



FIELD RECONNAISSANCE AND SEDIMENT SAMPLING REPORT

Upper Columbia River Site
Washington

By
Brendan Dowling

August 2007
Washington Department of Ecology
Toxics Cleanup Program
Eastern Regional Office
Spokane, WA

1.0 INTRODUCTION

Areas of the Upper Columbia River (UCR) and its banks have been shown to contain elevated concentrations of various heavy metal contaminants including arsenic, cadmium, copper, lead and zinc. Much of the observed heavy metal contamination has been attributed to sources located north of the U.S.-Canada international border¹. The United States Environmental Protection Agency (EPA) initiated Remedial Investigation (RI) activities in 2005 to characterize the nature and extent of contamination, focusing the Phase I sampling and analytical efforts on sediment and fish tissue. In June 2006, a formal settlement contract was established between the Federal Government, Teck Cominco American Incorporated (TCAI) and a separately incorporated affiliate, Tech Cominco Metals Ltd. This agreement places responsibility for implementation of the remaining remedial investigation and feasibility study activities with TCAI.

On May 14, 2007 the Washington State Department of Ecology (Ecology) conducted a one-day reconnaissance visit to evaluate selected portions of the UCR site. The purpose of this visit was twofold: (1) observe general sediment depositional patterns and conditions, including visual indications of granular slag material, and (2) collect sediment samples from a selected number near-shore, side-bank locations, including exposed river shorelines and island locations. The timing of the reconnaissance visit coincided with the normal seasonal drawdown of the Lake Roosevelt reservoir. Seasonal drawdown exposes a variety of landmass features that would otherwise be inundated during later season full-pool conditions. The sampling and reconnaissance activities were focused on the northern portion of the UCR site from approximately Kettle Falls (RM 700) to the area of “Deadman’s Eddy” (RM737), located approximately 7 miles south of the U.S.-Canada border (Figure 1).

2.0 SITE DESCRIPTION

The UCR Site is located in northeast Washington state and extends approximately 147 river miles from the U.S.-Canada international border to Grand Coulee Dam. The upper 15 miles or so of the site are characterized by a free-flowing river. This free flowing reach transitions into a reservoir, Franklin D. Roosevelt Lake (Lake Roosevelt), created behind Grand Coulee Dam. The transition between the free-flowing River and Lake Roosevelt occurs in the general vicinity of a large point bar feature referred to as China Bend. Construction of Grand Coulee Dam was completed in 1941. The dam was installed to provide irrigation water, help control flooding, and produce hydroelectric energy. Normal dam operations result in seasonal changes to the pool level within Lake Roosevelt. Drawdown typically begins in January and maximum drawdown generally is reached by May. During drawdown sidebank features including relic floodplain terraces and beaches become exposed. Sampling activities associated with the May 2007 reconnaissance visit were conducted when the reservoir pool was approximately 35 feet (elevation 1255) below the normal high pool elevation of 1290. Although substantially less drawdown effect was observed in the riverine reach as compared to the reservoir area, drawdown effects still were evident, and influenced the exposure of geomorphologic features within this portion of the floodplain.

¹ United States Environmental Protection Agency (USEPA). 2003. Upper Columbia River Expanded Site Investigation Report, Northwest Washington. TDD: 01-02-0028. Region 10 Start – 2, Superfund Technical Assessment and Response Team. May – September 2001 investigation. Prepared by Ecology and Environment, Inc. and Roy F. Weston, Inc.

3.0 SITE INVESTIGATION OBJECTIVES

Ecology developed the following objectives for the reconnaissance field visit and focused sampling of the Upper Columbia River site:

1. Visually observe variations in sediment deposition, grain size and slag content at selected stations; focus on exposed side bank/beach/terrace areas within the zone of drawdown (reservoir areas), and river edge areas in the upstream riverine reach.
2. Collect representative soil and sediment samples from selected locations to help refine the current understanding of contaminant nature and extent, as well as support informal comparisons with contaminant concentration data from previous UCR studies.
3. Conduct limited laboratory analysis to measure contaminant of interest concentrations, specifically arsenic, cadmium, copper, lead and zinc.
4. Compare the reported analytical results to selected human health and ecological screening levels.

4.0 METHODS

4.1 SAMPLE COLLECTION

The following procedures were used in association with the sampling activities conducted on May 14, 2007:

- Samples were collected as 5-point composite samples within a 10-foot radius. Sub-samples typically were collected from depth of approximately 0 to 6 inches below the surface and homogenized to form a single composite sample.
- A stainless steel spoon was used to collect the samples with decontamination procedures followed as outlined in the Sampling and Analysis Plan.
- A handheld Trimble Global Positioning System (GPS) unit was used to record the coordinates of the approximate center of the 5-point composites that made up each sample (Appendix A).
- Photographs of the general sampling station area, along with a close-up of the central sub-sample test pit, were taken directly after sample collection and are included as Appendix B to this report.
- The composited sediment was placed into 1-gallon zip-locking plastic bags labeled with the sample location number and date.
- Variations to the sampling methodology are noted within the attached field notes (Appendix C).

4.2 SAMPLE FRACTIONATION

Samples were sieved to create two separate size fractions. Sample fractionation via sieving was conducted at the Ecology Eastern Regional Office facility. The following protocols pertain to the fractionation process:

- Prior to sieving, samples were allowed to air dry for two days in the sample preparation room.
- Photographs were taken of the dry whole sample.
- Samples were fractionated using a #10 (2 mm) sieve.

