

**Region 10  
U.S. Environmental Protection  
Agency**

**FINAL**

**Phase I Fish Tissue Sampling  
Data Evaluation  
Upper Columbia River Site  
CERCLA RI/FS**

**October 30, 2007**

**Prepared by**

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**CONTRACT NO 68-S7-04-01**



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**Appendices (provided electronically on CD)**

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- B Analytical Results
- C Estimated Whole Body Concentrations from Walleye and Rainbow Trout
- D Estimated Whole Body Concentrations from Largescale Suckers
- E Comparison of Preliminary Contaminant of Interest Concentrations by River Reach
- F Data Validation Reports



# Acronyms and Abbreviations

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ACG	analytical concentration goal
A&R	approach and rationale
AFDW	ash-free dry weight
ANOVA	analysis of variance
ARAR	applicable or relevant and appropriate requirement
ASB	arsenobetanine
ASL	Applied Sciences Laboratory
°C	degree Celsius
CCT	Confederated Tribes of the Colville Reservation (Colville Confederated Tribes)
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program [USEPA]
CSM	conceptual site model
CV	coefficient of variation
DI	deionized
dioxin	dibenzo-p-dioxin
DMA	dimethylarsonic acid
DOI	U.S. Department of the Interior
DQO	data quality objective
Ecology	Washington State Department of Ecology
ESI	expanded site inspection
EVS	EVS Consultants
FSCA	fish sample collection area
furan	dibenzofuran
GPS	global positioning system
HQ	hazard quotient
HSCA	Hazardous Substances Control Act
ICP/AES	inductively coupled plasma/atomic emission spectroscopy
IEUBK	Integrated Exposure Uptake Biokinetic Model for Lead in Children
IRIS	Integrated Risk Information System
LDPE	low-density polyethylene
MELP	Ministry of Environment, Lands, and Parks, Province of British Columbia
µg/dL	micrograms per deciliter
µg/kg	micrograms per kilogram
mg/kg	milligrams per kilogram
MMA	monomethylarsonic acid
n	number of samples
NC	not calculated
PAH	polycyclic aromatic hydrocarbon
PARCC	precision, accuracy, representativeness, comparability, and

	completeness
PCB	polychlorinated biphenyl
PCOI	preliminary contaminant of interest
PCV	preliminary comparison value
pg/g	picograms per gram
PRC	preliminary remedial concentration
PRG	preliminary remediation goal
RfD	reference dose
QA	quality assurance
QAO	Quality Assurance Officer
QAPP	quality assurance project plan
QA/QC	quality assurance/quality control
QC	quality control
RfD	reference dose
RI/FS	remedial investigation/feasibility study
RSCC	Regional Sample Control Coordinator
SDG	sample delivery group
SIMS	Site Information Management System
STI	Spokane Tribe of Indians
TAL	Target Analyte List (USEPA)
TEF	toxicity equivalence factor
TOPO	Task Order Project Officer
TSR	target size range
UCR	Upper Columbia River
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
VTSR	validated time of sample receipt
WDOH	Washington State Department of Health
WW	wet weight

## SECTION 1

# Introduction

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This Phase I Fish Tissue Data Evaluation Report has been prepared to document the completion of the Phase I fish tissue sampling program for the Upper Columbia River (UCR) site. The UCR site is composed of an approximately 150-mile stretch of the Columbia River between the U.S.-Canada border and Grand Coulee Dam (Figure 1-1). The sampling program was conducted in September and October 2005 as part of Phase I of a Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Remedial Investigation/Feasibility Study (RI/FS) for the site being prepared under the direction of the U.S. Environmental Protection Agency (USEPA).

The overall objective of the RI/FS for the UCR is to identify site contamination, assess potential risk to human or ecological receptors, and develop remedial approaches to mitigate unacceptable risk. The Phase I fish tissue sampling program was designed to gather data to support (1) the human and ecological risk assessments, and (2) analyses to consider issuance of an updated fish advisory for Lake Roosevelt. The Phase I fish tissue sampling program was also designed to meet the following secondary objectives:

- Characterize the spatial patterns of tissue contaminants
- Establish baseline tissue contaminant levels for comparison with future surveys
- Correlate tissue concentrations with contaminant concentrations in sediment
- Compare tissue contaminant levels among fish species
- Compare tissue contaminant levels among river reaches
- Estimate the variation in tissue contaminant concentrations among individual fish of a species

