U
PCB-1260 (Aroclor 1260)			34 U	42 U	38 U		41 U
Inorganics (Total) (mg/kg)							
Aluminum		2600	6790	5210	10300	7350	1900
Antimony		0 78 UJK	0.61 BUJK	0 79 UJK	1.5 BUJK	2 5 BUJK	0 81 U
Arsenic		2 5 BJL	9 2	5 8 JL	10 7	2 1 U	1 3 B
Barium		40 2 B	73 4	156	124	167	11 5 B
Beryllium		0 12 B	0.23 B	0 18 B	0.45 B	0 34 B	0 12 B
Cadmium		0 08 U	0.06 U	0.39 B	0.88 B	0 50 B	0 08 U
Calcium		3960	33400	174000	12500	106000	1790
Chromium		6 5	17 6	11 2	20.1	21 4	3 2
Cobalt		1 7 B	5 6 B	4 0 B	7.9 B	4.6 B	0 91 B
Copper		5 0 BJL	22.0 JL	14.3 JL	30 0 JL	19 4 JL	1 7 B
Iron		5240	16500	9450	18600	13200	3370 JK

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS062	TS063	TS064	TS065	TS066	TS067
Sample ID:	TR-124-SD	TR-126-SD	TR-037-SD	TR-038-SD	TR-039-SD	TR-114-SD
Sample Date:	06/06/2001	06/08/2001	06/08/2001	06/08/2001	06/08/2001	06/05/2001
Constituent Depth (feet):	0 in to 7 in	0 in to 4 in	0 in to 3 5in	0 in to 1 in	0 in to 1 5in	0 in to 2 in
Lead	5.1 JL	8.5 JL	28.7 JL	65 5 JL	20 6 JL	1 8 U
Magnesium	1680	7750	4080	5340	6700	1620
Manganese	129	250	293	421	167	56 7
Nickel	4 9 B	17.9	11 3	19 2	15 1 B	2 3 B
Potassium	532 B	1160	824 B	2860	1760 B	431 BJL
Selenium	0 88 U	0.68 U	0 89 U	0 80 U	3 8	0 92 U
Silver	0 24 B	0.73 BU	0.21 U	0 86 BU	0 56 BU	0 22 U
Sodium	210 B	282 B	275 B	265 BU	562 BU	222 B
Thallium	1.0 U	0.78 U	1.0 U	0 92 U	2 1 U	1 1 U
Total Mercury	0 07 U	0 05 U	0 07 U	0 05 U	0 13 U	0 07 U
Vanadium	9 0 B	30.7	11.4 B	28 3	20 1 B	5 3 B
Zinc	20 2	50.5	52.0	123	102	7 6
Conventional Parameters						
Total Organic Carbon (mg/kg)		6020	15800	45400		2040
Grain Size (%)						
Percent Gravel	0	2	5	1 <	0	10
Percent Sand	90	98	75	60	40	90
Percent Silt	0	0	20	40	55-60	0
Percent Clay	10	0	1 <	1 <	5 <	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID.	TS068	TS069	TS070	TS071	TS072	TS073
Sample ID:	TR-115-SD	TR-119-SD	TR-116-SD	TR-117-SD	TR-118-SD	TR-120-SD
Sample Date:	06/06/2001	06/05/2001	06/05/2001	06/05/2001	06/05/2001	06/05/2001
Constituent Depth (feet):	0 in to 1 in	0 in to 3 in	0 in to 8 in	0 in to 2 in	0 in to 3 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)					3 5 U	
4,4'-DDT (p,p'-DDT)					3 5 U	
Alpha-chlordane					0 89 JQ	
Beta-BHC					1 8 U	
Endrin					3 5 U	
Endrin Aldehyde					0 64 JQ	
Methoxychlor					18 U	
PCB-1254 (Aroclor 1254)					35 U	
PCB-1260 (Aroclor 1260)					35 U	
Inorganics (Total) (mg/kg)						
Aluminum	7960	6430	5530	7360	5870	4190
Antimony	1 0 BJL	0 89 U	1.5 B	1 6 B	1 7 B	0 82 U
Arsenic	14 9 JL	4 0	14.2	42 5	17 9	2 5 BU
Barium	116	49 4 B	73 4	153	106	31 8 B
Beryllium	0 42 B	0 38 B	0 36 B	0 41 B	0 37 B	0 25 B
Cadmium	0 06 U	0 09 U	0.66 B	0 07 U	0 12 B	0 08 U
Calcium	21000	2280	3720	25400	47900	12400
Chromium	21.1	13 6	13.3	21 5	12 6	8 4
Cobalt	7 9 B	4.0 B	5 8 B	8 8 B	7 4 B	2 4 B
Copper	28 8 JL	8.8	20 6	49 0	59 0	5 6 B
Iron	25000	12900 JK	18900 JK	27400 JK	22200 JK	6660 JK

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS068	TS069	TS070	TS071	TS072	TS073
Sample ID:	TR-115-SD	TR-119-SD	TR-116-SD	TR-117-SD	TR-118-SD	TR-120-SD
Sample Date:	06/06/2001	06/05/2001	06/05/2001	06/05/2001	06/05/2001	06/05/2001
Constituent / Depth (feet):	0 in to 1 in	0 in to 3 in	0 in to 8 in	0 in to 2 in	0 in to 3 in	0 in to 3 in
Lead	14 2 JL	7.1	62.2	14.7	11 2	3 4
Magnesium	5170	3640	2710	4570	5210	6860
Manganese	452	191	230	602	495	140
Nickel	24.1	13.3	14 8	31 9	21 9	6 3 B
Potassium	1210	910 BJL	1330 JL	1230 JL	812 BJL	741 BJL
Selenium	0 78 B	1 0 U	1 2	1 0 B	0 71 U	0 95 B
Silver	0 77 B	0 47 B	0 63 B	0 78 B	0 51 B	0 26 B
Sodium	164 B	219 B	200 B	182 B	178 B	261 B
Thallium	0 82 U	1 2 U	0 93 U	1 1 B	0 81 U	1 1 U
Total Mercury	0 05 U	0 08 U	0 08 B	0.05 U	0 05 U	0 07 U
Vanadium	33.0	24.7	25.5	35.1	24 8	10 2 B
Zinc	78 5	34 5	83 8	59 7	76 0	16 8
Conventional Parameters						
Total Organic Carbon (mg/kg)					10700	
Grain Size (%)						
Percent Gravel	10	5	0	0	10	0
Percent Sand	75	95	90	85	90	100
Percent Silt	15	0	10	15	0	0
Percent Clay	0	0	0	0	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date: / Depth (feet):	TS074	TS075	TS076	TS077	TS078	TS079
	Sample ID:	TR-121-SD	TR-122-SD	TR-001-SD	TR-002-SD	TR-005-SD	TR-004-SD
	Sample Date:	06/05/2001	06/05/2001	05/21/2001	05/22/2001	05/22/2001	05/22/2001
	Depth (feet):	0 in to 5 in	0 in to 2 in	0 in to 1 in	0 in to 1 in	0 in to 1 in	0 in to 1 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)			4 6 U				
4,4'-DDT (p,p'-DDT)			4 6 U				
Alpha-chlordane			2 4 U				
Beta-BHC			2.4 U				
Endrin			4.6 U				
Endrin Aldehyde			4.6 U				
Methoxychlor			24 U				
PCB-1254 (Aroclor 1254)			46 U				
PCB-1260 (Aroclor 1260)			46 U				
Inorganics (Total) (mg/kg)							
Aluminum		2840	4530	7070 JL	7770 JL	9190 JL	8750 JL
Antimony		0 79 U	0 87 UJK	1 0 BJL	9 4 BJL	3 3 BJL	3 4 BJL
Arsenic		1 6 BU	1.4 B	3 2 JH	25 4 JH	54 0 JH	23 5 JH
Barium		33.6 B	42 6 B	74.5 JK	406 JK	183 JK	128 JK
Beryllium		0 16 B	0 30 B	0 32 B	0 30 B	0 45 B	0 36 B
Cadmium		0 08 U	0.09 U	0 86 B	15.3	2 1	2 5
Calcium		43700	2870 JK	6540 JL	17500 JL	5390 JL	24100 JL
Chromium		6 2	13 1	14 4 JL	12 5 JL	12 4 JL	14 5 JL
Cobalt		1.5 B	3 1 B	4 2 BJL	5.4 BJL	8 1 BJL	6 4 BJL
Copper		3 5 B	7.3 JL	11.2	33.5	31 4	30 3
Iron		4650 JK	9730	11600 JL	15300 JL	22700 JL	17500 JL

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS074	TS075	TS076	TS077	TS078	TS079
	Sample ID:	TR-121-SD	TR-122-SD	TR-001-SD	TR-002-SD	TR-005-SD	TR-004-SD
	Sample Date:	06/05/2001	06/05/2001	05/21/2001	05/22/2001	05/22/2001	05/22/2001
	Depth (feet):	0 in to 5 in	0 in to 2 in	0 in to 1 in	0 in to 1 in	0 in to 1 in	0 in to 1 in
Lead		2 3	3 9 JH	47.4 JL	603 JL	85 5 JL	107 JL
Magnesium		4080	2860	3390 JL	4520 JL	3860 JL	6170 JL
Manganese		110	151	190 JL	997 JL	716 JL	659 JL
Nickel		4 4 B	8 7 B	11 6	14 2	17 6	17 8
Potassium		419 BJL	714 B	1710 JL	2020 JL	2820 JL	1870 JL
Selenium		0 89 U	0 99 U	0.69 U	1 6 B	1 5	3 0
Silver		0 21 U	0 25 B	0 30 B	0 66 B	0 62 B	0 55 B
Sodium		242 B	264 B	168 B	260 B	154 B	222 B
Thallium		1 0 U	1 1 U	0.79 U	1 3 U	0 83 U	1 0 UJK
Total Mercury		0 07 U	0.07 U	0.14	0 22	0 05 U	0 09 B
Vanadium		8 1 B	20 8	19.7 JL	23 1 JL	27 3 JL	21 9 JL
Zinc		12 4	24.5	78.1	585	146	202
Conventional Parameters							
Total Organic Carbon (mg/kg)			2850				
Grain Size (%)							
Percent Gravel		15	0	0	0	15	15
Percent Sand		75	100	20	33	50	50
Percent Silt		10	0	40	67	35	35
Percent Clay		0	0	20	0	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS080	TS081	TS082	TS083	TS084	TS085
Sample ID:	TR-006-SD	TR-007-SD	TR-008-SD	TR-009-SD	TR-010-SD	TR-011-SD
Sample Date:	05/22/2001	05/22/2001	05/22/2001	05/23/2001	05/23/2001	05/23/2001
Constituent — Depth (feet).	0 in to 1 in	0 in to 1 in	0 in to 1 in	0 in to 2 in	0 in to 2 in	0 in to 0 5in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)						
4,4'-DDT (p,p'-DDT)						
Alpha-chlordane						
Beta-BHC						
Endrin						
Endrin Aldehyde						
Methoxychlor						
PCB-1254 (Aroclor 1254)						
PCB-1260 (Aroclor 1260)						
Inorganics (Total) (mg/kg)						
Aluminum	6080 JL	5770 JL	5650 JL	6290 JL	3350 JL	3510 JL
Antimony	1 8 BJL	2.6 BJL	2 4 BJL	3 5 BJL	0 61 UJK	1 3 BJL
Arsenic	9 8 JH	3 1 U	6 3 JH	4.1 JH	1 8 BJH	6 2 JH
Barium	130 JK	114 BJK	152 JK	115 JK	37 7 BJK	72 9 JK
Beryllium	0 21 B	0.23 B	0.24 B	0 25 B	0 16 B	0 13 B
Cadmium	0 23 B	1.4 B	2 4	8 4	0 07 B	0 32 B
Calcium	102000 JL	59900 JL	82600 JL	34300 JL	1780 JL	19500 JL
Chromium	16 7 JL	13 8 JL	12 0 JL	14.1 JL	6 8 JL	10 2 JL
Cobalt	5 8 BJL	3 1 BJL	3.9 BJL	3 4 BJL	2 4 BJL	2 1 BJL
Copper	15.5	27.9	18.9	41 3	5 5	10 1
Iron	12700 JL	9180 JL	9040 JL	10700 JL	6340 JL	9260 JL

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS080	TS081	TS082	TS083	TS084	TS085
	Sample ID:	TR-006-SD	TR-007-SD	TR-008-SD	TR-009-SD	TR-010-SD	TR-011-SD
	Sample Date:	05/22/2001	05/22/2001	05/22/2001	05/23/2001	05/23/2001	05/23/2001
	Depth (feet):	0 in to 1 in	0 in to 1 in	0 in to 1 in	0 in to 2 in	0 in to 2 in	0 in to 0 5in
Lead		13 8 JL	54 3 JL	79 4 JL	128 JL	5 3 JL	15 7 JL
Magnesium		5740 JL	6130 JL	4970 JL	5130 JL	1610 JL	3890 JL
Manganese		340 JL	133 JL	289 JL	288 JL	114 JL	95 1 JL
Nickel		18 8	19 3 B	11 7	33 5	6 0 B	9 7 B
Potassium		1070 BJL	1540 BJL	1540 JL	1460 BJL	689 BJL	647 BJL
Selenium		2 2	5.0	1.1 B	3.8	0 69 U	1 8
Silver		0 31 U	0 61 U	0 25 B	0 43 B	0 16 U	0 24 U
Sodium		380 B	611 B	237 B	350 B	141 B	244 B
Thallium		1.5 UJK	3 0 UJK	0.98 UJK	1 2 UJK	0 79 UJK	1 2 UJK
Total Mercury		0.09 U	0 19 U	0 10 B	0.11 B	0 05 U	0 07 U
Vanadium		17 9 BJL	14.9 BJL	13 8 JL	28 9 JL	10 8 JL	12 2 BJL
Zinc		79 4	117	185	212	27 4	103
Conventional Parameters							
Total Organic Carbon (mg/kg)							
Grain Size (%)							
Percent Gravel		0	0	0	0	0	0
Percent Sand		60	30	30	40	95	25
Percent Silt		30	60	30	30	5	75
Percent Clay		10	10	40	30	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	TS086	TS087	TS088	TS089	TS090	TS091
Sample ID:	TR-012-SD	TR-013-SD	TR-014-SD	TR-016-SD	TR-040-SD	TR-127-SD
Sample Date:	05/23/2001	05/23/2001	05/23/2001	05/23/2001	06/08/2001	06/08/2001
Depth (feet):	UNK to UNK	0 in to 1 in	0 in to 1 in	0 in to 2 in	0 in to 3 in	0 in to 6 in
Semi-Volatile Organic Compounds (ug/kg)						
Benzyl Butyl Phthalate						
Bis(2-ethylhexyl) Phthalate						
Pesticides/PCBs (ug/kg)						
4,4'-DDE (p,p'-DDE)					4 4 U	
4,4'-DDT (p,p'-DDT)					4 4 U	
Alpha-chlordane					2 3 U	
Beta-BHC					2 3 U	
Endrin					4 4 U	
Endrin Aldehyde					4 4 U	
Methoxychlor					23 U	
PCB-1254 (Aroclor 1254)					44 U	
PCB-1260 (Aroclor 1260)					44 U	
Inorganics (Total) (mg/kg)						
Aluminum	1120 JL	924 JL	9000 JL	5300	5940	8710
Antimony	1 2 BJL	0 80 UJK	2 5 BJL	2 1 B	0 90 UJK	9 6 BJL
Arsenic	2 3 JH	2 6 BJH	7 0 JH	5 0	9 7	12 0
Barium	119 JK	145 JK	126 BJK	98 0	42 6 B	288
Beryllium	0 04 U	0 05 U	0 35 B	0 19 B	0 20 B	0 37 B
Cadmium	0 41 B	0.77 B	5 1	3 7	0 09 U	10 5
Calcium	306000 JL	336000 JL	42800 JL	11400	4590	5510
Chromium	1.5 BJL	1.7 BJL	19.7 JL	7 6	16 6	12 3
Cobalt	0 48 BJL	0.44 BJL	5 2 BJL	2.6 B	4 7 B	4 5 B
Copper	4.0 B	6.3 B	36.0	15.9 JL	10 6 JL	15 1 JL
Iron	1440 JL	1030 JL	11700 JL	8440	12500	11400

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS086	TS087	TS088	TS089	TS090	TS091
Sample ID:	TR-012-SD	TR-013-SD	TR-014-SD	TR-016-SD	TR-040-SD	TR-127-SD
Sample Date:	05/23/2001	05/23/2001	05/23/2001	05/23/2001	06/08/2001	06/08/2001
Constituent / Depth (feet):	UNK to UNK	0 in to 1 in	0 in to 1 in	0 in to 2 in	0 in to 3 in	0 in to 6 in
Lead	10 8 JL	18.9 JL	21.8 JL	105	7 2 JL	405 JL
Magnesium	2980 JL	3800 JL	4100 JL	2690 JL	4240	2770
Manganese	41 4 JL	46.6 JL	238 JL	326	192	1210
Nickel	3 3 B	2 9 B	35 0	7 4 B	25 9	10 8
Potassium	296 BJL	265 BJL	1320 BJL	1140 B	771 B	1490
Selenium	0 73 U	0 91 U	3 3	1 4 JL	1 0 U	0 88 U
Silver	0.17 U	0.21 U	0 70 B	0 41 B	0 75 BU	0 72 BU
Sodium	205 B	276 B	723 B	213 B	408 B	273 BU
Thallium	0 84 UJK	1.0 UJK	2 5 UJK	1.1 U	1 2 U	1 0 U
Total Mercury	0 05 U	0 06 U	0 16 U	0 07 U	0 07 U	0 08 B
Vanadium	3 6 BJL	2 7 BJL	24.6 BJL	13 3 B	29 3	17 7
Zinc	28 5	55 7	135	421	37 0	495
Conventional Parameters						
Total Organic Carbon (mg/kg)					9430	
Grain Size (%)						
Percent Gravel		10	0	1	5 <	0
Percent Sand		60	60	90	85	70
Percent Silt		30	35	10	10	30
Percent Clay		0	5	0	1 <	1 <