4.3 ANALYSIS AND QC

Fractionated samples were submitted to Ecology's Manchester Laboratory for chemical analysis of five metals of interest: arsenic, cadmium, copper, lead and zinc. Only the sample material passing through the #10 sieve (<2 mm) was submitted for analysis. The following analytical methods were used:

1. EPA SW846 – 3050B Acid Digestion of Sediments, Sludges and Soils; **and**
2. EPA Method 200.8, Determination of Trace Elements in Waters and Wastes using ICP-MS

A split of Sample 10 was used as a lab duplicate.

5.0 RESULTS AND OBSERVATIONS

5.1 LAB ANALYSIS

Laboratory analytical results for the <2 mm size fraction are presented in Table 1 and graphically overlaid on an aerial photographs in Figures 2 and 3. Detailed descriptions of the sampling locations and sediment descriptions are provided in Appendix C. Visual observations of Samples 6, 8, and 10 showed the presence of black, sand-sized material recognized as slag.

Sample	Arsenic	Cadmium	Copper	Lead	Zinc	Visual Observation
1	14.1	7.4	90	444	1160	Silty Clay
2	3.7	2.6	23.5	131	240	Sandy Silty Clay
3	2.1	0.3	13.1	12.4	58	Silt overlying Medium Sand
4	6.9	3.1	67.4	185	679	Sandy Silt overlying Cobbly, Sandy Silty Gravel
5	7	1.6	31.9	80.1	285	Mix of Gravel, Sand and Silt with Organic Matter
6	13	1.5	939	564	7360	Slag-bearing sand with minor very Fine Gravel
7	12	8.4	69.1	413	1590	Silt (overlying Slag-bearing sand)
8	11	4.5	636	428	6380	Slag-bearing Sand
9	11	6.4	165	340	2540	Sandy Silt to Silty Sand
10a	18	4.6	1430	369	11000	
10b ²	18	3.3	1550	398	7480	Slag-bearing Sand

Table 1. Laboratory analysis results. All values are mg/kg.

5.2 SCREENING-LEVEL COMPARISON TO SELECTED PROTECTION VALUES

For screening purposes, analytical results presented in Table 1 were compared to selected human health and ecological protection values. Screening values proposed within the Phase 1 of the RI/FS provide a preliminary evaluation of potential adverse impacts to ecological and human health. Table 2 lists the threshold effects concentrations (TEC) and the probable effects concentrations (PEC) values developed by MacDonald et al. 2000³. Model Toxics Control Act (MTCA) Method A and B cleanup values for soil also are provided for reference, along with the EPA Region 9 preliminary remediation goals (PRGs³). A brief constituent by constituent summary is presented below.

² Lab duplicate.

³ MacDonald D. D., C.G. Ingersoll and T.A. Berger. (2000). Development and evaluation of consensus-based sediment quality guidelines for freshwater ecosystems. *Arch. Environmental Contamination Toxicology*. 39, 20-31.

Contaminant	EPA PRG	MTCA Method A	MTCA Method B	TEC	PEC
Arsenic	0.39	20	0.67	9.79	33
Cadmium	37	2	80	0.99	4.98
Copper	3129	-	3000	31.6	149
Lead	400	250	-	35.8	128
Zinc	23463	-	24000	121	459

Table 2. Selected human health and ecological screening levels presented in the EPA Phase 1 Sediment Sampling Data Evaluation Report⁴ (all values mg/kg).

ARSENIC

Arsenic concentrations exceeded both the PRG and MTCA Method B levels in all samples. MTCA Method A cleanup levels were not exceeded. The TEC value for arsenic was exceeded in Samples 1 and 6-10. The PEC value was not exceeded by any of the samples.

CADMIUM

Cadmium concentrations did not exceed the PRG or MTCA Method B levels in any of the samples. The MTCA Method A cleanup level was exceeded in eight samples (1, 2, 4 and 7-10). The TEC was exceeded in all samples except for Sample 3. The PEC was exceeded in three samples (1, 7 and 9).

COPPER

Copper concentrations did not exceed the PRG or MTCA Methods A and B levels in any of the samples. The TEC value was exceeded in eight samples (1 and 4-10). The PEC value was exceeded in four samples (6, 8, 9 and 10).

LEAD

Lead concentrations in four samples (1 and 6-8) exceeded both the PRG and MTCA Method A levels. There is no MTCA Method B value available for lead. The TEC value for lead was exceeded in all samples except for Sample 3. The PEC value was exceeded in eight samples (1, 2, 4, and 6-10)

ZINC

Zinc concentrations did not exceed the PRG or MTCA Methods A and B levels in any of the samples. The TEC was exceeded in all samples except for Sample 3. The PEC was exceeded in seven samples (1, 4, and 6-10).

5.3 SLAG OBSERVATIONS

Black, glassy, angular, sand-size particles were observed at selected sampling stations included as part of the May 14, 2007 reconnaissance visit. Granular materials having this particular characteristic were categorized as slag, and attempts were made to visually estimate the approximate bulk percentages of slag in the various sediment samples collected. Slag was visually evident in, or in association with, four of the samples:

- Sample 6 (China Bend; RM 723)

⁴ U.S. Environmental Protection Agency. 2006e. Phase I Sediment Sampling Data Evaluation - Upper Columbia River Site CERCLA RI/FS. Draft Final. August 2006. U.S. Environmental Protection Agency, Washington, DC.