The Phase I fish tissue sampling program was developed following the process described in the RI/FS Document and Data Gathering Task Summary (CH2M HILL, 2004a). The approach and rationale used for development of the program are described in the Phase I Fish Tissue Sampling Approach and Rationale Document (Fish Tissue A&R Document) (CH2M HILL, 2005a). Development of the Phase I fish tissue sampling program involved creation of a preliminary fish tissue conceptual site model (CSM), definition of fish tissue data quality objectives (DQOs), identification of data needs, assessment of existing data usability, and identification of data gaps. The Phase I fish tissue sampling program was developed in consideration of the specific data needs identified in the DQO process, the unique characteristics of the site, and comments received from participating stakeholders. The specific policies, organizations, objectives, and functional activities/procedures for the program are described in the Phase I Fish Tissue Sampling Quality Assurance Project Plan (Fish Tissue QAPP) (CH2M HILL, 2005b). The field activities associated with the program are described in the Phase I Fish Tissue Sampling Field Report (Fish Tissue Field Report) (CH2M HILL, 2006a).

After completing this Data Evaluation Report, the USEPA came to an agreement with Teck Cominco American, Inc. (Teck Cominco), under which Teck Cominco will complete the RI/FS and an ecological risk assessment under the supervision of USEPA. This Data Evaluation Report was prepared to facilitate information sharing among USEPA and the participating parties, to communicate preliminary Phase I findings to the public, and to provide context for subsequent RI/FS scoping documents and work plans. Because this report was prepared in advance of the initial RI/FS work plans, it does not substitute for the critical RI/FS work planning steps. Given this, the objective of the data evaluation was to present a preliminary analysis of the data that focuses on the nature and extent of fish tissue contaminants seen in the Phase I sampling and to present the data relative to the secondary objectives identified in the Fish Tissue A&R Document (CH2M HILL, 2005a) and, the Fish Tissue QAPP (CH2M HILL, 2005b) and presented above. Subsequent sampling that builds on the Phase I fish tissue study may be undertaken by Teck Cominco as part of completing the RI/FS and the ecological risk assessment under the supervision of the USEPA.

Additional and/or alternative analysis of the Phase I fish tissue data, such as assessment of potential human health and ecological risks posed by contaminants in fish from the UCR, are not addressed in this document. A site-specific human health risk assessment addressing consumption of targeted UCR fish species is being conducted by USEPA, and the ecological risk assessment to be conducted by Teck Cominco will be overseen by USEPA. The findings of the human health and ecological risk assessments will be presented in separate documents. Analysis of the Phase I fish tissue data to consider issuance of an updated fish advisory for Lake Roosevelt is being conducted by the Washington State Department of Health (WDOH).

## 1.1 Report Organization

Information presented in this report is intended to provide a preliminary summary of the nature and extent of contaminants in targeted fish species in the UCR, and to update the preliminary CSM for fish in the UCR. The preliminary CSM for fish is described in Section 4 of the Fish Tissue A&R Document (CH2M HILL, 2005a). This report is organized to present the following information:

- **Section 1: Introduction.** This section describes the purpose, scope, and organization of the Phase I Fish Tissue Data Evaluation Report. It also presents a brief description of the site and background events.
- **Section 2: Field and Analytical Program Overview.** This section summarizes the Phase I fish tissue field sampling and analytical program. It summarizes the objectives of the fish tissue sampling program, describes sampling and associated field activities and methodologies, and identifies the types and locations of samples collected. It also describes the analytical program and presents a usability assessment of the analytical data with respect to the procedures established within the Fish Tissue QAPP. Deviations from the QAPP are presented in detail in the UCR Fish Tissue Field Report (CH2M HILL, 2006a) and are summarized in this section.
- **Section 3: Data Evaluation Approach and Results.** This section presents the following information:

- Data evaluation approach, including a process for selecting preliminary contaminants of interest (PCOIs) to focus the data evaluation and data evaluation methods
- Analytical results by target species and analyte group
- Nature and Extent of PCOIs in targeted fish species, as follows:
  - o Statistical comparisons between species and river reaches and correlations between select PCOIs and select target species
  - o Comparison of study results to past studies
- **Section 4: Data Gaps and Recommendations.** This section summarizes the major study findings and lists data gaps identified for UCR fish tissue.
- **Section 5: References.** This section contains reference information for the documents cited in this report.
- **Appendix A: Preliminary Contaminant of Interest Comparison Value Results**
- **Appendix B: Analytical Results**
- **Appendix C: Estimated Whole Body Concentrations from Fillet and Offal Wild Rainbow Trout**
- **Appendix D: Estimated Whole Body Concentrations from Largescale Suckers**
- **Appendix E: Comparison of Preliminary Contaminant of Interest Concentrations by River Reach**
- **Appendix F: Data Validation Reports**

The appendices are provided in electronic format on a CD attached to this document.