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS092	TS093	TS094	TS095	TS096	TS097
	Sample ID:	TR-041-SD	TR-017-SD	TR-018-SD	TR-019-SD	TR-042-SD	TR-020-SD
	Sample Date:	06/08/2001	05/24/2001	05/24/2001	05/24/2001	06/08/2001	05/24/2001
	Depth (feet):	0 in to 1 in	0 in to 2 in	0 in to 3 in	0 in to 2 in	0 in to 5 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		5.1 U				4 4 U	
4,4'-DDT (p,p'-DDT)		5 1 U				4 4 U	
Alpha-chlordane		2 6 U				2 3 U	
Beta-BHC		2 6 U				2 3 U	
Endrin		5 1 U				4 4 U	
Endrin Aldehyde		5 1 U				4 4 U	
Methoxychlor		26 U				23 U	
PCB-1254 (Aroclor 1254)		51 U				44 U	
PCB-1260 (Aroclor 1260)		51 U				44 U	
Inorganics (Total) (mg/kg)							
Aluminum		4900	7530 JL	8880	1200	4190	5740
Antimony		1.5 UJK	1.2 BJL	0.63 B	1.7 U	1 2 BUJK	1 2 U
Arsenic		5 2	7.7 JH	7.0	2 2 U	4 8	4 8 JL
Barium		105	84.6 JK	108	59 8 B	42 4 B	148
Beryllium		0 17 B	0.31 B	0.34 B	0.11 U	0 21 B	0 24 B
Cadmium		0 16 B	1.3	1.1	0.23 B	0 08 U	1 0 B
Calcium		49100	3030 JL	5440	91500	13700	121000
Chromium		14 9	16.8 JL	19.9	3.7 B	11 3	14 7
Cobalt		3 6 B	5.5 BJL	4.7 B	0.61 U	3 9 B	4 3 B
Copper		11 5 BJL	15.5	13.7 JL	3 6 BJL	10 2 JL	16 1 JL
Iron		9410	13500 JL	16000	2600	10900	9520

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS092	TS093	TS094	TS095	TS096	TS097
	Sample ID:	TR-041-SD	TR-017-SD	TR-018-SD	TR-019-SD	TR-042-SD	TR-020-SD
	Sample Date:	06/08/2001	05/24/2001	05/24/2001	05/24/2001	06/08/2001	05/24/2001
	Depth (feet):	0 in to 1 in	0 in to 2 in	0 in to 3 in	0 in to 2 in	0 in to 5 in	0 in to 3 in
Lead		11.3 JL	50 2 JL	44.0	5.5	9 3 JL	22 2
Magnesium		3210	3700 JL	4300 JL	1290 BJL	3480	3410 JL
Manganese		993	352 JL	450	73 0	183	564
Nickel		9 9 B	14 8	18 8	2 9 B	11 7	16 7
Potassium		705 B	1910 JL	1460	300 B	571 B	1140 B
Selenium		1 7 U	0 82 B	0 71 UJK	1.9 UJK	0 88 U	2 1 JL
Silver		0.49 BU	0.40 B	0 60 B	0 44 U	0 51 BU	0 39 B
Sodium		523 BU	217 B	133 B	317 B	237 BU	291 B
Thallium		1.9 U	0.85 UJK	0.81 U	2 2 U	1 0 U	1 6 U
Total Mercury		0 12 U	0 05 U	0 05 U	0 13 U	0 06 U	0 10 U
Vanadium		16.7 B	24 9 JL	23 7	4 2 B	20 0	16 1 B
Zinc		42 2	97 0	109	16 2	48 4	95 2
Conventional Parameters							
Total Organic Carbon (mg/kg)		30400				6900	
Grain Size (%)							
Percent Gravel		0	0	1	0	5	0
Percent Sand		60	50	40	60	85	40
Percent Silt		30	40	50	40	10	40
Percent Clay		10 <	10	10	0	0	20

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS098	TS099	TS100	TS101	TS102	TS103
	Sample ID:	TR-022-SD	TR-043-SD	TR-023-SD	TR-044-SD	TR-024-SD	TR-025-SD
	Sample Date:	05/24/2001	06/08/2001	05/24/2001	06/09/2001	05/24/2001	05/24/2001
	Depth (feet):	0 in to 3 in	0 in to 4 in	0 in to 1 5in	0 in to 4 in	0 in to 1 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)			4 4 U		4 0 U		
4,4'-DDT (p,p'-DDT)			4 4 U		4 0 U		
Alpha-chlordane			2 3 U		2 1 U		
Beta-BHC			2 3 U		2 1 U		
Endrin			6 3		4 0 U		
Endrin Aldehyde			4.4 U		4 0 U		
Methoxychlor			23 U		21 U		
PCB-1254 (Aroclor 1254)			44 U		40 U		
PCB-1260 (Aroclor 1260)			44 U		40 U		
Inorganics (Total) (mg/kg)							
Aluminum		7140	3090	11500	6750	11300	2300
Antimony		3 3 B	0.83 UJK	4.8 B	0 91 BUJK	1 8 B	1 4 U
Arsenic		8.6	1 6 B	15.9	3 8	7 7	1 9 U
Barium		273	41.5 B	210	60 2	219	198
Beryllium		0 32 B	0 17 B	0.60 B	0 26 B	0 60 B	0 09 U
Cadmium		21.5	0.17 B	11.4	0.11 B	3 4	0 86 B
Calcium		155000	6380	16900	36200	8070	185000
Chromium		21.3	4 6	23 1	15.7	23 6	4 8
Cobalt		5 5 B	1 6 B	8.0 B	4.6 B	6 6 B	1 0 B
Copper		42 5 JL	3 9 BJL	42 2 JL	12.7 JL	51 8 JL	4 9 BJL
Iron		11700	6230	19300	13900	20200	3160

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS098	TS099	TS100	TS101	TS102	TS103
	Sample ID:	TR-022-SD	TR-043-SD	TR-023-SD	TR-044-SD	TR-024-SD	TR-025-SD
	Sample Date:	05/24/2001	06/08/2001	05/24/2001	06/09/2001	05/24/2001	05/24/2001
	Depth (feet):	0 in to 3 in	0 in to 4 in	0 in to 1 5in	0 in to 4 in	0 in to 1 in	0 in to 3 in
Lead		84 8	13.2 JL	478	8 1 JL	208	10 8
Magnesium		4990 JL	2790	5630 JL	4910	6580 JL	2910 JL
Manganese		277	113	594	208	193	301
Nickel		36.8	4.3 B	20 7	16.0	19 5	4 1 B
Potassium		1340 B	701 B	2540	1380	1290	571 B
Selenium		28 4 JL	0.95 U	0 92 UJK	0.92 U	1 4 JL	1 6 UJK
Silver		0.71 B	0 40 BU	1 1 B	0 59 BU	1 0 B	0 37 U
Sodium		236 B	241 BU	174 B	297 BU	173 B	327 B
Thallium		1 2 U	1 1 U	1 1 U	1.1 U	0 81 U	1 8 U
Total Mercury		0.07 U	0.06 U	0 14 B	0.06 U	0 14	0 11 U
Vanadium		21.1	11.9 B	31.7	26 6	33 8	5 2 B
Zinc		403	98.4	581	138	379	31 4
Conventional Parameters							
Total Organic Carbon (mg/kg)			7670		9280		
Grain Size (%)							
Percent Gravel			0	0	3	0	0
Percent Sand			97	75	87	20	85
Percent Silt			3	25	10	80	15
Percent Clay			0	0	0	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS104	TS105	TS106	TS107	TS108	TS109
	Sample ID:	TR-045-SD	TR-047-SD	TR-026-SD	TR-027-SD	TR-028-SD	TR-029-SD
	Sample Date:	06/09/2001	06/08/2001	05/31/2001	05/31/2001	05/31/2001	06/01/2001
	Depth (feet):	0 in to 2 in	0 in to 4 in	0 in to 2 in	0 in to 4 in	0 in to 4 5in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		4 6 U	4.0 U	3 4 U		6 0 U	5 0 U
4,4'-DDT (p,p'-DDT)		4 6 U	4.0 U	3 4 U		5 2 J	5 0 U
Alpha-chlordane		2.4 U	2.1 U	1.8 U		3 1 U	2 6 U
Beta-BHC		2 4 U	2.1 U	1.8 U		3 1 U	2 6 U
Endrin		4 6 U	4 0 U	3.4 U		6 0 U	5 0 U
Endrin Aldehyde		4 6 U	4.0 U	3.4 U		6 0 U	5 0 U
Methoxychlor		24 U	21 U	18 U		34	36
PCB-1254 (Aroclor 1254)		46 U	40 U	34 U		60 U	50 U
PCB-1260 (Aroclor 1260)		46 U	40 U	34 U		60 U	50 U
Inorganics (Total) (mg/kg)							
Aluminum		6480	3480	9470	8840	5890	8130
Antimony		1 1 BJL	0.74 UJK	0.62 UJK	0 81 B	2 4 B	0 89 U
Arsenic		3 7	2.6	7.7	7.0	4 5	4 9
Barium		121	28.4 B	104	155	102	127
Beryllium		0 31 B	0 13 B	0 69 B	0 48 B	0 30 B	0 19 B
Cadmium		1 8	0.07 U	0.06 U	0 54 B	4 8	0 79 B
Calcium		110000	3330	6120	10500	5630	15600
Chromium		20 6	7 4	31 8	26 1	14 4	13 8
Cobalt		4.5 B	2.1 B	7.0 B	6 7 B	5 3 B	8 5 B
Copper		18 3 JL	6 7 JL	21.4 JL	26.8 JL	22 3 JL	26 7 JL
Iron		10800	6850	18800	18700	14300	19100

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	TS104	TS105	TS106	TS107	TS108	TS109
Sample ID:	TR-045-SD	TR-047-SD	TR-026-SD	TR-027-SD	TR-028-SD	TR-029-SD
Sample Date:	06/09/2001	06/08/2001	05/31/2001	05/31/2001	05/31/2001	06/01/2001
Constituent Depth (feet):	0 in to 2 in	0 in to 4 in	0 in to 2 in	0 in to 4 in	0 in to 4 5in	0 in to 3 in
Lead	29 3 JL	3.3 JL	23.7	73 8	151	16 5
Magnesium	4210	2470	6030	7400 JL	3120 JL	4290 JL
Manganese	223	123	348	291	139	358
Nickel	17.4	8 3 B	24 6	20 2	12 1 B	29 8
Potassium	1450	596 B	1290	1270	1540 B	694 B
Selenium	1 7	0.84 U	0 70 U	1.8 JL	2 4 JL	1 6 JL
Silver	0 47 B	0.37 BU	0 69 B	0 74 B	0 67 B	0 79 B
Sodium	294 BU	255 BU	345 B	260 B	148 B	139 B
Thallium	1 1 U	0 96 U	0 80 U	0 90 U	1 4 UJK	1 2 UJK
Total Mercury	0 07 U	0 06 U	0 08 B	0 18	0 09 U	0 07 U
Vanadium	22 5	12.4	39 5	32 3	24 9	18 2
Zinc	148	21 2	78 8	238	220	134
Conventional Parameters						
Total Organic Carbon (mg/kg)	42700	1000 U	4980		57700	13200
Grain Size (%)						
Percent Gravel	1	5	10	10	0	5
Percent Sand	70	95	50	50	50	55
Percent Silt	25	0	40	30	40	30
Percent Clay	5	0	0	10 <	10	10

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID: / Sample ID: / Sample Date: / Depth (feet):	TS110	US001	US002	US003	US004	US005
	Sample ID:	TR-030-SD	BK-150-SD	BK-152-SD	BK-153-SD	BK-155-SD	BK-130-SD
	Sample Date:	06/01/2001	06/27/2001	06/28/2001	06/28/2001	06/28/2001	06/25/2001
	Depth (feet):	0 in to 8 in	0 in to 3 in	0 in to 2 in	0 in to 4 in	0 in to 2 in	0 in to 3 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate							
Bis(2-ethylhexyl) Phthalate							
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		4 3 U	5.1 U	4 2 U	3 8 U	3 9 U	5 3 U
4,4'-DDT (p,p'-DDT)		5 9 JQ	5.1 U	4 2 U	3 8 U	3 9 U	5 3 U
Alpha-chlordane		2 2 U	2.6 U	2 2 U	2 0 U	2 0 U	2 7 U
Beta-BHC		2 2 U	2 6 U	2 2 U	2 0 U	2 0 U	2 7 U
Endrin		4 3 U	5.1 U	4.2 U	3 8 U	3 9 U	5 3 U
Endrin Aldehyde		4 3 U	5.1 U	4 2 U	3.8 U	3 9 U	5 3 U
Methoxychlor		22 U	26 U	22 U	20 U	20 U	27 U
PCB-1254 (Aroclor 1254)		43 U	51 U	42 U	38 U	39 U	53 U
PCB-1260 (Aroclor 1260)		43 U	51 U	42 U	38 U	39 U	53 U
Inorganics (Total) (mg/kg)							
Aluminum		6850	3750	5120	9960	7950	3410
Antimony		14.3 JL	9 2 U	7 2 U	6 8 U	6 5 U	8 6 U
Arsenic		21 4	6.7	1.5 B	0 47 U	2 6	1 9 B
Barium		51 4	166	34 2 B	19 2 B	68 4	50 8 B
Beryllium		0 26 B	0 20 U	0 17 U	0.17 U	0 36 U	0 20 U
Cadmium		2 8	46 2 JK	0.35 BJK	0 05 UJK	0 38 BJK	0 06 BJK
Calcium		2480	214000 JK	1160 BJK	915 BJK	1520 JK	1760 JK
Chromium		12 6	7 0	7.9	16 4	14 1	2 2 B
Cobalt		2 2 B	2.2 B	4 8 B	10 5 B	9 3 B	1 6 U
Copper		22.7 JL	28.5 JK	6.1 BJK	8.7 JK	12 7 JK	3 7 BJK
Iron		10900	7050	14300	24500	13600	4520

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	TS110	US001	US002	US003	US004	US005
	Sample ID:	TR-030-SD	BK-150-SD	BK-152-SD	BK-153-SD	BK-155-SD	BK-130-SD
	Sample Date:	06/01/2001	06/27/2001	06/28/2001	06/28/2001	06/28/2001	06/25/2001
	Depth (feet):	0 in to 8 in	0 in to 3 in	0 in to 2 in	0 in to 4 in	0 in to 2 in	0 in to 3 in
Lead		589	20.3	6.4	5 0	14 8	2 7
Magnesium		3480	2660	2230	4490	3290	799 B
Manganese		176	177	178	235	699	387
Nickel		8 0 B	66 7	19 9	20 0	20 3	2 5 U
Potassium		1660	353 B	335 B	233 B	556 B	508 B
Selenium		0 81 BJH	0 60 U	0 76 B	0 44 U	0 42 U	0 56 U
Silver		1 1 B	0.85 UJL	0 67 UJL	0 63 UJL	0 60 UJL	0 80 UJL
Sodium		326 B	83 6 B	27.4 U	29 9 U	36 4 U	123 B
Thallium		0.88 U	0 91 U	0 72 U	0 68 U	0 65 U	0 86 U
Total Mercury		0 19	0.08 U	0 06 U	0 06 U	0 06 U	0 07 U
Vanadium		17 8	12 3 B	14 0	6 2 B	10 9 B	9 2 B
Zinc		279	1880	60.0	49 0	54 7	18 3
Conventional Parameters							
Total Organic Carbon (mg/kg)		96600	17100	1000 U	1310	19000	7380
Grain Size (%)							
Percent Gravel		1	10	5	5	3	3
Percent Sand		85	85	85	90	92	87
Percent Silt		13	5	10	5	5	10
Percent Clay		1	0	0	0	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Constituent	Station ID:	US006	US007	US008	US009	US010	US011
	Sample ID:	BK-131-SD	BK-134-SD	BK-135-SD	BK-133-SD	BK-139-SD	BK-142-SD
	Sample Date:	06/25/2001	06/25/2001	06/25/2001	06/25/2001	06/25/2001	06/26/2001
	Depth (feet):	0 in to 3 in	0 in to 4 in	0 in to 6 in	0 in to 8 in	0 in to 4 in	2 in to 10 in
Semi-Volatile Organic Compounds (ug/kg)							
Benzyl Butyl Phthalate			130 JQ	450 U	220 JQ		
Bis(2-ethylhexyl) Phthalate			56 JQ	450 U	400 U		
Pesticides/PCBs (ug/kg)							
4,4'-DDE (p,p'-DDE)		4 0 U	4 4 U	4 6 U	4 1 U	4 2 U	33 U
4,4'-DDT (p,p'-DDT)		4 0 U	4.4 U	4 6 U	4 1 U	4 2 U	33 U
Alpha-chlordane		2 0 U	2 3 U	2 3 U	2 1 U	2 2 U	17 U
Beta-BHC		2 0 U	2 3 U	2.3 U	2 1 U	2 2 U	17 U
Endrin		4 0 U	4 4 U	4 6 U	4.1 U	4 2 U	33 U
Endrin Aldehyde		4 0 U	4 4 U	4 6 U	4 1 U	4 2 U	33 U
Methoxychlor		20 U	23 U	23 U	21 U	22 U	170 U
PCB-1254 (Aroclor 1254)		40 U	44 U	46 U	41 U	42 U	330 U
PCB-1260 (Aroclor 1260)		40 U	44 U	46 U	41 U	42 U	330 U
Inorganics (Total) (mg/kg)							
Aluminum		4860	29300	27000	16000	8660	2260 JK
Antimony		7 2 U	8 2 U	8.2 U	7 0 U	7 4 U	34 9 UJK
Arsenic		1 3 B	4 5	7 0	1 5 B	0 51 U	2 4 UJK
Barium		31 1 B	166	214	197	52 3	66 5 BJK
Beryllium		0 27 U	0 79 U	0.80 U	0 59 U	0 74 U	0 24 UJK
Cadmium		0 05 UJK	0 28 BJK	3.3 JK	0 05 UJK	0 05 UJK	1 7 BJK
Calcium		3740 JK	6860 JK	1510 JK	2100 JK	1720 JK	68500 JK
Chromium		6.1	21.5	9.8	10 3	12 3	3 0 UJK
Cobalt		2 7 B	7.5 B	8 1 B	6 2 B	3 9 B	6 5 UJK
Copper		5.1 BJK	13.9 JK	9.8 JK	6 4 JK	4 6 BJK	13 0 BJK
Iron		7020	19200	17800	13200	13200	2310 JK