- Sample 7 (China Bend; RM 723)
- Sample 8 (Sand bar downstream of island feature; RM 730.5)
- Sample 10 (Deadman's Eddy; RM 737.5)

Sample 10 from the vicinity of Deadman's Eddy – approximately RM 737.5 – contained the highest apparent percentage of slag. The area from which Sample 10 was collected appeared to contain a variable slag content ranging from roughly 10% to 65%. Vertical variations in apparent slag content were noted when excavating the shallow pits used to obtain composite sub samples. A GPS-based reconnaissance was conducted to estimate the approximate areal extent of the side bank/point bar deposit (associated with Sample 10) covered by slag material. Based on the shape and perimeter coordinates of this sediment deposit, the slag-enriched zone covers an area of approximately 20 acres. The area depicted on Figure 4 likely does not represent the full extent of the Deadman's Eddy side bank/point bar area where slag-enriched sediment is present; adjacent areas not directly traversed on foot, also appeared to contain observable quantities of slag based on color and geomorphologic attributes of sediment deposition that were generally similar to the Sample 10 area.

6.0 CONCLUSION

Observations and analytical data from a reconnaissance-level visit to the UCR site on May 14, 2007 will assist in initiating needed additional information to further depict the hydraulic- and geomorphologic-driven variability of slag and metals-enriched sediment distribution in the upper reaches of the UCR site. Strong consideration of this structured variability needs to be faithfully integrated into future nature and extent investigation planning, as well as toxicity studies. The results of this reconnaissance visit also will assist in initiating an inventory of the Trail-facility legacy slag waste deposits in Washington.

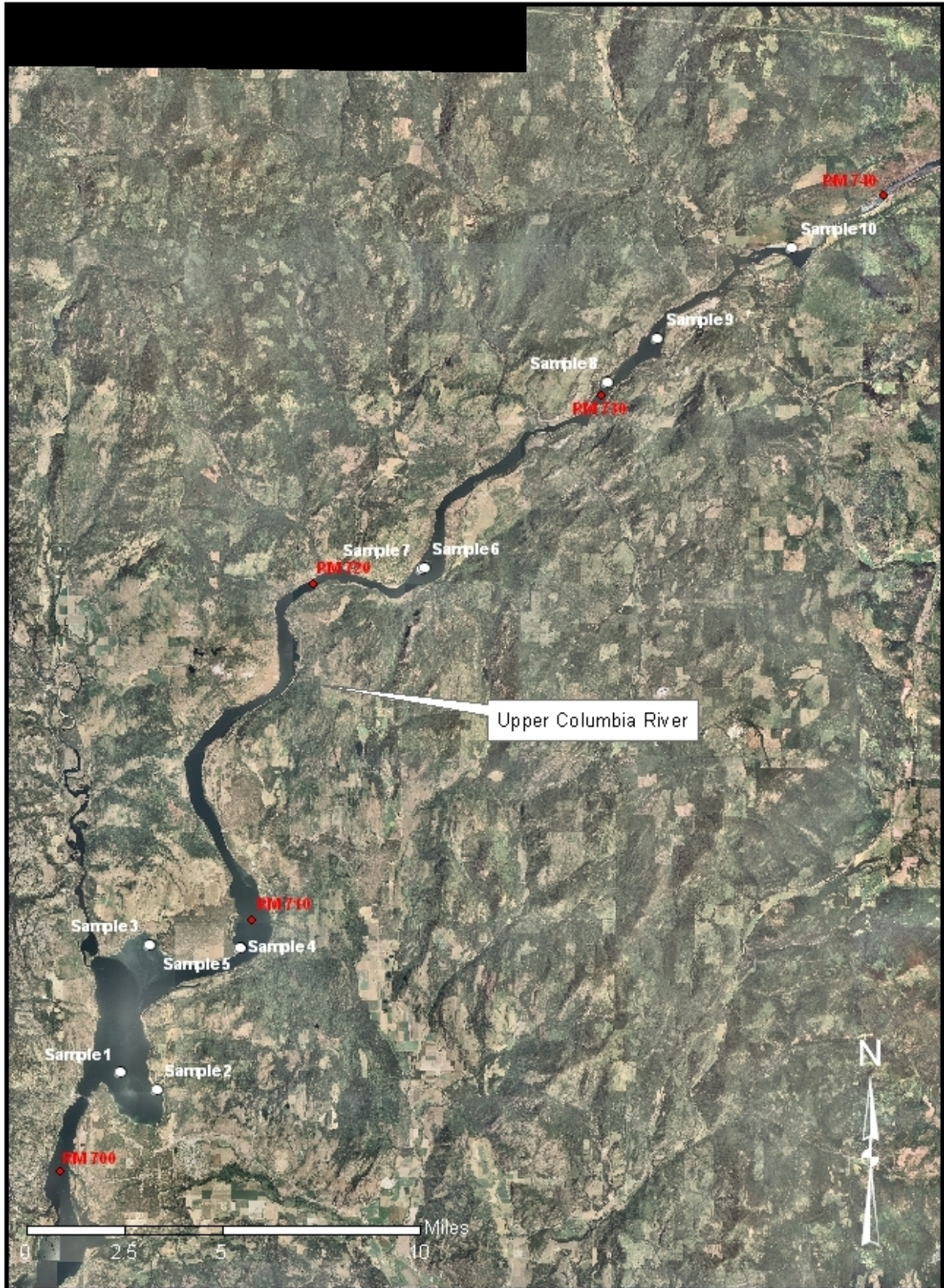


Figure 1. Sampling locations with approximate river miles of the Upper Columbia River.