## 1.2 Site Background

The UCR site is located in north-central Washington and extends from the U.S.-Canada international border south and west to Grand Coulee Dam, a distance of approximately 150 miles downriver (Figure 1-1). The UCR site includes both a free-flowing reach of the Columbia River and Franklin D. Roosevelt Lake (Lake Roosevelt), a large reservoir maintained behind Grand Coulee Dam. The transition between the free-flowing river and Lake Roosevelt occurs within approximately the first 15-mile stretch south of the U.S.-Canada border and 132 miles upriver from Grand Coulee Dam when the reservoir is full.

Previous investigations by federal and state agencies have identified the presence of contamination within the U.S. portion of the UCR and surrounding upland areas from Grand Coulee Dam to the Canadian border (U.S. Geological Survey [USGS] 1994 and 2000; Washington State Department of Ecology [Ecology] 1989, 1991, and 1994). Other studies have evaluated contaminant source areas and effects north of the Canadian border [Ministry of Environment, Lands, and Parks, Province of British Columbia (MELP) 1992; Teck Cominco 2001]. Potential sources of contamination include mining and milling operations,

smelting operations, pulp and paper production, sewage treatment plants, and other industrial activities. Contaminants found by the studies are documented in the A&R Document (CH2M HILL, 2005a) and include heavy metals such as cadmium, copper, lead, mercury, and zinc, as well as organic contaminants such as polychlorinated dibenzo-p-dioxins (dioxins), polychlorinated dibenzofuran (furans), and polychlorinated biphenyls (PCBs).

In August 1999, the Confederated Tribes of the Colville Indian Reservation (CCT) petitioned USEPA to conduct an assessment of hazardous substance contamination at the Upper Columbia River. The petition expressed concerns about possible risks to people's health and the environment from contamination in the river. In December 2000, USEPA completed a preliminary assessment (USEPA, 2000a). Based on a review of available information and existing data, USEPA determined that further data collection was warranted. In 2001, USEPA conducted an expanded site inspection (ESI) at the UCR and collected sediment samples to assess contaminant concentrations in river sediment and to determine whether further detailed investigation such as an RI/FS was warranted (USEPA, 2003c). The results of the investigation showed that widespread contamination is present in the lake and river sediment and that an RI/FS was necessary to evaluate possible risks to human health and the environment.

The RI/FS process was initiated in April 2004 with collection and review of existing site characterization information. This information was the basis for developing the preliminary CSM, both for contaminated sediment as presented in the Phase I Sediment Sampling Approach and Rationale Document (Sediment A&R Document) (CH2M HILL, 2004b) and for fish tissue as presented in the Fish Tissue A&R Document (CH2M HILL, 2005a). This information was also used to prioritize the initial RI data collection efforts. The top-priority data collection efforts for Phase I of the RI were determined to be: (1) further assessment of contamination within sediment, and (2) further evaluation of contamination within fish tissue. The sediment sampling program was conducted in April and May 2005, and the fish tissue sampling program was conducted in September and October 2005. This report presents an evaluation of the fish tissue data. A separate report presents an evaluation of the sediment data (CH2M HILL, 2006b).

**FIGURE 1-1**  
Upper Columbia River and Vicinity  
*Upper Columbia River R/FS*

- LEGEND**
- State Lands**
- Parks and Recreation Commission
  - Department of Fish and Wildlife
- Federal Lands**
- US Forest Service
  - National Park Service
  - US Fish and Wildlife Service
  - US Bureau of Land Management
  - US Bureau of Reclamation
- Other Lands**
- Tribal Lands
  - Municipal Government
  - County Government
- Other Features**
- Cities
  - ▲ EPA Information Repository Locations
  - Major Roads
  - Railroads
  - Counties
  - Water Features
  - Columbia River Mile (RM)