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	US006	US007	US008	US009	US010	US011
Sample ID:	BK-131-SD	BK-134-SD	BK-135-SD	BK-133-SD	BK-139-SD	BK-142-SD
Sample Date:	06/25/2001	06/25/2001	06/25/2001	06/25/2001	06/25/2001	06/26/2001
Constituent Depth (feet):	0 in to 3 in	0 in to 4 in	0 in to 6 in	0 in to 8 in	0 in to 4 in	2 in to 10 in
Lead	8 0	19.2	139	8 4	5 4	16 1 JK
Magnesium	1860	5190	1640	2300	2750	2260 BJK
Manganese	148	501	2340	501	194	12 2 BJK
Nickel	8 2 B	15.9	10 2 B	10 8	9 9 B	14 1 BJK
Potassium	509 B	1210 B	764 B	885 B	1210 B	398 UJK
Selenium	0 47 U	0 89 B	0 69 B	0 96 B	0 73 B	12 1 JK
Silver	0.66 UJL	0.75 UJL	0 76 UJL	0 64 UJL	0 69 UJL	3 2 UJK
Sodium	131 B	419 B	193 B	140 B	90 9 B	213 BJK
Thallium	0 71 U	0.81 U	0 81 U	0 69 U	0 74 U	3 5 UJK
Total Mercury	0 06 U	0 07 U	0.07 U	0 06 U	0 06 U	0 30 R
Vanadium	10.1 B	27.2	25 4	15.6	14 5	51 9 BJK
Zinc	20 0	135	901	80 6	32 3	42 0 JK
Conventional Parameters						
Total Organic Carbon (mg/kg)	5470				4710	309000
Grain Size (%)						
Percent Gravel	10	0	0	0	15	0
Percent Sand	85	50	75	80	85	0
Percent Silt	5	40	20	20	0	95
Percent Clay	0	10	5	0	0	5

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	US012	US013	US014	US015	US016
Sample ID:	BK-140-SD	BK-138-SD	TR-147-SD	TR-145-SD	TR-136-SD
Sample Date:	06/26/2001	06/26/2001	06/27/2001	06/27/2001	06/27/2001
Constituent — Depth (feet):	0 in to 1 in	0 in to 4 in	0 in to 3 in	0 in to 2 in	0 in to 5 in
Semi-Volatile Organic Compounds (ug/kg)					
Benzyl Butyl Phthalate					
Bis(2-ethylhexyl) Phthalate					
Pesticides/PCBs (ug/kg)					
4,4'-DDE (p,p'-DDE)	4.1 U	3 8 U	4.3 U	4.1 U	3 9 U
4,4'-DDT (p,p'-DDT)	4.1 U	3.8 U	4.3 U	4 1 U	3 9 U
Alpha-chlordane	2 1 U	2.0 U	2 2 U	2 1 U	2 0 U
Beta-BHC	2 1 U	2.0 U	2 2 U	2.1 U	2 0 U
Endrin	4 1 U	3.8 U	4.3 U	4 1 U	3 9 U
Endrin Aldehyde	4 1 U	3 8 U	4 3 U	4 1 U	3 9 U
Methoxychlor	21 U	20 U	22 U	21 U	20 U
PCB-1254 (Aroclor 1254)	41 U	38 U	43 U	41 U	39 U
PCB-1260 (Aroclor 1260)	41 U	38 U	43 U	41 U	39 U
Inorganics (Total) (mg/kg)					
Aluminum	4440	10000	10500	8960	10300
Antimony	7 3 U	7 2 U	28.0	2450	637
Arsenic	1 2 B	0 89 B	862	6180	2850
Barium	26 4 B	18.5 B	52 4 B	55 6	59 5
Beryllium	0 16 U	0.19 U	0.38 U	0 67 U	0 63 U
Cadmium	0 05 UJK	0.05 UJK	9.8 JK	210 JK	152 JK
Calcium	2510 JK	2620 JK	4890 JK	14400 JK	9120 JK
Chromium	7.3	13.2	28 8	16.9	20 9
Cobalt	2 5 B	5.9 B	12 8 B	23 0	20 1
Copper	5 9 BJK	4 2 BJK	25 8 JL	279 JK	106 JK
Iron	10200	22800	29400	62800	63500

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-1 - Sediment Sample Detected Concentrations

Station ID:	US012	US013	US014	US015	US016
Sample ID:	BK-140-SD	BK-138-SD	TR-147-SD	TR-145-SD	TR-136-SD
Sample Date:	06/26/2001	06/26/2001	06/27/2001	06/27/2001	06/27/2001
Constituent — Depth (feet):	0 in to 1 in	0 in to 4 in	0 in to 3 in	0 in to 2 in	0 in to 5 in
Lead	3 3	6.4	494	18300	14100
Magnesium	2160	4260	9140	19200	12800
Manganese	206	292	985	3520	2300
Nickel	8.9 B	17.0	21 6	23 6	23 9
Potassium	696 B	181 B	822 B	1010 B	847 B
Selenium	0 48 B	0 57 B	0 51 U	0 48 U	0 45 U
Silver	0.67 UJL	0 66 UJL	0.80 BJL	37 4 JL	24 4 JL
Sodium	65 3 B	73 9 B	47.6 B	40.0 U	55 4 B
Thallium	0.72 U	0.71 U	0 77 U	0 73 U	1 4 U
Total Mercury	0 06 U	0.06 U	0.07 U	0 35	0 06 U
Vanadium	9.4 B	12.0 B	31.5	35 4	38 7
Zinc	18.3	41 2	1330	23600	12300
Conventional Parameters					
Total Organic Carbon (mg/kg)	1000 U	4230	8750	2770	9060
Grain Size (%)					
Percent Gravel	0	10	5	10	10
Percent Sand	95	85	90	85	85
Percent Silt	5	5	5	5	5
Percent Clay	0	0	0	0	0

A blank cell indicates analysis was not performed or the result was rejected during analysis

Table 2-2 - Surface Water Sample Detected Concentrations

Station ID:	CW001	CW002	N/A	UW001	UW002	UW003
Sample ID:	CR-002-SW	CR-003-SW	CR-001-SW	BK-151-SW	BK-149-SW	BK-154-SW
Sample Date:	05/14/2001	05/15/2001	05/14/2001	06/27/2001	06/28/2001	06/28/2001
Constituent / Depth (feet):	N/A to N/A	32 ft to N/A	N/A to N/A	0 in to N/A	0 in to N/A	0 in to N/A
Volatile Organic Compounds (ug/l)						
Chloroform	26	10 U				
Semi-Volatile Organic Compounds (ug/l)						
Atrazine	10 R	10 R				
Inorganics (Total) (ug/l)						
Aluminum	168 U	168 U		126 BJK	27 2 UJL	27 2 UJL
Antimony	3 0 U	3 0 U		32 6 U	32 6 U	32 6 U
Arsenic	4 0 U	4 0 U		2 2 U	2 2 U	2 2 U
Barium	31 0 B	31.8 B		77.4 B	0 72 B	8 9 B
Cadmium	0 30 U	0 30 U		1 6 U	1 6 U	1 6 U
Calcium	21400	21500		83800	48 6 U	12500
Copper	1 4 BJL	0 97 BJL		3 4 U	3 4 U	3 4 U
Iron	54 6 U	54 6 U		165	14 3 U	41 2 U
Lead	1.5 U	1.5 U		1.3 UJK	2 1 B	1 3 U
Magnesium	5330	5360		24300	33 6 U	2050 B
Manganese	4.3 B	3.6 B		8 3 U	0 44 U	1 1 U
Potassium	1020 BJ	994 BJ		1030 B	372 U	674 B
Selenium	3.4 U	3.4 U		4 2 B	2 1 U	2 1 U
Sodium	4470 B	2600 B		2100 B	119 U	786 B
Zinc	8.7 B	5.9 B		116	2 1 UJK	1 9 UJK

A blank cell indicates analysis was not performed or the result was rejected during analysis

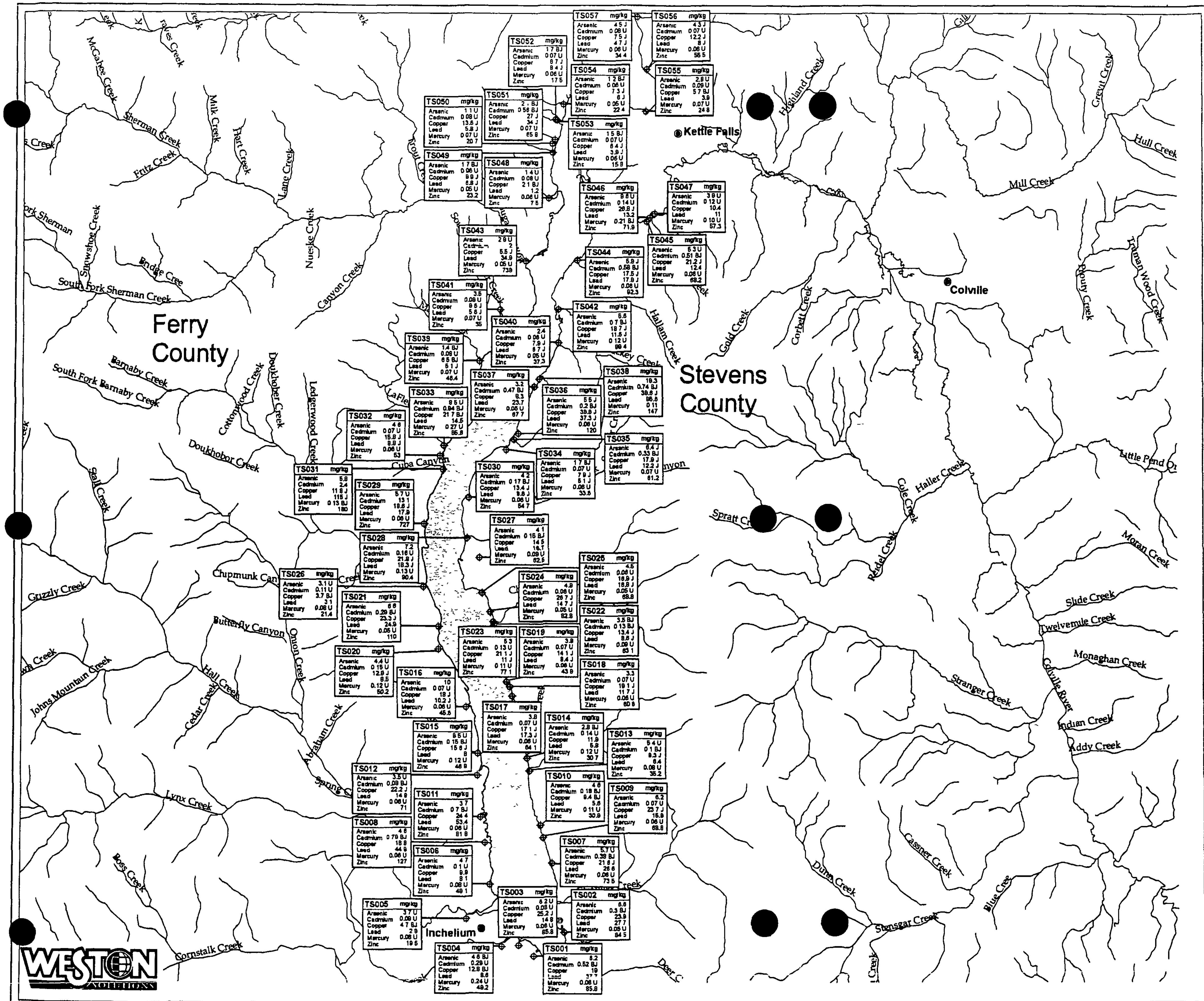
Table 2-2 - Surface Water Sample Detected Concentrations

Constituent	Station ID:	UW004	UW005	UW006	UW007
	Sample ID:	BK-132-SW	BK-143-SW	BK-141-SW	TR-148-SW
	Sample Date:	06/25/2001	06/26/2001	06/26/2001	06/27/2001
	Depth (feet):	0 in to N/A	0 in to N/A	0 in to N/A	0 in to N/A
Volatile Organic Compounds (ug/l)					
Chloroform					
Semi-Volatile Organic Compounds (ug/l)					
Atrazine					
Inorganics (Total) (ug/l)					
Aluminum		2250 JK	1240 JK	27 2 UJK	223 JL
Antimony		32.6 U	32 6 U	32 6 U	84 5
Arsenic		2 2 U	2 2 U	2.2 U	76 4
Barium		22 9 B	72.0 B	17 3 B	27 7 B
Cadmium		*0.70 U*	*0.49 U*	*0.22 U*	2 6 B
Calcium		11800	146000	47500	37800
Copper		3.4 U	3.4 U	3 4 U	6 0 B
Iron		1650	1240	116	1340
Lead		13 4 JK	10 6 JK	1.3 UJK	41.3
Magnesium		2330 B	15600	7120	20600
Manganese		56 6	21.0	10 4 B	38.7
Potassium		913 B	1690 B	1450 B	1240 B
Selenium		2.1 *U*	3 5 B	2.1 U	2 1 U
Sodium		1230 B	2740 B	2680 B	2670 B
Zinc		13.3 U	28 8	6 1 U	284

A blank cell indicates analysis was not performed or the result was rejected during analysis

APPENDIX D

FIGURES DEPICTING DATA RESULTS OF ARSENIC, CADMIUM, COPPER, LEAD, MERCURY, AND ZINC IN TRIBUTARY SEDIMENT SAMPLES



EXPLANATION

- Station Location
- Streams
- Town

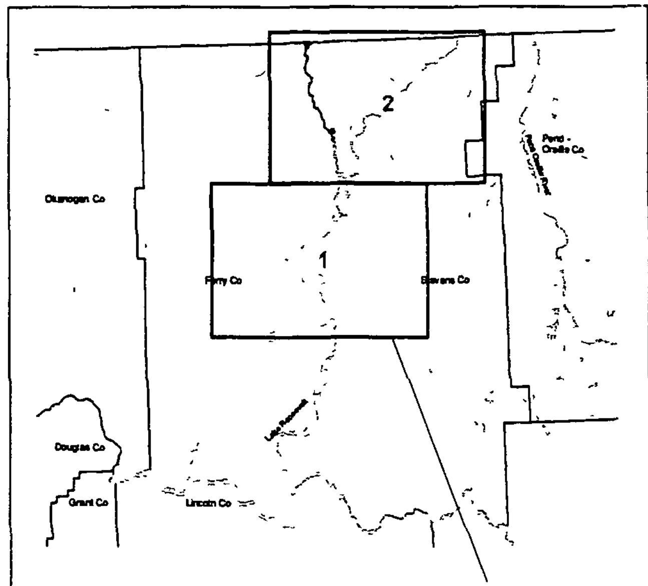
DATA QUALIFIERS

J The analyte was positively identified but the associated numerical value is an estimate

U The compound was analyzed for, but not detected.

B The result is below the Contract Required Detection Limit (CRDL).

0 7,000 14,000
Scale in Feet

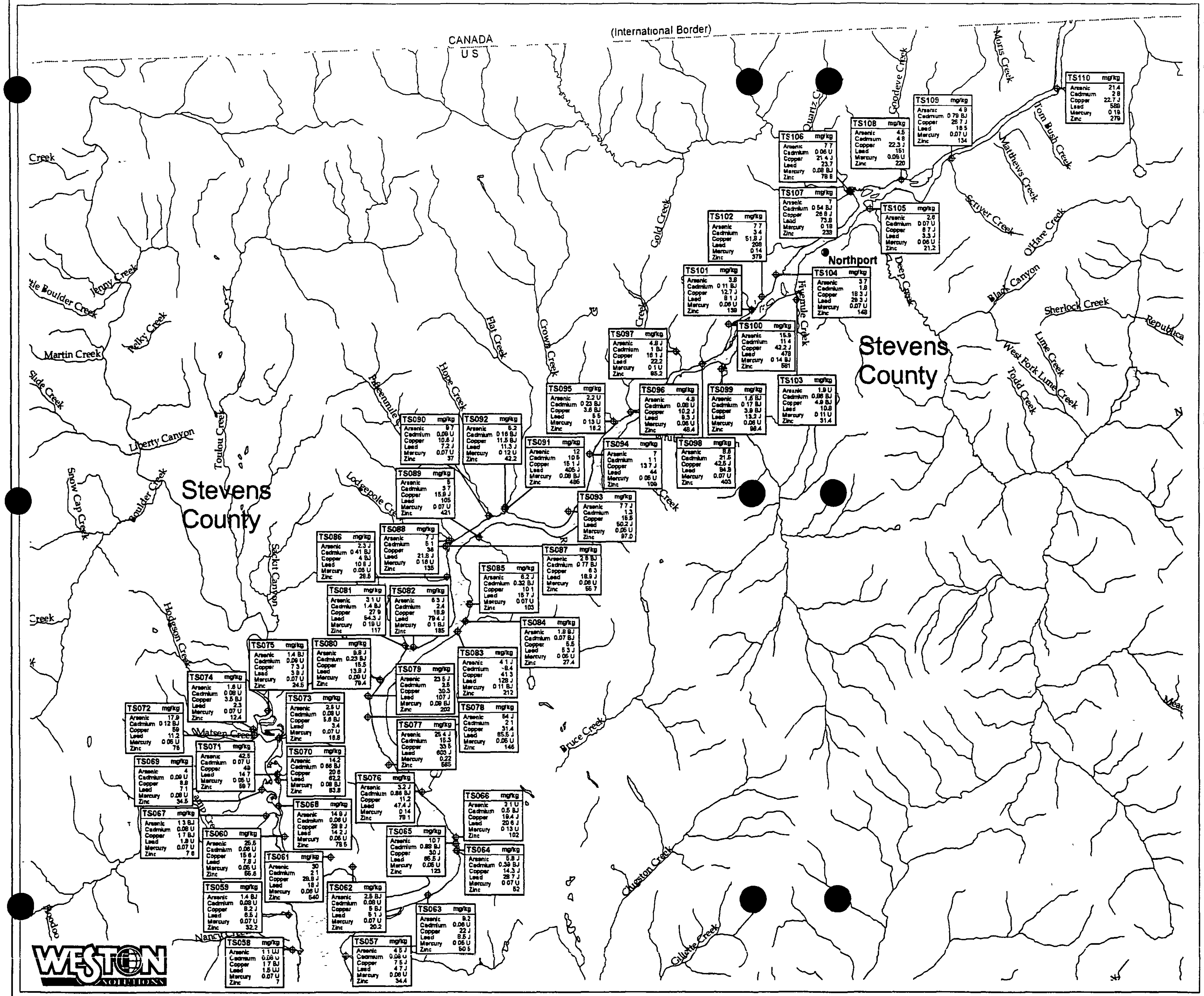


Map Extent

Figures Depicting Data Results of Arsenic, Cadmium, Copper, Lead, Mercury, and Zinc in Tributary Sediment Samples

Figure
1 of 2

02-0250 FigTS1of2.ai



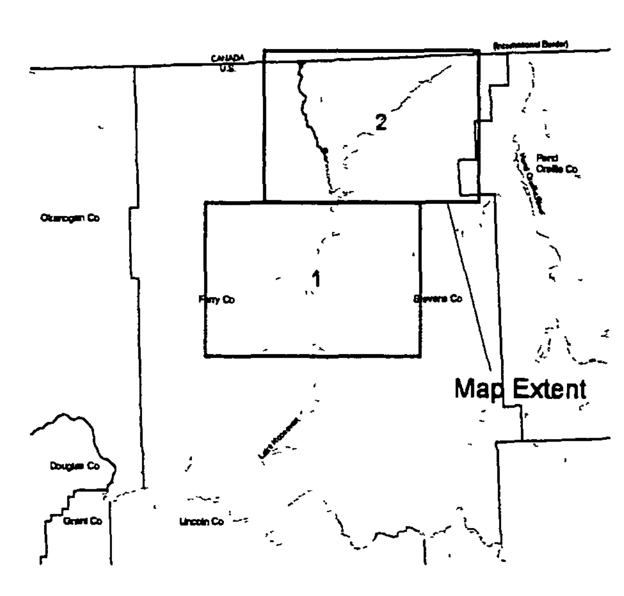
EXPLANATION

- Station Location
- Streams
- Town

DATA QUALIFIERS

- **J** The analyte was positively identified but the associated numerical value is an estimate.
- **U** The compound was analyzed for, but not detected.
- **B** The result is below the Contract Required Detection Limit (CRDL).