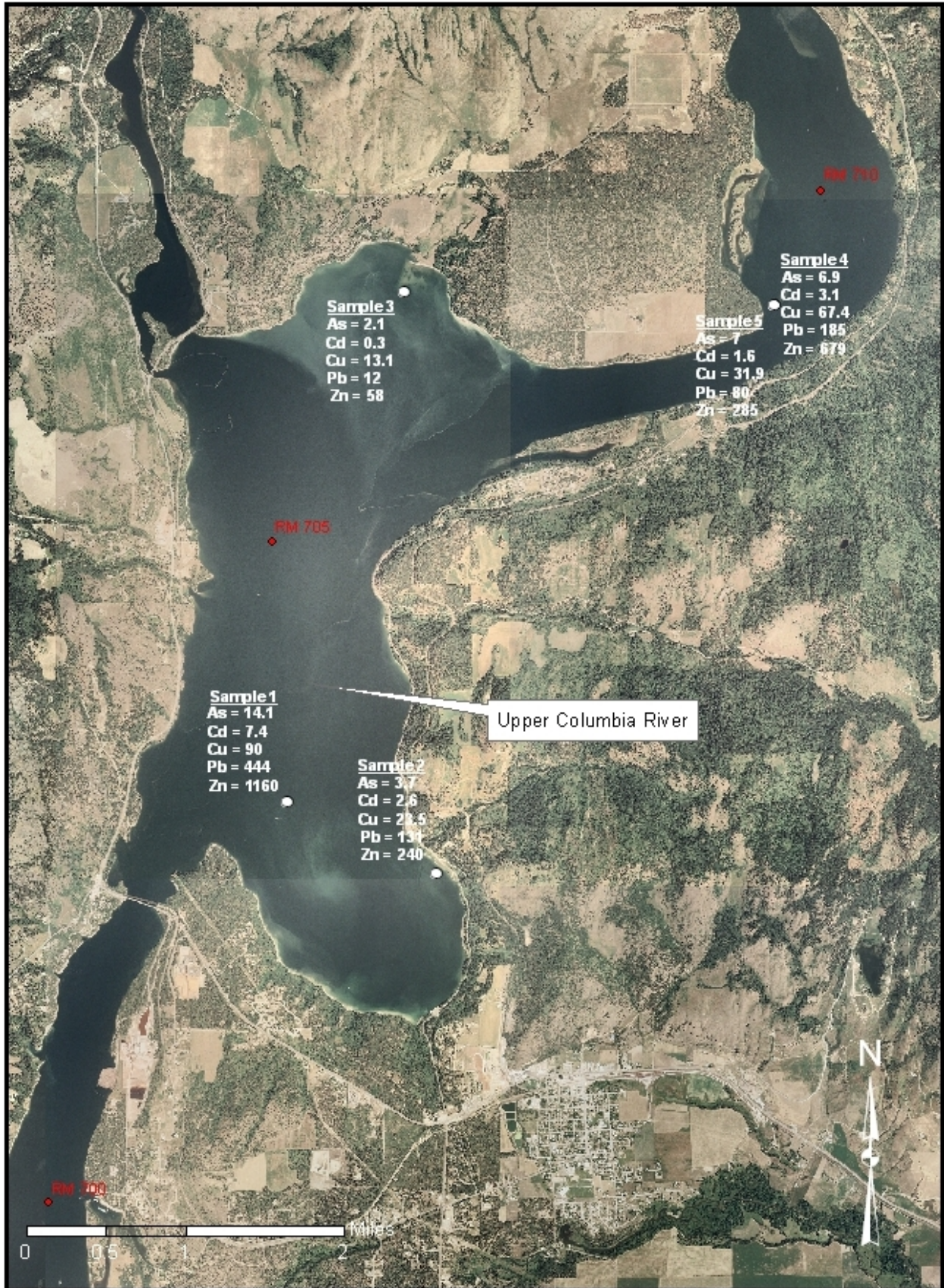


Figure 2: Metal concentrations (mg/kg) for samples collected within the Marcus Flats area.