0 7,000 14,000
Scale in Feet



Figures Depicting Data Results of Arsenic, Cadmium, Copper, Lead, Mercury, and Zinc in Tributary Sediment Samples

Figure
2 of 2

02-0260 FigTS2of2 ai

APPENDIX E

PHOTOGRAPHIC DOCUMENTATION

(Available Upon Request)

APPENDIX F

FIELD SAMPLE RECORD FORMS

(Available Upon Request)

APPENDIX G

SUMMARY OF CHEMICAL ANALYSES PERFORMED AND SUMMARY OF SAMPLE QUALITY ASSURANCE AND QUALITY ASSURANCE AND QUALITY CONTROL ANALYSIS

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
CW001	Grand Coulee Drinking Water System distribution	NA (spigot)	01204101	MJ08Y3	JX426	CR-002-SW	X	X	X	X		14-May-01	1435
CW002	Lake Roosevelt Grand Coulee Drinking Water Intake	32 feet	01204102	MJ08Y4	JX427	CR-003-SW	X	X	X	X		14-May-01	1130
CS001	Lake Roosevelt Crescent Bay boat ramp	0 - 3"	01204106	MJ08Y8	JX431	CR-003-SD	X	X			X	14-May-01	1800
CS002	Lake Roosevelt North Dam Boat Ramp	0	01204104	MJ08Y6	JX429	CR-001-SD	X	X			X	14-May-01	1900
CS003	Lake Roosevelt Plum Point	0 -4"	01204107	MJ08Y9	JX432	CR-004-SD	X	X			X	15-May-01	1300
CS004	Lake Roosevelt near Inchelium	0 -4"	01204110	MJ08Z0	JX433	CR-005-SD	X	X			X	17-May-01	1000
CS005	Lake Roosevelt at point south of Hall Creek	0 -4"	01204111	MJ08Z1	JX434	CR-006-SD	X	X			X	17-May-01	1045
CS006	Lake Roosevelt at Mission Point	0 -4"	01204112	MJ08Z2	JX435	CR-007-SD	X	X			X	17-May-01	1130
CS007	Lake Roosevelt north of Daisy Station	0 - 2 "	01204113	MJ08Z3	JX436	CR-008-SD	X	X			X	17-May-01	1330
CS008	Lake Roosevelt south of Cheweka Creek	0 - 4"	01204114	MJ08Z4	JX437	CR-009-SD	X	X			X	17-May-01	1415
CS009	Lake Roosevelt south of Chalk Grade Point	0 - 7 "	01204115	MJ08Z5	JX438	CR-010-SD	X	X			X	17-May-01	1445
CS010	Lake Roosevelt south of Barnaby Island	0 - 0.5"	01204116	MJ08Z6	JX439	CR-011-SD	X	X			X	17-May-01	1600
CS011	Lake Roosevelt on flats north of Quillisascut Creek	0 - 2 "	01204117	MJ08Z7	JX440	CR-012-SD	X	X			X	17-May-01	1700
CS012	Lake Roosevelt on flats north of Quillisascut Creek	0 - 3 "	01204118	MJ08Z8	JX441	CR-013-SD	X	X			X	18-May-01	1030
CS013	Lake Roosevelt on flats between French Point Rocks and La Fleur Creek	0 - 4 "	01204119	MJ08Z9	JX442	CR-014-SD	X	X			X	18-May-01	1100
CS014	Lake Roosevelt on mid-channel bar east of French Point Rocks	0 - 4 "	01204120	MJ0900	JX443	CR-015-SD	X	X			X	18-May-01	1230

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
CS015	Lake Roosevelt north of French Point	0 - 8 "	01204121	MJ0901	JX444	CR-016-SD	X	X			X	18-May-01	1330
CS016	Lake Roosevelt on flats North of Bradbury Beach	0 - 1"	01204122	MJ0902	JX445	CR-017-SD	X	X			X	18-May-01	1430
CS017	Lake Roosevelt on flats fronting Haag Cove	0 - 6 "	01204123	MJ0903	JX446	CR-018-SD	X	X			X	18-May-01	1530
CS017	Lake Roosevelt on flats fronting Haag Cove	18-24"	01204124	MJ09E2	JX550	CR-066-SD	X	X			X	18-May-01	1545
CS018	Lake Roosevelt on flats south of Colville River	0 - 6 5 "	01204125	MJ0904	JX447	CR-019-SD	X	X			X	19-May-01	900
CS019	Lake Roosevelt in bay at Colville River mouth	0 - 5 "	01204126	MJ0905	JX448	CR-020-SD	X	X			X	19-May-01	1045
CS020	Lake Roosevelt south of Boise Cascade Log Boom	0 - 4"	01204127	MJ0908	JX451	CR-023-SD	X	X			X	19-May-01	1130
CS021	Lake Roosevelt, Marcus Flats, northwest of Martin Spring Creek	0 - 4"	01214102	MJ0907	JX450	CR-022-SD	X	X			X	21-May-01	1030
CS022	Lake Roosevelt, Marcus Flats, southwest of Pingston Creek	0 - 4"	01214104	MJ0909	JX452	CR-024-SD	X	X			X	21-May-01	1050
CS023	Lake Roosevelt, Marcus Flats (west bank)	0 < 0 25"	01214106	MJ0910	JX453	CR-025-SD	X	X			X	21-May-01	1200
CS024	Marcus Flats, north of Pingston Creek	18 - 24"	01234124	MJ0BK4	JX804	CR-062-SD	X	X			X	08-Jun-01	945
CS025	Lake Roosevelt on Marcus Flats west of Pingston Creek	0 - 3"	01214108	MJ0911	JX454	CR-026-SD	X	X			X	21-May-01	1245
CS026	Lake Roosevelt, Marcus Flats, south of Marcus Island	0 - 3"	01214114	MJ0914	JX457	CR-029-SD	X	X			X	21-May-01	1415
CS027	Lake Roosevelt, Marcus Flats, east of Kamloops	0 - 4"	01214110	MJ0912	JX455	CR-027-SD	X	X			X	21-May-01	1330
CS028	Lake Roosevelt, Marcus Flats northeast	0 - 2"	01214112	MJ0913	JX456	CR-028-SD	X	X			X	21-May-01	1445

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
CS029	Lake Roosevelt north of Summer Island	0 - 2"	01214116	MJ0915	JX458	CR-030-SD	X	X			X	21-May-01	1545
CS030	Lake Roosevelt on flats at Evans Campground	0 - 1"	01214118	MJ0916	JX459	CR-031-SD	X	X			X	21-May-01	1645
CS031	Lake Roosevelt east of Snag Cove	0 - 2"	01214120	MJ0917	JX460	CR-032-SD	X	X			X	21-May-01	1800
CS032	Lake Roosevelt on flats south of Bossburg	0 - 1"	01214122	MJ0918	JX461	CR-033-SD	X	X			X	22-May-01	1000
CS033	Lake Roosevelt on flats north of Bossburg	0 - 5"	01214124	MJ0919	JX462	CR-034-SD	X	X			X	22-May-01	1100
CS034	Lake Roosevelt on flats south of North Gorge (east bank)	0 - 1"	01214128	MJ0921	JX464	CR-036-SD	X	X			X	22-May-01	1400
CS035	Lake Roosevelt on flats south of North Gorge (west bank)	0 - 0 25 "	01214126	MJ0920	JX463	CR-035-SD	X	X			X	22-May-01	1200
CS036	Lake Roosevelt east of Flat Creek (north bank)	0 - 2"	01214130	MJ0922	JX465	CR-037-SD	X	X			X	22-May-01	1500
CS037	Lake Roosevelt at China Bar	0 - 2"	01214132	MJ0923	JX466	CR-038-SD	X	X			X	22-May-01	1630
CS038	Lake Roosevelt near navigation light south of Crown Creek	0 - 3"	01214134	MJ0924	JX467	CR-039-SD	X	X			X	23-May-01	1015
CS039	Lake Roosevelt north of Rattlesnake Creek (east bank)	0 - 4"	01214136	MJ0925	JX468	CR-040-SD	X	X			X	23-May-01	1130
CS040	Lake Roosevelt north of Onion Creek	0 - 2"	01214138	MJ0926	JX469	CR-041-SD	X	X			X	23-May-01	1245
CS041	Upper Columbia River southern tip of island northwest of Onion Creek	0 - 3"	01214140	MJ0927	JX470	CR-042-SD	X	X			X	23-May-01	1330
CS042	Upper Columbia River southern tip of island south of Squaw Creek	0 - 2"	01214142	MJ0928	JX471	CR-043-SD	X	X			X	23-May-01	1400
CS043	Upper Columbia River north of Fivemile Creek	0 - 2"	01214144	MJ0929	JX472	CR-044-SD	X	X			X	23-May-01	1515
CS044	Upper Columbia River on beach at Northport	0 - 4"	01224150	MJ0930	JX473	CR-045-SD	X	X			X	31-May-01	1045

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
CS045	Upper Columbia River north of Big Sheep Creek	0 - 3"	01224151	MJ0931	JX474	CR-046-SD	X	X			X	31-May-01	1215
CS046	Upper Columbia River south of Steamboat Rock	0 - 1"	01224154	MJ0932	JX475	CR-047-SD	X	X			X	31-May-01	1430
CS047	Upper Columbia River northeast of Steamboat Rock	0 - 1"	01224155	MJ0933	JX476	CR-048-SD	X	X			X	31-May-01	1515
CS048	Upper Columbia River north of Goodeve Creek	0 - 3"	01224157	MJ0934	JX477	CR-049-SD	X	X			X	31-May-01	1630
CS049	Upper Columbia River on point bar southwest of Scriver Creek	0 - 2"	01224160	MJ0935	JX478	CR-050-SD	X	X			X	01-Jun-01	930
CS050	Upper Columbia River south of Tom Bush Creek	0 - 2"	01224162	MJ0936	JX479	CR-051-SD	X	X			X	01-Jun-01	1145
CS051	Upper Columbia River at "Black Sand Beach"	0 - 4"	01224163	MJ0937	JX480	CR-052-SD	X	X			X	01-Jun-01	1230
CS052	Upper Columbia River on boulder bar near border	0 - 3"	01224164	MJ0938	JX481	CR-053-SD	X	X			X	01-Jun-01	1415
TS001	Unnamed, T32N R37E, Section 8	0 - 2"	01234079	MJ0BJ4		TR-056-SD	X					05-Jun-01	1000
TS002	Unnamed, Clover Leaf Beach Campground	0 -0.5"	01234080	MJ0BJ5		TR-057-SD	X					05-Jun-01	1045
TS003	Unnamed, T32N R37E, Section 8 (northern tributary)	0 - 3"	01234053	MJ09E4		TR-058-SD	X					03-Jun-01	1500
TS004	Stranger Creek (west)	0 - 3"	01234081	MJ0BJ6	JX570	TR-059-SD	X	X			X	05-Jun-01	1145
TS005	Hall Creek	0 - 2"	01234052	MJ09E6	JX559	TR-061-SD	X	X			X	03-Jun-01	1315
TS006	Cobbs Creek	0 - 2"	01234082	MJ0BJ7		TR-062-SD	X					05-Jun-01	1245
TS007	Unnamed, T33N, R37E, Section 28	0 - 4"	01234054	MJ09E5	JX558	TR-060-SD	X	X			X	04-Jun-01	1430
TS008	Unnamed, T33N, R37E, Section 30	0 - 1"	01234083	MJ0BJ8		TR-064-SD	X					05-Jun-01	1400
TS009	unproposed sampling location	0 - 3"	01234055	MJ09E8		TR-063-SD	X					04-Jun-01	1645
TS010	Unnamed, T33N, R37E, Section 21	0 - 3"	01234058	MJ09E7		TR-065-SD	X					04-Jun-01	1550

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
TS011	Unnamed, T33N, R37E, Section 19	0 - 2"	01234084	MJ0BJ9		TR-066-SD	X					05-Jun-01	1445
TS012	Unnamed, T33N, R37E, Section 18	0 - 3"	01234051	MJ09F0		TR-068-SD	X					03-Jun-01	1045
TS013	Magee Creek	0 - 4"	01234056	MJ09E9		TR-067-SD	X					04-Jun-01	1245
TS014	Jennings Creek	0 - 3"	01234057	MJ09F1		TR-069-SD	X					04-Jun-01	1400
TS015	Little Jim Creek	0 - 2"	01234050	MJ09F2		TR-070-SD	X					03-Jun-01	935
TS016	Unnamed, T33N R36E, Section 1	0 - 1"	01234096	MJ0BK8		TR-071-SD	X					05-Jun-01	1545
TS017	Unnamed, T33N R37E, Section 4	0 - 1"	01234097	MJ0BK9		TR-072-SD	X					05-Jun-01	1630
TS018	Unnamed, T33N R37E, Section 5	0 - 1"	01234098	MJ0BL0		TR-073-SD	X					06-Jun-01	945
TS019	Unnamed, T34N R37E, Section 32	0 - 2"	01234085	MJ09F3		TR-074-SD	X					06-Jun-01	1030
TS020	Unnamed, T34N R36E, Section 36	0 - 2 5"	01234059	MJ09F4		TR-075-SD	X					03-Jun-01	1030
TS021	Unnamed, T34N R36E, Section 25	0 - 1 5"	01234060	MJ09F5		TR-076-SD	X					03-Jun-01	1100
TS022	Cheweka Creek	0 - 2"	01234099	MJ0BL1	JX571	TR-077-SD	X	X			X	06-Jun-01	1100
TS023	Unnamed, T34N, R37E, Section 29 (north of Cheweka Creek)	0 - 1 5"	01234100	MJ0BL2		TR-078-SD	X					06-Jun-01	1215
TS024	Unnamed, T34N, R37E, Section 29 (NW qtr)	0 - 3"	01234101	MJ0BL3		TR-079-SD	X					06-Jun-01	1300
TS025	Unnamed, T34N, R37E, Section 20	0 - 5"	01234102	MJ0BL4		TR-080-SD	X					06-Jun-01	1330
TS026	Barnaby Creek	0 - 2"	01234061	MJ09F6		TR-081-SD	X					03-Jun-01	1300
TS027	Rotter Bay Creek	0 - 3"	01234064	MJ09F7		TR-082-SD	X					04-Jun-01	1200
TS028	Quillisascut Creek	0 - 2"	01234086	MJ09F8		TR-083-SD	X					06-Jun-01	1415
TS029	Unnamed, T34N, R36E, Section 11	0 - 1"	01234062	MJ09F9		TR-084-SD	X					03-Jun-01	1345
TS030	Unnamed, T34N, R37E, Section 6	0 - 1.5"	01234087	MJ09G0		TR-085-SD	X					06-Jun-01	1515
TS031	Cuba Canyon Creek	0 - 8"	01234103	MJ0BL5	JX572	TR-086-SD	X	X			X	06-Jun-01	1600
TS032	Unnamed, T35N, R37E, Section 31	0 - 2"	01234112	MJ0BM4		TR-087-SD	X					07-Jun-02	915

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification: Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	Analyses: TAL Metals	Pest/PCB	VOC	SVOC	TOC	Sample Date	Sample Time
TS033	La Fleur Creek	0 - 2"	01234063	MJ09G1		TR-088-SD	X					03-Jun-01	1450
TS034	Unnamed, T36N, R37E, Section 32	0 - 3"	01234113	MJ0BM5		TR-089-SD	X					07-Jun-01	1000
TS035	Unnamed, T36N, R37E, Section 33 (southwest qtr), drains Nettleton Lake	0 - 4"	01234128	MJ0BK8		TR-128-SD	X					09-Jun-01	1500
TS036	Unnamed, T35N, R37E, Section 33 (northwest qtr)	0 - 6"	01234129	MJ0BK9	JX793	TR-129-SD	X	X			X	09-Jun-01	1530
TS037	unproposed sampling location	0 - 4"	01234067	MJ09G2		TR-090-SD	X					04-Jun-01	930
TS038	Unnamed, T35N, R37E, Section 22 (south of Bradbury campground)	0 - 3"	01234068	MJ09G3	JX560	TR-091-SD	X	X			X	04-Jun-01	1030
TS039	Martin Creek	0 - 2"	01234114	MJ0BM6		TR-093-SD	X					07-Jun-01	1030
TS040	Unnamed, T35N, R37E, Section 15 (north of Bradbury campground)	0 - 3"	01234071	MJ09G6		TR-094-SD	X					06-Jun-01	1200
TS041	Roper Creek	0 - 2"	01234115	MJ0BM7		TR-095-SD	X					07-Jun-01	1130
TS042	Rickey Creek	0 - 1"	01234116	MJOBM8		TR-096-SD	X					07-Jun-01	1300
TS043	Cougar Canyon Creek	0 - 4"	01234072	MJ09G7		TR-097-SD	X					04-Jun-01	1015
TS044	Hallam Creek	0 - 4"	01234106	MJ0BL8	JX573	TR-104-SD	X	X			X	06-Jun-01	1500
TS045	Unnamed ephemeral tributary west of Mingo Creek	0 - 7"	01234075	MJ09H0	JX564	TR-105-SD	X	X			X	04-Jun-01	1830
TS046	Mingo Creek	0 - 1 5"	01234076	MJ0BJ1	JX565	TR-106-SD	X	X			X	04-Jun-01	1745
TS047	Colville River	0 - 2"	01234077	MJ0BJ2	JX566	TR-107-SD	X	X			X	04-Jun-01	1715
TS048	Sherman Creek	0 - 2"	01234073	MJ09G8	JX562	TR-098-SD	X	X			X	04-Jun-01	1105
TS049	Unnamed, T36N, R37E, Section 22, SE qtr	0 - 2"	01234117	MJ0BM9		TR-099-SD	X					07-Jun-01	1645
TS050	Unmapped tributary adjacent to TS051	0 - 3"	01234136	MJ0BJ4		TR-125-SD	X					09-Jun-01	1730
TS051	Unnamed, T36N, R37E, Section 22, NE qtr	0 - 3"	01234118	MJ0BN0		TR-100-SD	X					07-Jun-01	1600
TS052	Unnamed, T36N, R37E, Section 15, SE qtr, western trib	0 - 4"	01234104	MJ0BL6		TR-101-SD	X					07-Jun-01	1500

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification: Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	Analyses: TAL Metals	Pest/PCB	VOC	SVOC	TOC	Sample Date	Sample Time
TS053	Unnamed, T36N, R37E, Section 15, SE qtr, eastern trib	0 - 2"	01234119	MJ0BN1		TR-102-SD	X					07-Jun-01	1430
TS054	Unnamed, T36N, R37E, Section 14, SW qtr	0 - 2"	01234120	MJ0BN2		TR-103-SD	X					07-Jun-01	1400
TS055	Unnamed, ephemeral tributary, T36N, R38E, Section 18, SW qtr	0 - 1"	01234078	MJ0BJ3		TR-108-SD	X					04-Jun-01	1300
TS056	Martin Spring Creek	0 - 1.5"	01234107	MJ0BL9	JX574	TR-109-SD	X	X			X	06-Jun-01	1645
TS057	Pingston Creek	0 - 3"	01234108	MJ0BM0	JX791	TR-110-SD	X	X			X	06-Jun-01	1600
TS058	Nancy Creek	0 - 4"	01234109	MJ0BM1		TR-111-SD	X					06-Jun-01	1400
TS059	Unnamed ephemeral tributary at T37N, R37E, Section 33	0 - 5"	01234121	MJOBJ1		TR-112-SD	X					09-Jun-01	1645
TS060	Unnamed tributary T37N, R37E, Section 16, southwest qtr	0 - 1"	01234065	MJ09F8		TR-113-SD	X					06-Jun-01	900
TS061	Unnamed ephemeral tributary at T37N, R37E, Section 22	0 - 3"	01234110	MJ0BM2		TR-123-SD	X					06-Jun-01	1245
TS062	Unnamed, across from Marcus Island T37N, R37E, Section 23	0 - 7"	01234111	MJ0BM3		TR-124-SD	X					06-Jun-01	1130
TS063	Unnamed ephemeral tributary at T37N, R38E, Section 28	0 - 4"	01234123	MJ0BK3	JX803	TR-126-SD	X	X			X	08-Jun-01	1615
TS064	Unnamed ephemeral tributary at T37N, R38E, Section 22 (SW qtr)	0 - 3 5"	01234127	MJ0BK7	JX807	TR-037-SD	X	X			X	08-Jun-01	1120
TS065	Unnamed ephemeral tributary at T37N, R38E, Section 22 (NW qtr)	0 - 1"	01234125	MJ0BK5	JX805	TR-038-SD	X	X			X	08-Jun-01	1130
TS066	Unnamed, spring drainage east of Evans Campground peninsula	0 - 1.5"	01234126	MJ0BK6		TR-039-SD	X					08-Jun-01	1245
TS067	Deadman Creek	0 - 2"	01234066	MJ09G0	JX567	TR-114-SD	X	X			X	05-Jun-01	1345
TS068	Unnamed ephemeral tributary, T37N, R37E, Section 16, northwest qtr	0 - 1"	01234088	MJ0BK0		TR-115-SD	X					06-Jun-01	1030

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
TS069	Unnamed tributary to Kettle River Arm, draining pond near Boyds	0 - 3"	01234092	MJ0BK4		TR-119-SD	X					05-Jun-01	1320
TS070	Unnamed ephemeral tributary, T37N, R37E, Section 9, NW qtr, SE qtr	0 - 8"	01234089	MJ0BK1		TR-116-SD	X					05-Jun-01	1530
TS071	Unnamed ephemeral tributary, T37N, R37E, Section 9, NW qtr, NE qtr	0 - 2"	01234090	MJ0BK2		TR-117-SD	X					05-Jun-01	1600
TS072	Unnamed ephemeral tributary, T37N, R38E, Section 4, NE qtr	0 - 3"	01234091	MJ0BK3	JX568	TR-118-SD	X	X			X	05-Jun-01	1430
TS073	Matsen Creek	0 - 3"	01234093	MJ0BK5		TR-120-SD	X					05-Jun-01	1145
TS074	Doyle Creek	0 - 5"	01234094	MJ0BK6		TR-121-SD	X					05-Jun-01	1100
TS075	Kettle River	0 - 2"	01234095	MJ0BK7	JX569	TR-122-SD	X	X			X	05-Jun-01	945
TS076	China Creek	0 - 1"	01214101	MJ0952		TR-001-SD	X					21-May-01	1715
TS077	Unnamed tributary south of Snag Cove	0 - 1"	01214103	MJ0953		TR-002-SD	X					22-May-01	1045
TS078	Unnamed ephemeral tributary at T38N, R37E, Section 36 (SW qtr)	0 - 1"	01214105	MJ0954		TR-005-SD	X					22-May-01	1345
TS079	Unnamed ephemeral tributary entering river at T38N, R37E,Section 35 (NE qtr)	0 - 1"	01214107	MJ0955		TR-004-SD	X					22-May-01	1455
TS080	Unnamed tributary directly across from Bossburg, WA	0 - 1"	01214109	MJ0956		TR-006-SD	X					22-May-01	1550
TS081	Dilly Lake ephemeral tributary	0 - 1"	01214111	MJ0957		TR-007-SD	X					22-May-01	1705
TS082	Unnamed ephemeral tributary upstream of Dilly Lake ephemeral tributary	0 - 1"	01214113	MJ0958		TR-008-SD	X					22-May-01	1735
TS083	Unnamed ephemeral tributary at T38N, R38E, Section 21	0 - 2"	01214115	MJ0959		TR-009-SD	X					23-May-01	1100

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification: Regional Tracking #	Sample Identification: Inorganic CLP #	Sample Identification: Organic CLP #	Sample Identification: Internal Sample ID	Analyses: TAL Metals	Analyses: Pest/PCB	Analyses: VOC	Analyses: SVOC	Analyses: TOC	Sample Date	Sample Time
TS084	Unnamed ephemeral tributary at T38N, R38E, Section 22	0 - 2"	01214117	MJ0960		TR-010-SD	X					23-May-01	1220
TS085	Unnamed ephemeral tributary at North Gorge Campground	0 -.5"	01214119	MJ0961		TR-011-SD	X					23-May-01	1410
TS086	Unnamed ephemeral tributary at T38N, R38E,Section 17 (NW qtr)	missing sample log	01214121	MJ0962		TR-012-SD	X					23-May-01	1445
TS087	Unnamed ephemeral tributary downstream of Lodgepole Cr at T38N, R38E,Section 8 (NW qtr)	0 - 1"	01214123	MJ0963		TR-013-SD	X					23-May-01	1555
TS088	Lodgepole Creek	0 - 1"	01214125	MJ0964		TR-014-SD	X					23-May-01	1640
TS089	Unnamed ephemeral tributary at T38N, R38E, Section 10	0 - 2"	01214129	MJ0968		TR-016-SD	X					23-May-01	1645
TS090	Fifteenmile Creek	0 - 3"	01234137	MJ0BJ5	JX795	TR-040-SD	X	X			X	08-Jun-01	1645
TS091	Unnamed ephemeral tributary at Flat Creek	0 - 6"	01234143	MJ0BJ2		TR-127-SD	X					08-Jun-01	1545
TS092	Flat Creek	0 - 1"	01234138	MJ0BJ6	JX796	TR-041-SD	X	X			X	08-Jun-01	1500
TS093	Unnamed ephemeral tributary downstream of China Bar	0 - 2"	01214127	MJ0967		TR-017-SD	X					24-May-01	1215
TS094	Unnamed ephemeral tributary at T39N, R39E, Section 25 (SW qtr)	0 - 3"	01214131	MJ0969		TR-018-SD	X					24-May-01	1300
TS095	Crown Creek	0 - 2"	01214133	MJ0970		TR-019-SD	X					24-May-01	1345
TS096	Rattlesnake Creek	0 - 5"	01234139	MJ0BJ7	JX797	TR-042-SD	X	X			X	08-Jun-01	1145
TS097	Unnamed ephemeral tributary downstream from Moses Spring Creek	0 - 3"	01214135	MJ0971		TR-020-SD	X					24-May-01	1615
TS098	Moses Spring Creek	0 - 3"	01214137	MJ0972		TR-022-SD	X					24-May-01	1530
TS099	Onion Creek	0 - 4"	01234140	MJ0BJ8	JX798	TR-043-SD	X	X			X	08-Jun-01	1300
TS100	Unnamed ephemeral tributary In T39N, R39E, Section 10	0 - 1.5"	01214139	MJ0973		TR-023-SD	X					24-May-01	1435
TS101	Squaw Creek	0 - 4 "	01234141	MJ0BJ9	JX799	TR-044-SD	X	X			X	09-Jun-01	1030

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
TS102	Unnamed tributary from nearshore ponds	0 - 1"	01214141	MJ0974		TR-024-SD	X					24-May-01	1325
TS103	Fivemile Creek	0 - 3"	01214143	MJ0975		TR-025-SD	X					24-May-01	1145
TS104	Bear Creek	0 - 2"	01234142	MJ0BK0	JX800	TR-045-SD	X	X			X	09-Jun-01	930
TS105	Deep Creek	0 - 4"	01234122	MJ0BK2	JX802	TR-047-SD	X	X			X	08-Jun-01	1000
TS106	Big Sheep Creek	0 - 2"	01224153	MJ0976	JX552	TR-026-SD	X	X			X	31-May-01	1345
TS107	Quartz Creek	0 - 4"	01224152	MJ0977		TR-027-SD	X					31-May-01	1300
TS108	Goodeve Creek	0 - 4 5"	01224156	MJ0978	JX553	TR-028-SD	X	X			X	31-May-01	1545
TS109	Scriver Creek	0 - 3"	01224161	MJ0979	JX554	TR-029-SD	X	X			X	01-Jun-01	1100
TS110	Unnamed tributary NE of Gaging Station	0 - 8 "	01224165	MJ0980	JX555	TR-030-SD	X	X			X	01-Jun-01	1330
US001	Tributary to Tom Bush Creek, Melrose Mine	0-3"	01264068	MJ0BQ1	JX827	BK-150-SD	X	X			X	27-Jun-01	900
US002	Flume Creek; Sullivan Mine	0-2"	01264070	MJ0BQ3	JX829	BK-152-SD	X	X			X	28-Jun-01	930
US003	Flume Creek South Fork	0-4"	01264073	MJ0BQ5	JX831	BK-153-SD	X	X			X	28-Jun-01	1045
US004	Linton Creek, Oriole Mine	0-2"	01264075	MJ0BQ7	JX832	BK-155-SD	X	X			X	28-Jun-01	1300
US005	Unnamed tributary to Onion Creek, Van Stone Mine	0-3"	01264050	MJ0BN3	JX810	BK-130-SD	X	X			X	25-Jun-01	945
US006	Unnamed tributary to Onion Creek; Van Stone Mine	0-3"	01264051	MJ0BN4	JX811	BK-131-SD	X	X			X	25-Jun-01	1315
US007	Van Stone Mine soil	0-4"	01264054	MJ0BN7	JX814	BK-134-SD	X	X		X		25-Jun-01	1445
US008	Van Stone Mine soil	0-6"	01264055	MJ0BN8	JX815	BK-135-SD	X	X		X		25-Jun-01	1500
US009	Van Stone Mine soil	0-8"	01264053	MJ0BN6	JX813	BK-133-SD	X	X		X		25-Jun-01	1300
US010	Unnamed tributary to Onion Creek; Van Stone Mine	0-4"	01264059	MJ0BP2	JX819	BK-139-SD	X	X			X	25-Jun-01	1215
US011	Tributary to Deep Creek, Last Chance Mine	0-10"	01264062	MJ0BP5	JX822	BK-142-SD	X	X			X	26-Jun-01	1615
US012	Deep Creek South Fork	0-1"	01264060	MJ0BP3	JX820	BK-140-SD	X	X			X	26-Jun-01	1230
US013	Unnamed tributary to Deep Creek	0-4"	01264058	MJ0BP1	JX818	BK-138-SD	X	X			X	26-Jun-01	1000
US014	Unnamed tributary to Hunters Creek, Cleveland Mine	0-3"	01264065	MJ0BP8	JX825	TR-147-SD	X	X			X	27-Jun-01	1630

Table 1-2—Sample Analytical Requirements

Station ID	Station Description	Sample Interval (below media surface)	Sample Identification				Analyses					Sample Date	Sample Time
			Regional Tracking #	Inorganic CLP #	Organic CLP #	Internal Sample ID	TAL Metals	Pest/PCB	VOC	SVOC	TOC		
US015	Unnamed tributary to Hunters Creek, Cleveland Mine	0-2"	01264072	MJ0BQ8	JX833	TR-145-SD	X	X			X	27-Jun-01	1515
US016	Unnamed tributary to Hunters Creek, Cleveland Mine	0-5"	01264056	MJ0BN9	JX816	TR-136-SD	X	X			X	27-Jun-01	1430
UW001	Tributary to Tom Bush Creek, Melrose Mine	0"	01264069	MJ0BQ2		BK-151-SW	X					27-Jun-01	930
UW002	Flume Creek-Sullivan Mine	0"	01264067	MJ0BQ0		BK-149-SW	X					28-Jun-01	945
UW003	Flume Creek South Fork	0"	01264074	MJ0BQ6		BK-154-SW	X					28-Jun-01	1055
UW004	Unnamed tributary to Onion Creek, Van Stone Mine	0"	01264052	MJ0BN5		BK-132-SW	X					25-Jun-01	1345
UW005	Tributary to Deep Creek, Last Chance Mine	0"	01264063	MJ0BP6		BK-143-SW	X					26-Jun-01	1600
UW006	Deep Creek South Fork	0"	01264061	MJ0BP4		BK-141-SW	X					26-Jun-01	1245
UW007	Unnamed tributary to Hunters Creek, Cleveland Mine	0"	01264066	MJ0BP9		TR-148-SW	X					27-Jun-01	1645
RW001	Kemmerer Bottle	NA (rinsate)	01204103	MJ08Y5	JX428	RS-001-SW	X	X	X	X		15-May-01	1120
RS001	Bowl and Spoon	NA (rinsate)	01224158	MJ0981	JX556	RS-001-SD	X	X				31-May-01	830
RS002	Dredge Sampler	NA (rinsate)	01224159	MJ0982	JX557	RS-002-SD	X	X				31-May-01	900
RS003	Hand Auger	NA (rinsate)	01234135	MJ0BJ3	JX792	RS-003-SD	X	X				08-Jun-01	800
RS004	Bowl and Spoon	NA (rinsate)	01264071	MJ0BQ4	JX830	R-004-SD	X	X				27-Jun-01	700
TB001	Grand Coulee	NA (trip blank)	01204108		JX547	TB-001-SW			X			14-May-01	11 45
TB002	Grand Coulee	NA (trip blank)	01204109		JX549	TB-002-SW			X			14-May-01	10 00

Notes
CLP Contract Laboratory Program
NA Not applicable
Pest/PCB Chlorinated pesticides and polychlorinated biphenyls
SVOC Semivolatile organic compound
TAL Metals Target analyte list metals
TOC Total organic carbon
VOC Volatile organic compound

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Table 1-3—Sample QA/QC Analysis Summary

Laboratory	Matrix	Parameters/Method	Total Field Samples	QA/QC Sample Summary Analyses: Organic MS/MSD	Inorganic MS/MSD	Rinsate Blanks	Trip Blanks	Total Field and QA/QC Analyses
Field Analysis	Soil/ Sediment	Pb, Cu, Zn by XRF EPA 6200	NA	NA	NA	NA	NA	NA
EPA Region 10 or CLP Laboratory	Soil/ Sediment	TAL Metals/ (CLPAS) ILM04 1	179	NA	9	4	NA	192
		Pesticides/PCBs (CLPAS) OLM04.2	100	8	NA	4	NA	112
		SVOC	3	1	NA	0	NA	4
Commercial Laboratory	Soil/ Sediment	TOC EPA SW-846 9060M	97	9	NA	NA	NA	106
EPA Region 10 or CLP Laboratory	Water	Pesticides/PCBs (CLPAS) OLM04 2	2	1	NA	1	NA	4
		VOCs	2	1	NA	1	2	6
		SVOCs	2	1	NA	1	NA	4
		TAL Metals/ (CLPAS) ILM04.1	9	NA	1	1	NA	11

Notes:
CLP. Contract Laboratory Program
CLPAS. Contract-Laboratory Program Analytical Service
OLM
ILM
MS/MSD Matrix Spike/Matrix Spike Duplicate
NA: Not Applicable
PCBs Polychlorinated Biphenyls
Pesticides. Chlorinated Pesticides
QA Quality Assurance
QC Quality Control
SVOCs Semivolatile Organic Compounds
TAL: Target Analyte List
TOC. Total Organic Carbon
VOCs. Volatile Organic Compounds