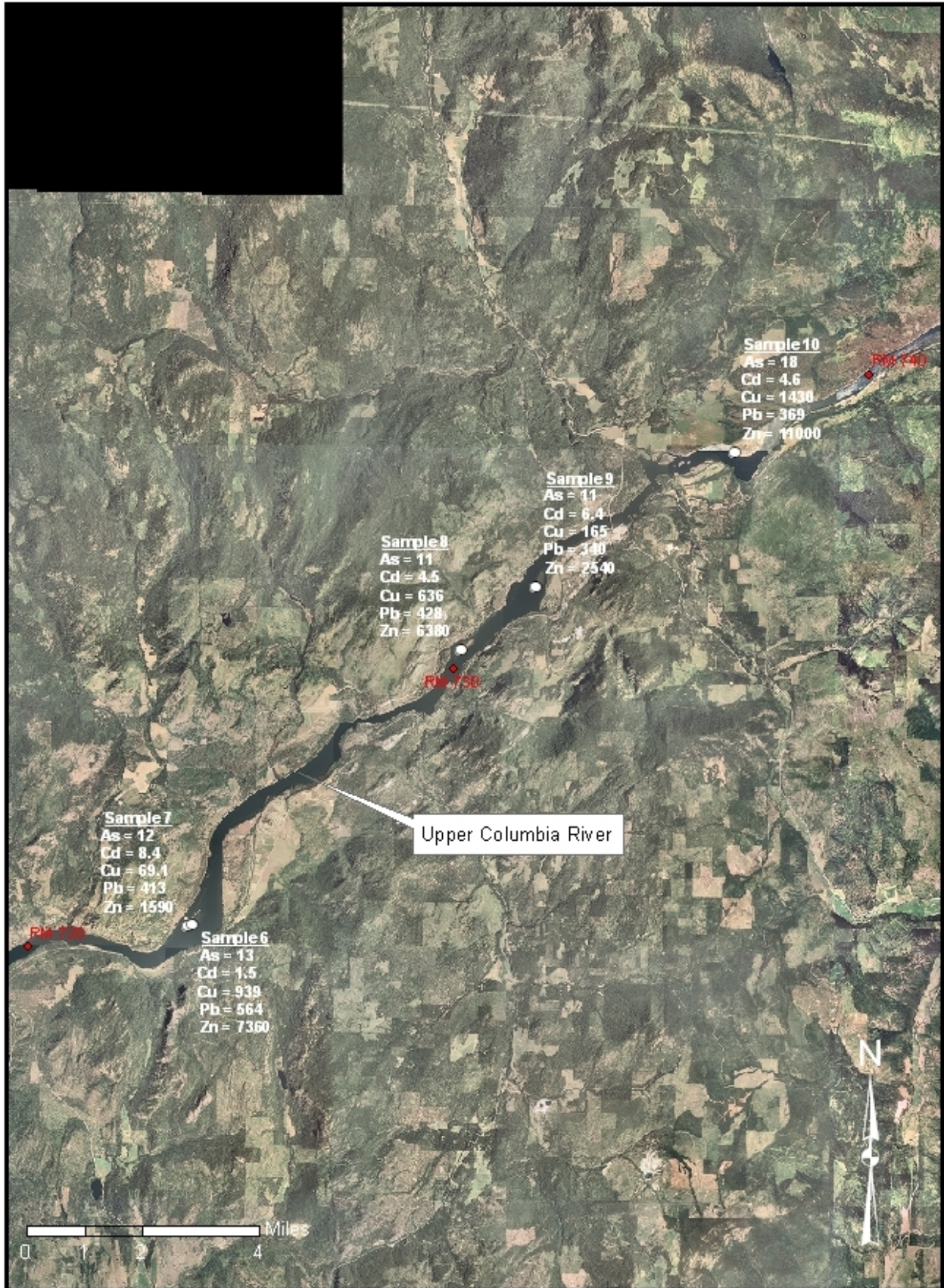


Figure 3: Metal concentrations (mg/kg) for samples collected within the free-flowing stretch.



Figure 4: Survey area of observed slag deposit totaling approximately 20 acres in size.

APPENDIX A

SAMPLE COORDINATES

Sample	Latitude	Longitude
1	419137.75	5387481.63
2	420647.59	5386756.90
3	420328.44	5392653.44
4	424059.11	5392511.97
5	424059.11	5392511.97
6	431548.67	5407994.43
7	431399.15	5407964.18
8	438987.40	5415585.50
9	441033.57	5417344.21
10	446508.38	5421058.55

Table 1. GPS coordinates for each Sample. Coordinate system: NAD 83 UTM Zone 11N in meters.

APPENDIX B

SAMPLE LOCATION PHOTOS



Sample Location 1: View looking to the south.



Sample 1



Sample Location 2: View looking to the southwest.



Sample 2



Sample Location 3: View looking to the southeast.



Sample 3



Sample Locations 4 and 5: View looking to the southwest.



Samples 4 and 5



Sample Location 6: View looking to the northeast.



Sample 6



Sample Location 7: View looking west just upstream of Sample 7.



Sample 7



Sample Location 8: View looking to the north.



Sample 8



Sample Location 9: View looking to the east.



Sample 9



Sample Location 10: View looking to the east.



Sample Location 10: Observed floating slag.



Sample 10

APPENDIX C

FIELD NOTES

Department of Ecology

May 16, 2007

TO: UCR Site File

FROM: John Roland and Brendan Dowling

SUBJECT: Upper Columbia River Site - Ecology Reconnaissance Visit and Sediment Sampling Field Notes

Screening analytical samples were collected at various exposed shoreline or island locations during a reconnaissance survey of the Upper Columbia River (UCR) on May 14, 2007. The survey was conducted prior to seasonal filling of the Lake Roosevelt Reservoir, while several landmass features were still exposed prior to inundation. The river corridor was traveled by boat and covered a distance from approximately River Mile (RM) 700 to RM 738. Brendan Dowling of TCP ERO joined in the effort. Locations were marked using a Trimble GPS unit. Field notes summary is as follows:

All samples discussed below, unless noted otherwise, were collected as 5-point composite samples within a 10-foot radius, with each point being a sub sample collected from approximately 0 to 6 inches below the surface then homogenized to form one sample. Visual subsurface observations were no more than approximately 20 inches in depth below ground surface.