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APPENDIX H

GLOBAL POSITIONING SYSTEM COORDINATES

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
CW001	Grand Coulee Drinking Water System distribution	q051422a	14-May-01	15:12:32	-118.99610886	47.93332505	
CW002	Lake Roosevelt Grand Coulee Drinking Water Intake	q051519a	15-May-01	12:12:24	-118.96799217	47.9419154	
CS001	Lake Roosevelt Crescent Bay boat ramp	q051501a	14-May-01	18:19:34	-118.98623543	47.94759778	
CS002	Lake Roosevelt North Dam Boat Ramp	q051502a	14-May-01	19:05:58	-118.96423424	47.94736508	
CS003	Lake Roosevelt Plum Point	q051520b	15-May-01	13:23:03	-118.86615068	47.95086836	
CS004	Lake Roosevelt near Inchelium	M051717a	17-May-01	10:12:53	-118.17252426	48.30055232	
CS005	Lake Roosevelt at point south of Hall Creek	M051717b	17-May-01	11:08:06	-118.17635539	48.30913076	
CS006	Lake Roosevelt at Mission Point	M051718b	17-May-01	11:29:56	-118.18676555	48.36033147	
CS007	Lake Roosevelt north of Daisy Station	M051719a	17-May-01	12:17:01	-118.17905349	48.37980781	
CS008	Lake Roosevelt south of Cheweka Creek	M051720a	17-May-01	13:56:37	-118.18347358	48.41597662	
CS009	Lake Roosevelt south of Chalk Grade Point	M051723a	17-May-01	16:07:17	-118.19309538	48.43027213	
CS010	Lake Roosevelt south of Barnaby Island	M051722a	17-May-01	15:46:08	-118.2135052	48.44196518	
CS011	Lake Roosevelt on flats north of Quillisascut Creek	M051723b	17-May-01	16.35:23	-118.20449056	48.45583243	
CS012	Lake Roosevelt on flats north of Quillisascut Creek	M051817a	18-May-01	10:11:39	-118.20277675	48.46142995	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
CS013	Lake Roosevelt on flats between French Point Rocks and La Fleur Creek	M051818a	18-May-01	11:07:27	-118.19430024	48.48882027	
CS014	Lake Roosevelt on mid-channel bar east of French Point Rocks	M051819a	18-May-01	12:20:57	-118.17004536	48.49718576	
CS015	Lake Roosevelt north of French Point	M051820a	18-May-01	13:20:07	-118.18602119	48.50445393	
CS016	Lake Roosevelt on flats North of Bradbury Beach	t051821a	18-May-01	14:25:17	-118.14655292	48.51941734	
CS017	Lake Roosevelt on flats fronting Haag Cove	t051822a	18-May-01	15:31:34	-118.1444874	48.55427273	
CS018	Lake Roosevelt on flats south of Colville River	t051916a	19-May-01	09:05:38	-118.12093579	48.56666331	
CS019	Lake Roosevelt	t051917a	19-May-01	10:23:50	-118.11732646	48.57692281	
CS020	Lake Roosevelt south of Boise Cascade Log Boom	t051918a	19-May-01	11:17:13	-118.12327834	48.60848159	
CS021	Lake Roosevelt, Marcus Flats, northwest of Martin Spring Creek	m052117a	21-May-01	10:18:33	-118.08657537	48.63306761	
CS022	Lake Roosevelt, Marcus Flats, southwest of Pingston Creek	m052117b	21-May-01	10:54:01	-118.08513455	48.6386791	
CS023	Lake Roosevelt, Marcus Flats (west bank)	m052118a	21-May-01	11:55:11	-118.10837503	48.65239937	
CS024	Marcus Flats, north of Pingston Creek	Q060816a	8-Jun-01	09:38:56	-118.08516557	48.65257778	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
CS025	Lake Roosevelt on Marcus Flats west of Pingston Creek	m052119a	21-May-01	12:28:33	-118.09188759	48.65340326	
CS026	Lake Roosevelt, Marcus Flats, south of Marcus Island	m052120d	21-May-01	13:51:47	-118.08823714	48.66118525	
CS027	Lake Roosevelt, Marcus Flats, east of Kamloops	m052120c	21-May-01	13:24:12	-118.10057102	48.66951163	
CS028	Lake Roosevelt, Marcus Flats northeast	m052121b	21-May-01	14:32:36	-118.08490619	48.67947102	
CS029	Lake Roosevelt north of Summer Island	m052122a	21-May-01	15:51:59	-118.03244671	48.69400597	
CS030	Lake Roosevelt on flats at Evans Campground	m052123a	21-May-01	16:36:06	-118.02333361	48.69649822	
CS031	Lake Roosevelt east of Snag Cove	m052200b	21-May-01	17:43:31	-118.04915581	48.73141971	
CS032	Lake Roosevelt on flats south of Bossburg	m052217a	22-May-01	10:02:08	-118.05368666	48.75086841	
CS033	Lake Roosevelt on flats north of Bossburg	m052217b	22-May-01	10:54:37	-118.04684768	48.758648	
CS034	Lake Roosevelt on flats south of North Gorge (east bank)	m052220a	22-May-01	13:57:37	-118.00701706	48.78642347	
CS035	Lake Roosevelt on flats south of North Gorge (west bank)	m052218a	22-May-01	11:51:02	-118.01351494	48.79179918	
CS036	Lake Roosevelt east of Flat Creek (north bank)	m052222a1	22-May-01	15:10:53	-117.978723	48.82050073	
CS037	Lake Roosevelt at China Bar	m052223a	22-May-01	16.36.40	-117.92591543	48.82824855	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
CS038	Lake Roosevelt near navigation light south of Crown Creek	m052317a	23-May-01	10:46:47	-117.9266419	48.83728583	
CS039	Lake Roosevelt north of Rattlesnake Creek (east bank)	m052318a	23-May-01	11:36:52	-117.87875634	48.8661392	
CS040	Lake Roosevelt north of Onion Creek	m052319a	23-May-01	12:41:11	-117.84625343	48.87497229	
CS041	Upper Columbia River southern tip of island northwest of Onion Creek	m052320a	23-May-01	13:26:19	-117.84687866	48.87851059	
CS042	Upper Columbia River southern tip of island south of Squaw Creek	m052321a	23-May-01	14:20:34	-117.835167	48.88751909	
CS043	Upper Columbia River north of Fivemile Creek	m052322a	23-May-01	15:19:42	-117.79750404	48.9143281	
CS044	Upper Columbia River on beach at Northport	M053117a	31-May-01	10:36:08	-117.77216319	48.92262736	
CS045	Upper Columbia River north of Big Sheep Creek	M053119a	31-May-01	12:19:22	-117.7613159	48.93831373	
CS046	Upper Columbia River south of Steamboat Rock	m053121a	31-May-01	NA	-117.75325833	48.9365027778	10 feet SE
CS047	Upper Columbia River northeast of Steamboat Rock	M053122a	31-May-01	15:17:03	-117.7415272	48.93783955	
CS048	Upper Columbia River north of Goodeve Creek	M053123a	31-May-01	16:15:58	-117.73233422	48.94028916	
CS049	Upper Columbia River on point bar southwest of Scriver Creek	M060117a	1-Jun-01	10:08:40	-117.72070544	48.94212391	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
CS050	Upper Columbia River south of Tom Bush Creek	M060118A	1-Jun-01	NA	-117.66189167	48.9662944444	
CS051	Upper Columbia River at "Black Sand Beach"	M060119A	1-Jun-01	NA	-117.647925	48.9710361111	
CS052	Upper Columbia River on boulder bar near border	M060121A	1-Jun-01	NA	-117.63542222	48.9979916667	
TS001	Unnamed, T32N R37E, Section 8	m060517a	5-Jun-01	10:16:03	-118.16438774	48.28845408	
TS002	Unnamed, Clover Leaf Beach Campground	m060517b	5-Jun-01	10:57:19	-118.14565112	48.29717002	
TS003	Unnamed, T32N R37E, Section 8 (northern tributary)	t060322a	3-Jun-01	15:22:06	-118.17297572	48.29296774	300 feet W
TS004	Stranger Creek (west)	m060518a	5-Jun-01	11:49:08	-118.18297642	48.29285846	
TS005	Hall Creek	t060320a	3-Jun-01	13:39:51	-118.20323074	48.30413505	
TS006	Cobbs Creek	m060520a	5-Jun-01	13:15:41	-118.18859712	48.31719259	100 feet W
TS007	Unnamed, T33N, R37E, Section 28	t060421c	4-Jun-01	14:48:15	-118.15137802	48.32425419	
TS008	Unnamed, T33N, R37E, Section 30	m060521a	5-Jun-01	14:01:41	-118.19069809	48.33331945	
TS009	unproposed sampling location	t060500a	4-Jun-01	17:07:37	-118.15598623	48.33447263	20 E
TS010	Unnamed, T33N, R37E, Section 21	t060422a	4-Jun-01	15:41:57	-118.15741696	48.33935713	
TS011	Unnamed, T33N, R37E, Section 19	m060522b	5-Jun-01	15:05:27	-118.19292	48.34340185	210 feet upstream
TS012	Unnamed, T33N, R37E, Section 18	t060317b	3-Jun-01	10:52:39	-118.19385202	48.35956205	20 feet SW
TS013	Magee Creek	t060419a	4-Jun-01	12:46.57	-118 16258061	48.36059685	
TS014	Jennings Creek	t060421a	4-Jun-01	14:10.01	-118.16385295	48.36554478	
TS015	Little Jim Creek	t060317a	3-Jun-01	10.09.21	-118.19318967	48.3681474	300 feet upstream
TS016	Unnamed, T33N R36E, Section 1	m060522c	5-Jun-01	15.46:41	-118.19924238	48 38629585	
TS017	Unnamed, T33N R37E, Section 4	m060523a	5-Jun-01	16.32·58	-118.17116956	48.38987494	20 feet E

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS018	Unnamed, T33N R37E, Section 5	m060616b	6-Jun-01	09:51:13	-118.17220931	48.39352615	
TS019	Unnamed, T34N R37E, Section 32	m060617a	6-Jun-01	10:12:53	-118.17428199	48.39556317	
TS020	Unnamed, T34N R36E, Section 36	m060317a	3-Jun-01	10:26:27	-118.21456777	48.40914227	
TS021	Unnamed, T34N R36E, Section 25	m060319a	3-Jun-01	12:17:17	-118.21397201	48.41797662	34 feetW, 30 feetN
TS022	Cheweka Creek	m060618a	6-Jun-01	11:38:20	-118.18047933	48.41838184	130 feet upstream
TS023	Unnamed, T34N, R37E, Section 29 (north of Cheweka Creek)	m060619a	6-Jun-01	12:19:30	-118.1810255	48.4191279	6 feet E
TS024	Unnamed, T34N, R37E, Section 29 (NW qtr)	m060619b	6-Jun-01	12:57:55	-118.18258081	48.42289413	
TS025	Unnamed, T34N, R37E, Section 20	m060620a	6-Jun-01	13:30:14	-118.18713713	48.43054423	
TS026	Barnaby Creek	m060320a	3-Jun-01	13:05:40	-118.22217327	48.4336522	
TS027	Rotter Bay Creek	t060418a	4-Jun-01	11:50:25	-118.18818647	48.44430514	
TS028	Quillisascut Creek	m060621a	6-Jun-01	14:49:28	-118.19501414	48.4519532	
TS029	Unnamed, T34N, R36E, Section 11	m060321a	3-Jun-01	14:17:36	-118.22064723	48.45808083	30 feet W
TS030	Unnamed, T34N, R37E, Section 6	m060622a	6-Jun-01	15:13:26	-118.19335082	48.4678232	
TS031	Cuba Canyon Creek	m060622b	6-Jun-01	15:50:23	-118.20795771	48.47924134	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS032	Unnamed, T35N, R37E, Section 31	m060716a	7-Jun-01	09:17.54	-118.20955747	48.48460456	
TS033	La Fleur Creek	m060322a	3-Jun-01	15:03:37	-118.20722707	48.48854853	5 feet E
TS034	Unnamed, T36N, R37E, Section 32	m060717a	7-Jun-01	10:10:49	-118.16963206	48.48597205	30 feet E
TS035	Unnamed, T36N, R37E, Section 33 (southwest qtr); drains Nettleton Lake	m060922a	9-Jun-01	15:04:17	-118.16489287	48.48984614	
TS036	Unnamed, T35N, R37E, Section 33 (northwest qtr)	m060922b	9-Jun-01	15:57:20	-118.16237102	48.49207338	
TS037	Unproposed sampling location	t060416a	4-Jun-01	09:54:36	-118.15179622	48.51021109	100 feet upstream
TS038	Unnamed, T35N, R37E, Section 22 (south of Bradbury campground)	t060417a	4-Jun-01	10:30:01	-118.14848597	48.51319364	
TS039	Martin Creek	m060718a	7-Jun-01	11:11:09	-118.18437434	48.52104276	200 feet W
TS040	Unnamed, T35N, R37E, Section 15 (north of Bradbury campground)	m060719a	7-Jun-01	12:38:56	-118.13670448	48.52695478	10 feet S
TS041	Roper Creek	m060718b	7-Jun-01	11:41:47	-118.17069762	48.54066585	
TS042	Rickey Creek	m060720a	7-Jun-01	13:06:51	-118.13595896	48.53985776	
TS043	Cougar Canyon Creek	m060417a	4-Jun-01	10:18:45	-118.15453807	48.5591544	
TS044	Hallam Creek	t060622a	6-Jun-01	15:11:35	-118.12376311	48.55857879	
TS045	Unnamed ephemeral tributary west of Mingo Creek	m060501b	4-Jun-01	18:42:01	-118.08140433	48.57265454	
TS046	Mingo Creek	m060501a	4-Jun-01	18:00:23	-118.07941283	48.57414722	
TS047	Colville River	m060500a	4-Jun-01	17:28:04	-118.07636583	48.57566028	
TS048	Sherman Creek	m060418a	4-Jun-01	11:40:00	-118.1394913	48.58308291	
TS049	Unnamed, T36N, R37E, Section 22, SE qtr	m060800a	7-Jun-01	17:16:01	-118.13629622	48.60069248	65 feet W

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS050	Unmapped tributary adjacent to TS051	m061000a	9-Jun-01	17:33:00	-118.13607492	48.60422634	
TS051	Unnamed, T36N, R37E, Section 22, NE qtr	m060722b	7-Jun-01	15:57:36	-118.1344893	48.60572171	
TS052	Unnamed, T36N, R37E, Section 15, SE qtr, western tributary	m060722a	7-Jun-01	15:09:15	-118.1336598	48.61336795	
TS053	Unnamed, T36N, R37E, Section 15, SE qtr, eastern tributary	m060721c	7-Jun-01	14:49:38	-118.13288015	48.61328849	
TS054	Unnamed, T36N, R37E, Section 14, SW qtr	m060721b	7-Jun-01	14:25:01	-118.12895123	48.61919872	200 feet upstream
TS055	Unnamed, ephemeral tributary, T36N, R38E, Section	m060421a	4-Jun-01	14:17:30	-118.07956772	48.6153404	200 feet upstream
TS056	Martin Spring Creek	t060700a	6-Jun-01	17:02:54	-118.07826015	48.63163767	30 feet E, 10 feet N
TS057	Pingston Creek	t060622b	6-Jun-01	15:52:21	-118.08259481	48.65214266	
TS058	Nancy Creek	t060621a	6-Jun-01	14:17:52	-118.11399285	48.65541396	5 feet E
TS059	Unnamed ephemeral tributary at T37N,	m060923a	9-Jun-01	16:36:07	-118.11554746	48.66880883	
TS060	Unnamed tributary T37N, R37E, Section 16, southwest qtr	t060617a	6-Jun-01	10:01:43	-118.1163399	48.69894892	
TS061	Unnamed ephemeral tributary at T37N,	t060619a	6-Jun-01	12:51:45	-118.08936076	48.69034757	10 feet N
TS062	Unnamed, across from Marcus Island T37N, R37E, Section 23	t060618a	6-Jun-01	11:53:06	-118.07618591	48.68646883	50 feet S
TS063	Unnamed ephemeral tributary at T37N,	m060900a	8-Jun-01	17:07:50	-118.03252902	48.674347	20 feet SE

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS064	Unnamed ephemeral tributary at T37N, R38E, Section 22	q060818a	8-Jun-01	11:41:38	-118.01458202	48.6910539	
TS065	Unnamed ephemeral tributary at T37N, R38E, Section 22 (NW qtr)	q060819a	8-Jun-01	12:21:07	-118.01511441	48.69373847	
TS066	Unnamed, spring drainage east of Evans Campground peninsula	q060819b	8-Jun-01	12:47:58	-118.01488625	48.69618122	
TS067	Deadman Creek	t060521a	5-Jun-01	14:04:19	-118.12680241	48.70725424	
TS068	Unnamed ephemeral tributary, T37N, R37E, Section 16, northwest qtr	t060617b	6-Jun-01	10:32:21	-118.11911193	48.71083339	
TS069	Unnamed tributary to Kettle River Arm, draining pond near Boyds	t060520a	5-Jun-01	13:26:48	-118.12882848	48.71741605	
TS070	Unnamed ephemeral tributary, T37N, R37E, Section 9, NW qtr, SE qtr	t060522a	5-Jun-01	15:49:53	-118.11871181	48.72085941	10 feet S
TS071	Unnamed ephemeral tributary, T37N, R37E, Section 9, NW qtr, NE qtr	t060523a	5-Jun-01	16:44:01	-118.11885067	48.72315992	120 feet upstream (E)
TS072	Unnamed ephemeral tributary, T37N, R38E, Section 4, NE qtr	t060521b	5-Jun-01	14:59:23	-118.11716902	48.73722253	
TS073	Matsen Creek	t060518b	5-Jun-01	11:59 09	-118.13178812	48.73857207	
TS074	Doyle Creek	t060518a	5-Jun-01	11:28:32	-118.13225922	48.74096216	30 feet S
TS075	Kettle River	t060517a	5-Jun-01	10:02:21	-118.1231085	48.74804728	
TS076	China Creek	m052200a	21-May-01	17:18·10	-118.03376107	48.71413716	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS077	Unnamed tributary south of Snag Cove	t052218a	22-May-01	11:18:25	-118.0528747	48.72516913	
TS078	Unnamed ephemeral tributary at T38N, R37E, Section 36 (SW qtr)	t052220a	22-May-01	13:50:52	-118.06398584	48.74391456	
TS079	Unnamed ephemeral tributary entering river at T38N, R37E,Section 35 (NE qtr)	t052221a	22-May-01	14:57:23	-118.06352579	48.75206898	
TS080	Unnamed tributary directly across from Bossburg, WA	t052223a	22-May-01	16:09:19	-118.05597784	48.75829918	
TS081	Dilly Lake ephemeral tributary	t052300a	22-May-01	17:10:43	-118.0403655	48.77095646	
TS082	Unnamed ephemeral tributary upstream of Dilly Lake ephemeral tributary	t052300b	22-May-01	NA	-118.03813889	48.7699444444	
TS083	Unnamed ephemeral tributary at T38N, R38E, Section 21	t052318a	23-May-01	11:03:39	-118.00884452	48.77559496	
TS084	Unnamed ephemeral tributary at T38N, R38E, Section 22	t052319a	23-May-01	12:23:03	-118.00398041	48.77945341	
TS085	Unnamed ephemeral tributary at North Gorge Campground	t052321a	23-May-01	14:09:33	-118.00107156	48.78578034	
TS086	Unnamed ephemeral tributary at T38N, R38E,Section 17 (NW qtr)	t052321b	23-May-01	14:50:14	-118.01392302	48.79681448	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS087	Unnamed ephemeral tributary downstream of Lodgepole Cr at	t052322B	23-May-01	NA	-118.01455	48.8091638889	
TS088	Lodgepole Creek	t052323c	23-May-01	16:44:36	-118.01192578	48.81094806	
TS089	Unnamed ephemeral tributary at T38N, R38E, Section 10	m052323a	23-May-01	16:56:54	-117.99423047	48.81178515	
TS090	Fifteenmile Creek	q060823a	8-Jun-01	16:43:39	-117.9878564	48.82014294	
TS091	Unnamed ephemeral tributary at Flat Creek	q060822b	8-Jun-01	16:05:56	-117.97827733	48.8223694	30 feet S
TS092	Flat Creek	q060822a	8-Jun-01	15:04:11	-117.9780477	48.82304915	
TS093	Unnamed ephemeral tributary downstream of China Bar	m052419a	24-May-01	12:19:19	-117.94096487	48.82060811	
TS094	Unnamed ephemeral tributary at T39N, R39E, Section 25 (SW qtr)	m052420a	24-May-01	13:00:14	-117.92703145	48.8424334	
TS095	Crown Creek	m052420b	24-May-01	13:40:53	-117.91183214	48.85459859	
TS096	Rattlesnake Creek	m060818a	8-Jun-01	11:43:53	-117.90114262	48.85789975	
TS097	Unnamed ephemeral tributary downstream from Moses Spring Creek	m052423a	24-May-01	16:19:45	-117.87309993	48.88062481	
TS098	Moses Spring Creek	t052422a	24-May-01	15:51:04	-117.8577589	48.87557936	
TS099	Onion Creek	m060819a	8-Jun-01	12:58:06	-117.84620837	48.87318893	
TS100	Unnamed ephemeral tributary in T39N, R39E, Section 10	t052421b	24-May-01	14:42.25	-117.84092911	48.89026632	
TS101	Squaw Creek	m060917a	9-Jun-01	10:20:11	-117.82698843	48.89546073	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
TS102	Unnamed tributary from nearshore ponds	t052421a	24-May-01	14:06:35	-117.8205032	48.90021192	
TS103	Fivemile Creek	t052418a	24-May-01	11:58:44	-117.79957867	48.8988877	
TS104	Bear Creek	m060916a	9-Jun-01	09:45:50	-117.8114682	48.90855778	
TS105	Deep Creek	m060817a	8-Jun-01	10:05:07	-117.7536441	48.93226648	
TS106	Big Sheep Creek	M053120a	31-May-01	13:36:48	-117.76537435	48.93923694	
TS107	Quartz Creek	M053119b	31-May-01	12:51:31	-117.76444347	48.93905546	
TS108	Goodeve Creek	M053122b	31-May-01	15:51:19	-117.73418096	48.94296884	12 feet SW
TS109	Scriver Creek	M060117b	1-Jun-01	10:49:00	-117.7034734	48.9503596	6 feet N
TS110	Unnamed tributary NE of Gaging Station	M060120A	1-Jun-01	NA	-117.63981944	48.97556944	
US001 / UW001	Tributary to Tom Bush Creek; Melrose Mine	r062717b	27-Jun-01	10:13:06	-117.64614013	48.9463303	200 feet upstream
US002 / UW002	Flume Creek; Sullivan Mine	r062817a	28-Jun-01	10:00:48	-117.38501219	48.90289118	50 feet SE
US003 / UW002	Flume Creek South Fork	r062817b	28-Jun-01	10:50:08	-117.39327514	48.87175394	
US004	Linton Creek; Oriole Mine	r062820a	28-Jun-01	13:31:47	-117.41577952	48.85920965	30 feet W
US005	Unnamed tributary to Onion Creek; Van Stone Mine	r062516a	25-Jun-01	09:55:36	-117.79365619	48.77948285	
US006	Unnamed tributary to Onion Creek; Van Stone Mine	r062521a	25-Jun-01	14:08:35	-117.75384957	48.75051462	
US007	Van Stone Mine soil	r062521c	25-Jun-01	14:42:04	-117.7530733	48.75045504	
US008	Van Stone Mine soil	r062522e	25-Jun-01	15:08:32	-117.75884106	48.75304501	
US009	Van Stone Mine soil	r062520a	25-Jun-01	13:13:40	-117.74375006	48.75748945	
US010	Unnamed tributary to Onion Creek; Van Stone Mine	r062519b	25-Jun-01	12:35:37	-117.74363503	48.75676136	

Station ID	Station Description	Data File	GPS Date	GPS Time	Longitude	Latitude	Distance/ Direction to Sample Location
UW004	Unnamed tributary to Onion Creek; Van Stone Mine	r062520b	25-Jun-01	13:57:19	-117.7538001	48.75052196	
US011 / UW005	Tributary to Deep Creek; Last Chance Mine	r062623a1	26-Jun-01	16:40:13	-117.68972521	48.86287034	
US012 / UW006	Deep Creek South Fork	r062619a	26-Jun-01	12:26:32	-117.66672655	48.76888098	
US013	Unnamed tributary to Deep Creek	r062617a	26-Jun-01	10:36:50	-117.65789432	48.6975981	180 feet
US014 / UW007	Unnamed tributary to Hunters Creek; Cleveland Mine	r062723a	27-Jun-01	16:30:13	-118.04019634	48.12127929	
US015	Unnamed tributary to Hunters Creek; Cleveland Mine	r062722b	27-Jun-01	15:58:06	-118.0296757	48.11797048	150 feet S
US016	Unnamed tributary to Hunters Creek; Cleveland Mine	r062721a	27-Jun-01	14:19:27	-118.02697886	48.11598579	

No DGPS coordinates available, coordinates shown are uncorrected.
NA: Not available.

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APPENDIX I

DATA QUALITY ASSURANCE REVIEW MEMORANDA AND ANALYTICAL DATA FORMS

(Available Upon Request)

APPENDIX J

EPA'S REQUEST FOR PERMISSION TO CONDUCT SAMPLING IN CANADA

Department of Foreign Affairs
and International Trade

CANADA

Ministère des Affaires étrangères
et du Commerce international

July 23, 2001

Mrs. Susan Lysyshyn
~~Counsellor~~
Economic and Environment,
Science and Technology Section
Embassy of the United States of America
490 Sussex Drive
Ottawa, ON
K1N 1G8

Dear Mrs. Lysyshyn:

I wish to thank the US Environmental Protection Agency (EPA) for contacting Environment Canada, the Province of British Columbia, and the Department of Foreign Affairs and International Trade regarding their interest in collecting sediment and water samples from the Canadian portion of the Columbia River within the Province of British Columbia. I understand these samples were to assist the EPA in determining whether Lake Roosevelt in the State of Washington should be classified as a US Superfund site.

It is my understanding that cooperation on addressing environmental issues in this region is exemplary. However, it is clear that the EPA's request to collect sediment and water samples in Canada for US Superfund purposes and for potential litigation in the US is different and outside the normal areas of cooperation. Discussions between Canadian and US officials suggest in fact that a request of this nature is without precedent and a guiding framework.

Of specific interest to the Government of Canada, is how issues concerning reciprocity, sovereignty, and liability will be addressed in the absence of a clearly defined framework. Recognizing the potential implications for both countries, Canada has reservations about proceeding on an ad hoc basis and would recommend that we discuss this matter more fully before addressing the EPA's request.

Yours truly,

Anne Charles
Director
United States Transboundary Division

cc: Jenna McKay-Alie, Director (Americas Division), Environment Canada

Embassy of the United States of America

October 3, 2001

Mr. Bruce Levy, Director
United States Transboundary Division
Department of Foreign Affairs & International Trade
Lester B. Pearson Building, Floor A-6
125 Sussex Drive
Ottawa, Ontario K1A 0G2

Dear Mr. Levy:

I am responding to a letter by Anne Charles of July 23, 2001 addressed to my predecessor, Susan Lysyshyn, regarding the request by the U.S. Environmental Protection Agency (EPA) Superfund program to collect sediment samples from portions of the Columbia River in Canada within the Province of British Columbia. I would like to clarify and more thoroughly explain the purpose, benefits and possible implications of EPA's proposed sampling in Canada, as well as restate my Government's request to perform this sampling.

The EPA Superfund program is undertaking an assessment of contamination in a portion of the Columbia River in Washington State just south of the U.S.-Canada border. EPA is conducting this assessment at the request of the Colville Confederated Tribes and the Spokane Tribe of Indians of Washington State. This also involves the assessment of approximately ninety (90) mines and mills in the U.S. that have been identified as potential contaminant sources to the Columbia River. In order to establish "background" or "reference" concentrations, EPA is seeking to collect sediment samples from locations upstream of potential contaminant sources. Based on the location of potential contaminant sources and the direction of River flow, ideal locations to collect "background" or "reference" samples are near Lower Arrow Lake in Castlegar, B.C. and along the Pend Oreille River in Canada just north of the international boundary. A figure showing the proposed sample locations is provided in Enclosure 1. Further explanation of the sampling proposed, including EPA's intended coordination efforts with the Government of Canada, is provided in Enclosure 2.

Analytical results of sediment samples collected from "background" or "reference" locations in Canada would merely be compared to the results of sediment samples collected from along the Columbia River in the U.S. Samples collected by EPA in the U.S., in comparison to those proposed for collection in Canada, will help determine if some portion of U.S. waters should be prioritized for further investigation and cleanup.

Accordingly, EPA is seeking to gather data for purposes of site prioritization, not for potential litigation in U.S. courts against Canadian interests.

Additionally, for the information to be useful, it is important that the protocols under which these samples are taken match those of samples collected in the U.S. I assure you that Canada's consent regarding the proposed sampling does not constitute an open-ended commitment to allow future EPA activities in Canadian territory. If EPA determines that additional sampling is required, EPA will again consult with and seek the consent of the Canadian government.

Excellent examples of bi-national cooperation abound, such as the sampling conducted by Environment Canada in the United States near Superfund sites along the Niagara and St. Lawrence Rivers to help fulfill the goals of the Great Lakes Water Quality Agreement. Another demonstration of trans-boundary cooperation includes sampling conducted this year in Canada by the United States Geological Survey and the Washington State Department of Ecology at Lower Arrow Lake in Castlegar.

Finally I wish to point out that collaborative efforts in the Columbia River region between EPA and the British Columbia Ministry of Water, Land and Air Protection (WLAP) already exist through an exchange of information and expertise on unique and complex contaminated sites, such as the coordination of EPA's review of documents related to the first phase ecological risk assessment (ERA) for a contaminated site located along the Columbia River in Trail, B.C. This site in Canada, for which an assessment of the extent and magnitude of contamination is being conducted, includes an "area of interest" extending along the Columbia River from the international boundary to Castlegar. It is important to understand that the "area of interest" being assessed by Canada is immediately upstream of the U.S. portion of the Columbia River currently being assessed by the EPA Superfund program. This example of collaboration in the region demonstrates both countries recognition that contamination issues along the Columbia River extend beyond the international boundary and that in order for each country to better understand the common challenges of contaminated sites of this nature, it is important that information and data be accessible for the mutual benefit of both countries. EPA believes that the results of sediment samples collected from the U.S. portion of the Columbia River and the results of those samples proposed for collection in Canada will provide useful data to the BC Ministry of Water, Land and Air Protection in its assessment of contamination along the Columbia River.

I hope this clarification of EPA's request addresses the concerns raised in your letter. If you approve EPA to conduct sampling with this clarification, we will inform EPA to proceed in close coordination and communication with Environment Canada and BC Ministry of Water, Land and Air Protection. However, if you have additional questions, and/or desire a meeting or conference call, this office would be happy to coordinate it.

Because it is important for EPA to complete all assessment-related activities within the statutory deadline of August 2002, we look forward to your response to this clarification as soon as possible. If you feel a meeting is required, we would like to meet with you by October 12, 2001. Thank you for your interest in this matter and I look forward to receiving your response.

Finally, I will call your office in the next few days to request an appointment to meet you, as clearly there will be other issues of mutual, interest with which we will both be involved in the future.

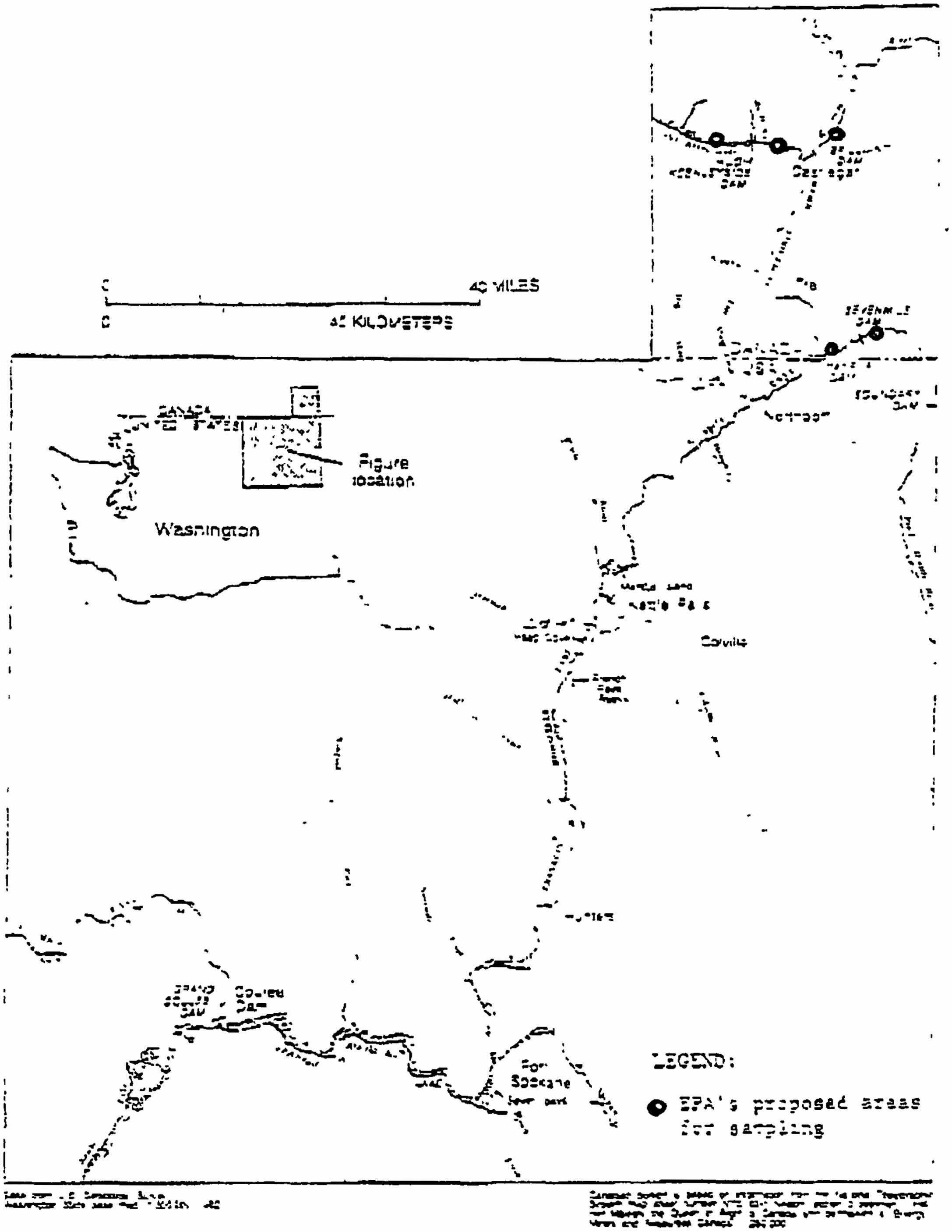
Sincerely,

Michael Gallagher

Michael F. Gallagher
Environment, Science & Technology
Counselor

Enclosures: As stated.

Cc: Jenna McKay-Alie,
Environment Canada



40 MILES
0
40 KILOMETERS
CANADA
Figure location
Washington
Colville
Coulee Dam
Fort Spokane
LEGEND:
EPA's proposed areas for sampling

Figure

Proposed Sampling by EPA in Canada

What is the purpose of EPA's sampling in Canada?
To collect "background" or "reference" samples in relation to EPA's on-going assessment of contamination along the U.S. portion of the Columbia River south of the International Boundary.

How will the data be used?
Analytical results of the "background" or "reference" samples will be compared to sediment samples collected from the U.S. portion of the Columbia River. This information will help EPA determine if some portion of U S. waters should be prioritized for further investigation and cleanup.

What sample media/type will be collected?
Surface sediment samples similar in sediment type/grain size to sediment samples collected in the U.S.

What chemical analyses will be conducted on each sample?
Metals, pesticides, and polychlorinated biphenyls (PCBs)

Where are the proposed sample locations? (Please see figure presented in Enclosure 1)

- Lower Arrow Lake in Castlegar, B.C.
- near Hugh Kennleyside and Brilliant Dams in Castlegar
- near Waneta and Sevenmile Dams along the Pend Oreille River

Up to four different sediment types are proposed for collection at each of these locations. Examples of sediment types are; coarse, fine, very fine, etc.

How were these locations determined?
For purposes of EPA's assessment, "background" or "reference" concentrations are established by collecting samples upstream or outside the influence of potential contaminant sources. Based on the location of potential contaminant sources to the portion of the Columbia River being assessed by EPA and the direction of River flow, the proposed locations in Canada are ideal "background" or "reference" sample locations.

When is the proposed sampling event?
Because it is important for EPA to complete all assessment-related activities within the statutory deadline of August 2002, the desired time frame to conduct sample collection is October 2001. Some examples of "assessment-related activities" are; sample collection and laboratory analysis data validation, evaluation and interpretation of results, and report writing

What are EPA's intended coordination efforts with Canada for this proposed sampling event?

EPA intends to fully coordinate and communicate planned sampling activities and schedule with Environment Canada and BC Ministry of Water, Land and Air Protection (WLAP) prior to conducting any sample collection activities in Canada.

EPA will provide Environment Canada and WLAP early notice of its planned schedule. Both will be provided the opportunity to accompany EPA during field sampling activities, as well as the opportunity to assist in sample collection.

EPA will seek input from Environment Canada and WLAP staff regarding the proposed sample locations given their familiarity with River conditions and characteristics.

EPA will ensure the opportunity for Environment Canada and WLAP to obtain split samples.

EPA intends to provide Environment Canada with a copy of its Sampling Plan and has already provided WHAP with a copy of the Plan as part of the collaborative information sharing effort in the region.

EPA intends to provide Environment Canada and WLAP with a copy of the sample results as soon as it is available and will continue to keep both offices informed of EPA's activities related to the assessment of the U.S. portion of the Columbia River.

1.1.1

RECORD OF COMMUNICATION

☐ PHONE CALL ☐ DISCUSSION ☐ FIELD TRIP ☐ CONFERENCE
☒ OTHER (SPECIFY) Teleconference
(Record of item checked above)

Participants:
TO: EPA Region 10
Office of General Counsel (OGC)
Office of International Activities (OIA)
US State Department
Canadian Dept. of Foreign Affairs & International Trade

FROM:

DATE 4/25/2002

TIME

SUBJECT
EPA's proposed sampling in Canada at Lower Arrow Lake

SUMMARY OF COMMUNICATION

Monica Tonel, EPA Region 10 Site Assessment Manager, discussed:

- overview of Superfund site assessment process
- overview of upper Columbia River site investigation and purpose of EPA's proposed sediment sampling at Lower Arrow Lake in Canada
- chronology of EPA's communication with government of Canada dating back to Spring 2001 in seeking permission to conduct sampling in Canada
- EPA's request regarding the 'excess' sediment samples currently in the possession of BC WLAP.