Station #1:

Marcus area. Low lying exposed unvegetated exposed mudflat island just above Kettle Falls. Numerous mussel shells observed (Oregon Floater; *Anodonta oregonensis*, per B. Dowling). Shrinkage cracks characterized the ground surface.

Sample 1 – Collected near center of island. Composition: Silty clay to clayey silt, reddish mottling observed

Station #2:

Marcus area - exposed shoreline sloping area located in large embayment on river left near Hwy 25. No eroding bluffs noted in the immediate proximity. Composition: sandy silty clay or clayey silt, minor reddish mottling. Occasional mussel shells (*A. oregonensis*) noted in the immediate area.

Sample 2 – Collected on sloping shoreline flats

Station #3:

Marcus area - up stream from Kettle River mouth on exposed near shore ground surface along river right. Eroding bluffs noted ~ ½ mile up river. The terrace area is marked by hummocky ground that includes tree stumps, active sand bed forms, and the presence of erosion resistant, dipping Pleistocene lucustrine bedding along the shoreline at that water level. Significant wind wave-action effects on sediment migration noted.

Sample 3 – Composite sample collected to evaluate surface-only sediment (0 to 3 inches) within a small depression situated on the lee side of a migrating sandy bedform wedge. Composition: sandy clayey silt. Shallow excavated hole showed 3 inches of the silt overlying medium sand. Top 3 inches were sampled.

Station #4:

Evans area. River right. Broad exposed area with dry [paleo?] channel floodway and bar features, along with bed-rock outcrops. Scattered mussel shells observed (*A. oregonensis*).

Sample 4 – Collected in dry channel feature. Location marked by a shrinkage-cracked sandy silt (0 to 3 inches) over a cobbly, sandy silty gravel transitioning to a dark brownish mix of gravel sand & silt that appeared organic rich [soil horizon?]. The Sample 4 composite was collected from the 0 to 4 inches, above the dark brownish horizon.

Sample 5 – Sample of the dark brownish layer, approximately 4 to 6 inches in depth.

Station #5:

Broad exposed floodway and island area along river right, just upstream and on the opposite bank from the China Bend launch. Area is marked by bedrock outcrops at the down-stream end, a high-water channel on the shoreline side that is the site of an industrial log-sort operation. Wood debris is prevalent over much of the flats, but varies by location. Wood wastes have altered much of the sediments (e.g., reducing conditions) along the floodway channel feature. Some other portions of the general area also look to have been physically disturbed by other human actions (placer mining pits maybe?).

Sample 6 – Just down stream of the treed island, on the side nearest the active channel, are a series of discontinuous sand bars that appear to contain significant slag. Slag increases with depth where evaluated. A sample was collected from one of the sand/slag deposits and was situated several feet above the active river/reservoir level. Collected sample contained minor very fine gravel. The composite sample was collected from 2 to 6 inches in depth, after removing a thin layer of organic flotsam and mixed materials locally distributed at the surface.

Sample 7 – Near the down-stream end of the treed island a silt layer was composite sampled from 0 to 4 inch in depth collection points. The sampled silt overlaid sand that appeared to contain slag.

Side note: Scattered slag was observed amongst the bed-rock outcrops at the down-stream end of the floodway/channel area.

Station #6:

Sand bar down stream of island feature, located at approximately RM 730.5 on river right. Sand bar looks to be roughly about 100 ft long, 50 ft wide, and 4 ft in height. Slag present.

Sample 8 – Sampled slag-bearing sand.

Station #7:

Island/bar feature near RM 732 along river left.

Sample 9 – Composite sample collected (0 to 6 inches) from a mudflat area close to the river. Composition: sandy silt grading to sand. No indication of slag at this location.

Also marked a location with GPS unit because of the presence of a sandy bar deposit containing slag near the down-stream end of the island/bar.

Station #8:

This is a broad floodway and island area along river right at approximately RM 737.5. Area is known as “dead man eddy”. The exposed area covers tens of acres and is marked by high energy cobble deposits on the up-stream end, transitioning to mostly sand on the downstream side. The downstream end of the area contains substantial slag mixed with sand. Slag percentages in the sand were roughly estimated to range from 10% to 65+%, with some areas examined below the surface to be potentially higher. Some parts of the overall area are higher in elevation and have well established trees; these higher points appear to have cleaner sand, less impacted by the slag. A preliminary survey of the impacted sands using the GPS unit indicates the area to be approximately 20 acres in size with adjacent areas that were not surveyed to also be impacted by slag. The thickness of the sands looks to reach at least 8 to 10 feet in some areas. Floating slag observed in quite water areas.

Sample 10 – Slag-bearing sand located near the down stream end of the sandbar deposit. Slag content (roughly estimated to be at least 10 to 30%) is below the maximum observed in this area. Composite sampling conducted over 0 to 6-inch depth intervals. Sand characteristics were similar at each station.