This was followed by Q & A.

The teleconference wrapped up with Peter Fawcett of DFAIT assuring EPA that a determination on EPA's request would be made within 2 weeks.

Recorded by:
Monica Tonel, April 25, 2002

EPA Form 1300-6 (7-72) REPLACES EPA HQ FORM 5300-3 WHICH MAY BE USED UNTIL SUPPLY IS EXHAUSTED.

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intentionally left blank.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue
Seattle, WA 98101

JUN - 6 2002

Reply To
Attn Of: ECL-115

Mr. Peter Fawcett, Deputy Director
United States Transboundary Division
Department of Foreign Affairs &
International Trade
Lester B. Pearson Building, Floor A-6
125 Sussex Drive
Ottawa, Ontario K1A 0G2

Dear Mr. Fawcett:

I am writing as a follow-up to the teleconference of April 25, 2002, between U.S. and Canadian government staff regarding the request by the U.S. Environmental Protection Agency (EPA) to collect sediment samples from Lower Arrow Lake in Canada. We have also requested the extra volume of sediment collected by the British Columbia Ministry of Water, Land and Air Protection (WLAP) during its past Columbia River monitoring effort.

I appreciate your taking the time to speak with my staff on these matters. As discussed during the teleconference, the dialogue between U.S. and Canada regarding EPA's request to obtain access to Lower Arrow Lake was initiated in the Spring of 2001. The Region appreciated the commitment by you to respond to our requests within two weeks of the April 25 teleconference and remains hopeful that a response is forthcoming. To streamline the process, please include in your letter a designated contact for future reference.

EPA is continuing to consider all possible options in establishing "background" concentrations for its ongoing investigation of hazardous substance contamination along the U.S. portion of the upper Columbia River in northeast Washington. The Region will be reviewing the quality and usability of analytical data provided by The Confederated Tribes of the Colville Indian Reservation pertinent to sediment samples collected from the Columbia River Basin in Canada. In accordance with the government-to-government relationship between EPA and the Tribes, EPA is obligated to consider and review the quality and usability of this information. A copy of the analytical data has been provided to Canadian federal government staff.

Thank you for your valued involvement in this matter. We look forward to your written response to our requests and future cooperation between both countries in addressing contamination issues.

Sincerely,

L. John Iani
Regional Administrator

cc: Christine Todd Whitman, EPA Administrator
Mike Gallagher, US Embassy-Ottawa
Marianne Horinko, EPA Office of Solid Waste and Emergency Response
Judith Ayers, EPA Office of International Activities
Pete Christich, EPA Office of Interational Activities
Eric Running, U.S. State Department
Tom Fitzsimmons, Director, WA Department of Ecology
Derek Thompson, Minister of BC - Water Land & Air Protection (WLAP)
Tim Hodges, Canadian Embassy

APPENDIX K

CHAIN-OF-CUSTODY FORMS AND DATA VALIDATION REPORTS RELATING TO THE SEDIMENT SAMPLE COLLECTED FROM LOWER ARROW LAKE DURING THE ECOLOGY 2001 SAMPLING EVENT

150301

Page 1 of 1

Project Name: FDR Sediment Toxicity

PIC D3100/D31PF (50 50) **Program.** EAP

Send Results to Dave Serdar **Mail Stop:** 47710

Laboratory Analyses Required

X Preliminary Investigation
_ Monitoring
_ For HW Designation
_ For NPDES

Date Results needed by. Bioassay by June 30,

X There is a QAPP for this project

Date (Year 2001) Mo Da	Time Hr Mn	Field Station Identification	Lab Sample Number	Matrix Code	Source Code	No. of Containers	General Chemistry: % Solids	TOC	Grain Size (Cut)	Micro: Microtox	Hyalella 10 D	Chironomus 20-D	Metals: Mercury (Hg)	Cd, Cu, Pb, Zn, As (Cu/Pb) (Total)
05 07	20 45	LOWER ARRO	198040	40	42	6	X	X	X	X	X	X	X	X
05 08	12 00	GOODEVE CR	198041			6		X						
05 08	13 45	AUXILIARY	198042			6		X						
05 08	14 55	BOUNDARY	198043			6		X						
05 08	18 15	KETTLE R	198044			6		X						
05 08	20 50	SANPOIL, R	198045			6		X						
05 09	12 30	CASTLE RCK	198046			6		X						
05 09	15 00	WHITESTN	198047			6		X						
05 09	15 00	WHITESTNR	198048			3		X						
05 09	17 00	SWAWILLA	198049			6		X		X	X	X		
05 09	18 30	GR COULEE	198050			6		X		X	X	X		

Project Officer Dave Serdar

Phone number 407-6772

Samplers Dave Serdar, Randy Couts, Brandee Era

Recorder Brandee Era

Date 5/10/01

Chain of Custody Record

Relinquished By	Received By	Yr Mo Da Hr Mn	Seal I.D.	Condition of Seals	Comments
Brandee Era	HQ	01 05 10 0200	5 coolers	good - old	seals
			signed by Dave	intact	
C.C. WALK-IN	Will White	01 05 10 0700	SEALS INTACT. NO		SEAL I.D. #'s
Will White	[illegible]	01 05 10 0900	seals signed by Dave Serdar	intact	

Comments

ECY 040-115 Rev. 4/96

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard, Washington 98366

Case Narrative

August 7, 2002

Subject. Metals Quality Assurance Memo for FDR Sediment Toxicity Study

Officer· Dave Serdar

By: Dean Momohara
DM

Summary

The data generated by the analysis of these samples can be used with the qualifications noted in this memo. The samples were analyzed on 07/09/01 The results are from analytes simultaneously analyzed but not requested by the client at that time. In some cases, adequate quality control samples (QC) were not analyzed and/or QC results did not meet validation. These results should be treated accordingly

All analyses requested were evaluated by established regulatory quality assurance guidelines

Sample Information

Samples were received by Manchester Environmental Laboratory on 05/10/01 in good condition.

Holding Times

All analyses were performed within established EPA holding times.

Calibration

Instrument calibrations and calibration checks were performed in accordance with the appropriate method All calibration checks were within control limits Balances are professionally calibrated yearly and calibrated in-house daily.

Method Blanks

No analytically significant levels of analyte were detected in the method blanks associated with these samples.

Matrix Spikes

The matrix spike recoveries for iron were not calculated due to the native source concentration being significantly higher than the spike. The data was qualified as an estimate.

Spikes were not analyzed for potassium, magnesium, silver, antimony and tin analyses. The data associated with these analytes were qualified as estimates. All other matrix spike recoveries were within the acceptance limits of $\pm$ 25%

Replicates

All duplicate relative percent differences of samples with concentrations greater than 5 times the reporting limit were within acceptance limits of less than 20%.

Laboratory Control Samples

The iron, chromium and antimony laboratory control sample recoveries were beyond control limits The data associated with these analytes were qualified as estimates. All other laboratory control sample recoveries were within acceptance limits.

Other Quality Assurance Measures and Issues

The beryllium initial calibration verification result was beyond the control limit. The data associated with this analyte was qualified as an estimate.

U - The analyte was not detected at or above the reported result.

J - The analyte was positively identified. The associated numerical result is an estimate

UJ - The analyte was not detected at or above the reported estimated result.

NAF - Not analyzed for

NC - Not Calculated

bold - The analyte was present in the sample. (Visual Aid to locate detected compounds on report sheet)

Please call Dean Momohara at (360) 871-8808 to further discuss this project.

cc Project File

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Inductively Coupled Plasma

Project Name: FDR Sediment Toxicity | **LIMS Project ID: 1503-01**

Sample: 01198040 | **Date Collected:** 05/07/01 | **Method:** SW6010

Field ID: LOWERARRO | **Date Prepared:** 05/22/01 | **Matrix:** Sediment/Soil

Project Officer: Dave Serdar | **Date Analyzed:** 07/09/01 | **Units:** mg/Kg dw

Analyte	Result	Qualifier
Arsenic	2	U
Cadmium	**0.47**	
Copper	**3.5**	
Lead	**11**	
Zinc	**26.9**	
Barium	**27.2**	
Cobalt	**2.1**	
Manganese	**47.0**	
Nickel	**13.4**	
Selenium	5	U
Thallium	5	U
Vanadium	**5.93**	
Silver	0.5	UJ
Beryllium	0 5	UJ
Chromium	**12.0**	**J**
Iron	**3650**	**J**
Potassium	**447**	**J**
Magnesium	**1690**	**J**
Antimony	4	UJ
Tin	5	UJ

Authorized By [signature] Release Date 7/29/02

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Inductively Coupled Plasma

Project Name: FDR Sediment Toxicity | **LIMS Project ID:** 1503-01

Sample: 01198040 (duplicate - LDP1) | **Date Collected:** 05/07/01 | **Method:** SW6010
Field ID: LOWERARRO | **Date Prepared:** 05/22/01 | **Matrix:** Sediment/Soil
Project Officer: Dave Serdar | **Date Analyzed:** 07/09/01 | **Units:** mg/Kg dw

Analyte	Result	Qualifier
Arsenic	2	U
Cadmium	0.44	
Copper	3.6	
Lead	12	
Zinc	26.8	
Barium	26.8	
Cobalt	1.8	
Manganese	45.2	
Nickel	11.5	
Selenium	5	U
Thallium	5	U
Vanadium	5.58	
Silver	0.5	UJ
Beryllium	0.5	UJ
Chromium	11.8	J
Iron	3490	J
Potassium	446	J
Magnesium	1400	J
Antimony	4	UJ
Tin	5	UJ

Authorized By: Randy Knox   Release Date: 7/29/02

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Inductively Coupled Plasma

Project Name: FDR Sediment Toxicity | **LIMS Project ID:** 1503-01

Sample: 01198040 (matrix spike - LMX1) | **Date Collected:** 05/07/01 | **Method:** SW6010
Field ID: LOWERARRO | **Date Prepared:** 05/22/01 | **Matrix:** Sediment/Soil
Project Officer: Dave Serdar | **Date Analyzed:** 07/09/01 | **Units:** % Recovery

Analyte	Result	Qualifier
Arsenic	104	
Cadmium	104	
Copper	103	
Lead	98	
Zinc	97	
Barium	99	
Cobalt	100	
Manganese	98	
Nickel	96	
Selenium	102	
Thallium	107	
Vanadium	101	
Silver		NAF
Beryllium	120	
Chromium	98	
Iron		NC
Potassium		NAF
Magnesium		NAF
Antimony		NAF
Tin		NAF

Authorized By: Randy L Knox   Release Date: 7/29/02

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Inductively Coupled Plasma

Project Name: FDR Sediment Toxicity | **LIMS Project ID:** 1503-01

Sample: 01198040 (matrix spike - LMX2) | **Date Collected:** 05/07/01 | **Method:** SW6010
Field ID: LOWERARRO | **Date Prepared:** 05/22/01 | **Matrix:** Sediment/Soil
Project Officer: Dave Serdar | **Date Analyzed:** 07/09/01 | **Units:** % Recovery

Analyte	Result	Qualifier
Arsenic	104	
Cadmium	104	
Copper	104	
Lead	98	
Zinc	98	
Barium	100	
Cobalt	101	
Manganese	100	
Nickel	95	
Selenium	102	
Thallium	108	
Vanadium	102	
Silver		NAF
Beryllium	121	
Chromium	100	
Iron		NC
Potassium		NAF
Magnesium		NAF
Antimony		NAF
Tin		NAF

Authorized By: Randy L Knox   Release Date: 7/29/02

APPENDIX L

GRAIN SIZE CLASSIFICATION

Table 1-1—Grain Size Classification of Sediment Samples

Station ID	Internal Sample ID	Grain Size Class	Station ID	Internal Sample ID	Grain Size Class	Station ID	Internal Sample ID	Grain Size Class
CS001	CR-003-SD	3	TS008	TR-064-SD	4	TS068	TR-115-SD	1
CS002	CR-001-SD	3	TS009	TR-063-SD	1	TS069	TR-119-SD	1
CS003	CR-004-SD	4	TS010	TR-065-SD	1	TS070	TR-116-SD	1
CS004	CR-005-SD	4	TS011	TR-066-SD	4	TS071	TR-117-SD	1
CS005	CR-006-SD	4	TS012	TR-068-SD	3	TS072	TR-118-SD	1
CS006	CR-007-SD	1	TS013	TR-067-SD	2	TS073	TR-120-SD	1
CS007	CR-008-SD	2	TS014	TR-069-SD	1	TS074	TR-121-SD	1
CS008	CR-009-SD	2	TS015	TR-070-SD	3	TS075	TR-122-SD	1
CS009	CR-010-SD	1	TS016	TR-071-SD	3	TS076	TR-001-SD	3
CS010	CR-011-SD	4	TS017	TR-072-SD	4	TS077	TR-002-SD	3
CS011	CR-012-SD	4	TS018	TR-073-SD	4	TS078	TR-005-SD	2
CS012	CR-013-SD	4	TS019	TR-074-SD	1	TS079	TR-004-SD	2
CS013	CR-014-SD	4	TS020	TR-075-SD	4	TS080	TR-006-SD	2
CS014	CR-015-SD	4	TS021	TR-076-SD	4	TS081	TR-007-SD	3
CS015	CR-016-SD	4	TS022	TR-077-SD	2	TS082	TR-008-SD	3
CS016	CR-017-SD	4	TS023	TR-078-SD	4	TS083	TR-009-SD	3
CS017	CR-018-SD	4	TS024	TR-079-SD	3	TS084	TR-010-SD	1
CS017	CR-066-SD	3	TS025	TR-080-SD	2	TS085	TR-011-SD	4
CS018	CR-019-SD	3	TS026	TR-081-SD	3	TS086	TR-012-SD	NA
CS019	CR-020-SD	4	TS027	TR-082-SD	3	TS087	TR-013-SD	2
CS020	CR-023-SD	4	TS028	TR-083-SD	2	TS088	TR-014-SD	2
CS021	CR-022-SD	4	TS029	TR-084-SD	2	TS089	TR-016-SD	NA
CS022	CR-024-SD	4	TS030	TR-085-SD	2	TS090	TR-040-SD	1
CS023	CR-025-SD	3	TS031	TR-086-SD	1	TS091	TR-127-SD	2
CS024	CR-062-SD	3	TS032	TR-087-SD	1	TS092	TR-041-SD	2
CS025	CR-026-SD	4	TS033	TR-088-SD	4	TS093	TR-017-SD	3
CS026	CR-029-SD	3	TS034	TR-089-SD	1	TS094	TR-018-SD	3
CS027	CR-027-SD	3	TS035	TR-128-SD	2	TS095	TR-019-SD	2
CS028	CR-028-SD	4	TS036	TR-129-SD	4	TS096	TR-042-SD	1
CS029	CR-030-SD	3	TS037	TR-090-SD	1	TS097	TR-020-SD	3
CS030	CR-031-SD	3	TS038	TR-091-SD	1	TS098	TR-022-SD	NA
CS031	CR-032-SD	2	TS039	TR-093-SD	1	TS099	TR-043-SD	1
CS032	CR-033-SD	3	TS040	TR-094-SD	1	TS100	TR-023-SD	2
CS033	CR-034-SD	3	TS041	TR-095-SD	2	TS101	TR-044-SD	1
CS034	CR-036-SD	3	TS042	TR-096-SD	3	TS102	TR-024-SD	4
CS035	CR-035-SD	3	TS043	TR-097-SD	2	TS103	TR-025-SD	1
CS036	CR-037-SD	2	TS044	TR-104-SD	1	TS104	TR-045-SD	2
CS037	CR-038-SD	2	TS045	TR-105-SD	4	TS105	TR-047-SD	1
CS038	CR-039-SD	2	TS046	TR-106-SD	2	TS106	TR-026-SD	2
CS039	CR-040-SD	2	TS047	TR-107-SD	4	TS107	TR-027-SD	2
CS040	CR-041-SD	2	TS048	TR-098-SD	1	TS108	TR-028-SD	3
CS041	CR-042-SD	1	TS049	TR-099-SD	1	TS109	TR-029-SD	2
CS042	CR-043-SD	1	TS050	TR-125-SD	2	TS110	TR-030-SD	1
CS043	CR-044-SD	1	TS051	TR-100-SD	2	US001	BK-150-SD	1
CS044	CR-045-SD	1	TS052	TR-101-SD	1	US002	BK-152-SD	1
CS045	CR-046-SD	1	TS053	TR-102-SD	1	US003	BK-153-SD	1
CS046	CR-047-SD	1	TS054	TR-103-SD	1	US004	BK-155-SD	1
CS047	CR-048-SD	1	TS055	TR-108-SD	1	US005	BK-130-SD	1
CS048	CR-049-SD	1	TS056	TR-109-SD	1	US006	BK-131-SD	1

Table 1-1—Grain Size Classification of Sediment Samples

Station ID	Internal Sample ID	Grain Size Class	Station ID	Internal Sample ID	Grain Size Class	Station ID	Internal Sample ID	Grain Size Class
CS049	CR-050-SD	1	TS057	TR-110-SD	1	US007	BK-134-SD	3
CS050	CR-051-SD	2	TS058	TR-111-SD	1	US008	BK-135-SD	2
CS051	CR-052-SD	1	TS059	TR-112-SD	1	US009	BK-133-SD	1
CS052	CR-053-SD	1	TS060	TR-113-SD	1	US010	BK-139-SD	1
TS001	TR-056-SD	4	TS061	TR-123-SD	1	US011	BK-142-SD	4
TS002	TR-057-SD	4	TS062	TR-124-SD	1	US012	BK-140-SD	1
TS003	TR-058-SD	3	TS063	TR-126-SD	1	US013	BK-138-SD	1
TS004	TR-059-SD	3	TS064	TR-037-SD	1	US014	TR-147-SD	1
TS005	TR-061-SD	1	TS065	TR-038-SD	2	US015	TR-145-SD	1
TS006	TR-062-SD	2	TS066	TR-039-SD	3	US016	TR-136-SD	1
TS007	TR-060-SD	1	TS067	TR-114-SD	1			

Grain Size Classes:

1. < 25% fines
2. Greater than 25% but less than 50% fines
3. Greater than 50% but less than 75% fines
4. > 75% fines

NA: Not available

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