APPENDIX D

LABORATORY RESULTS FORMS

Manchester Environmental Laboratory

7411 Beach Dr E, Port Orchard, Washington 98366

Case Narrative

July 23, 2007

RECEIVED

JUL 27 2007

DEPARTMENT OF ECOLOGY
EASTERN WASHINGTON UNIVERSITY

Subject: Metals UCR Site Investigation RI/FS

Project No: 153207

Officer: Brendan Dowling

By: Dean Momohara
D

Summary

The matrix spike recoveries for copper, zinc and lead were not calculated due to insufficient spike used. The result for cadmium for sample 244110 was qualified as an estimate due matrix interference. No other problems were encountered in the analyses of these samples. All other sample results were reported without qualification.

All analyses requested were evaluated by established regulatory quality assurance guidelines.

Methods

The samples were analyzed and/or digested using the following methods: EPA method 3050B for the digestion of trace metals and EPA method 200.8 (ICPMS) for the analysis of trace metals.

Sample Information

Samples were received by Manchester Environmental Laboratory on 06/14/07. All coolers were received within the proper temperature range of 0°C - 6°C. The samples were received in good condition and where applicable, were properly preserved. Eleven (11) samples were received and assigned laboratory identification numbers 244105 - 244115.

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 initial and continuing calibration checks were within control limits. The calibration correlation coefficients were within the acceptance range of 1.000 - 0.995. The instruments were calibrated with NIST traceable standards and verified to be in calibration with a second source NIST traceable standard. Soil drying oven temperatures were recorded before and after each analysis batch and were within acceptable limits.

Method Blanks

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

Matrix Spikes

The matrix spike (MS) recoveries for copper, zinc and lead were not calculated. The standard spiking level was insufficient for the elevated concentration of analyte in the source sample and no action was taken. All other MS recoveries were within the acceptance limits of 75% - 125%.

Replicates

The duplicate relative percent differences were within the acceptance range of 0% - 20%.

Laboratory Control Samples

All laboratory control sample recoveries were within the acceptance limits of 85% - 115%.

Internal Standards

All internal standard recoveries were within acceptance limits of 60% - 125%.

Other Quality Assurance Measures and Issues

Cadmium results can be quantified using either of its two main isotopes, 111 and 114. Unless there is matrix interference, both isotopes will quantify the same concentration. For these samples, isotope 114 was used.

However, for sample 244110, isotope 111 was less than 114 and the result for 111 was used. Unfortunately the associated quality control samples failed and the result 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.

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
Cadmium

Project Name: UCR Site Investigation RI/FS				LIMS Project ID: 1532-07				
Project Officer: Brendan Dowling				Method: EPA200.8				
Date Reported: 07/19/07				Analyte: Cadmium				
Sample	QC	Field ID	Matrix	Result	Qualifier	Units	Collected	Analyzed
07244105		1	Sediment/Soil	7.37		mg/Kg dw	05/14/07	07/17/07
07244105	LMX1	(matrix spike)		105		%	05/14/07	07/17/07
07244105	LMX2	(matrix spike)		103		%	05/14/07	07/17/07
07244106		2	Sediment/Soil	2.6		mg/Kg dw	05/14/07	07/17/07
07244107		3	Sediment/Soil	0.33		mg/Kg dw	05/14/07	07/18/07
07244108		4	Sediment/Soil	3.1		mg/Kg dw	05/14/07	07/17/07
07244109		5	Sediment/Soil	1.6		mg/Kg dw	05/14/07	07/17/07
07244110		6	Sediment/Soil	1.5	J	mg/Kg dw	05/14/07	07/17/07
07244111		7	Sediment/Soil	8.4		mg/Kg dw	05/14/07	07/18/07
07244112		8	Sediment/Soil	4.5		mg/Kg dw	05/14/07	07/18/07
07244113		9	Sediment/Soil	6.4		mg/Kg dw	05/14/07	07/18/07
07244114		10A	Sediment/Soil	4.6		mg/Kg dw	05/14/07	07/18/07
07244115		10B	Sediment/Soil	3.3		mg/Kg dw	05/14/07	07/18/07
MB0719411		Lab BLNK	Sediment/Soil	0.10	U	mg/Kg dw		07/17/07
ML0719411		Lab LCS-	Sediment/Soil	115		%		07/17/07

Authorized By: *M. J. [Signature]*

Release Date: 7/19/07

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Copper

Project Name: UCR Site Investigation RI/FS				LIMS Project ID: 1532-07				
Project Officer: Brendan Dowling			Method: EPA200.8					
Date Reported: 07/18/07			Analyte: Copper					
Sample	QC	Field ID	Matrix	Result	Qualifier	Units	Collected	Analyzed
07244105		1	Sediment/Soil	90.0		mg/Kg dw	05/14/07	07/17/07
07244105	LMX1 (matrix spike)				NC	%	05/14/07	07/17/07
07244105	LMX2 (matrix spike)				NC	%	05/14/07	07/17/07
07244106		2	Sediment/Soil	23.5		mg/Kg dw	05/14/07	07/17/07
07244107		3	Sediment/Soil	13.1		mg/Kg dw	05/14/07	07/17/07
07244108		4	Sediment/Soil	67.4		mg/Kg dw	05/14/07	07/17/07
07244109		5	Sediment/Soil	31.9		mg/Kg dw	05/14/07	07/17/07
07244110		6	Sediment/Soil	939		mg/Kg dw	05/14/07	07/18/07
07244111		7	Sediment/Soil	69.1		mg/Kg dw	05/14/07	07/17/07
07244112		8	Sediment/Soil	636		mg/Kg dw	05/14/07	07/18/07
07244113		9	Sediment/Soil	165		mg/Kg dw	05/14/07	07/17/07
07244114		10A	Sediment/Soil	1430		mg/Kg dw	05/14/07	07/18/07
07244115		10B	Sediment/Soil	1550		mg/Kg dw	05/14/07	07/18/07
MB07194I1	Lab BLNK		Sediment/Soil	0.10	U	mg/Kg dw		07/17/07
ML07194I1	Lab LCS-		Sediment/Soil	115		%		07/17/07

Authorized By: M. Jauer

Release Date: 7/18/07

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Arsenic

Project Name: UCR Site Investigation RI/FS				LIMS Project ID: 1532-07				
Project Officer: Brendan Dowling			Method: EPA200.8					
Date Reported: 07/18/07			Analyte: Arsenic					
Sample	QC	Field ID	Matrix	Result	Qualifier	Units	Collected	Analyzed
07244105		1	Sediment/Soil	14.1		mg/Kg dw	05/14/07	07/18/07
07244105	LMX1 (matrix spike)			109		%	05/14/07	07/18/07
07244105	LMX2 (matrix spike)			109		%	05/14/07	07/18/07
07244106		2	Sediment/Soil	3.7		mg/Kg dw	05/14/07	07/17/07
07244107		3	Sediment/Soil	2.1		mg/Kg dw	05/14/07	07/17/07
07244108		4	Sediment/Soil	6.93		mg/Kg dw	05/14/07	07/17/07
07244109		5	Sediment/Soil	7.0		mg/Kg dw	05/14/07	07/17/07
07244110		6	Sediment/Soil	13		mg/Kg dw	05/14/07	07/18/07
07244111		7	Sediment/Soil	12		mg/Kg dw	05/14/07	07/18/07
07244112		8	Sediment/Soil	11		mg/Kg dw	05/14/07	07/18/07
07244113		9	Sediment/Soil	11		mg/Kg dw	05/14/07	07/18/07
07244114		10A	Sediment/Soil	18		mg/Kg dw	05/14/07	07/18/07
07244115		10B	Sediment/Soil	18		mg/Kg dw	05/14/07	07/18/07
MB0719411		Lab BLNK	Sediment/Soil	0.10	U	mg/Kg dw		07/17/07
ML0719411		Lab LCS-	Sediment/Soil	114		%		07/17/07

Authorized By: *M. Jauer*

Release Date: 7/18/07

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Lead

Project Name: UCR Site Investigation RI/FS				LIMS Project ID: 1532-07				
Project Officer: Brendan Dowling				Method: EPA200.8				
Date Reported: 07/18/07				Analyte: Lead				
Sample	QC	Field ID	Matrix	Result	Qualifier	Units	Collected	Analyzed
07244105		1	Sediment/Soil	444		mg/Kg dw	05/14/07	07/17/07
07244105	LMX1	(matrix spike)			NC	%	05/14/07	07/17/07
07244105	LMX2	(matrix spike)			NC	%	05/14/07	07/17/07
07244106		2	Sediment/Soil	131		mg/Kg dw	05/14/07	07/17/07
07244107		3	Sediment/Soil	12.4		mg/Kg dw	05/14/07	07/17/07
07244108		4	Sediment/Soil	185		mg/Kg dw	05/14/07	07/17/07
07244109		5	Sediment/Soil	80.1		mg/Kg dw	05/14/07	07/17/07
07244110		6	Sediment/Soil	564		mg/Kg dw	05/14/07	07/18/07
07244111		7	Sediment/Soil	413		mg/Kg dw	05/14/07	07/18/07
07244112		8	Sediment/Soil	428		mg/Kg dw	05/14/07	07/18/07
07244113		9	Sediment/Soil	340		mg/Kg dw	05/14/07	07/18/07
07244114		10A	Sediment/Soil	369		mg/Kg dw	05/14/07	07/18/07
07244115		10B	Sediment/Soil	398		mg/Kg dw	05/14/07	07/18/07
MB07194I1		Lab BLNK	Sediment/Soil	0.10	U	mg/Kg dw		07/17/07
ML07194I1		Lab LCS-	Sediment/Soil	114		%		07/17/07

Authorized By: *M. Jan*

Release Date: 7/18/07

Washington State Department of Ecology
Manchester Environmental Laboratory
Analysis Report for
Zinc

Project Name: UCR Site Investigation RI/FS					LIMS Project ID: 1532-07			
Project Officer: Brendan Dowling					Method: EPA200.8			
Date Reported: 07/19/07					Analyte: Zinc			
Sample	QC	Field ID	Matrix	Result	Qualifier	Units	Collected	Analyzed
07244105		1	Sediment/Soil	1160		mg/Kg dw	05/14/07	07/19/07
07244105	LMX1 (matrix spike)				NC	%	05/14/07	07/19/07
07244105	LMX2 (matrix spike)				NC	%	05/14/07	07/19/07
07244106		2	Sediment/Soil	240		mg/Kg dw	05/14/07	07/19/07
07244107		3	Sediment/Soil	58.0		mg/Kg dw	05/14/07	07/19/07
07244108		4	Sediment/Soil	679		mg/Kg dw	05/14/07	07/19/07
07244109		5	Sediment/Soil	285		mg/Kg dw	05/14/07	07/19/07
07244110		6	Sediment/Soil	7360		mg/Kg dw	05/14/07	07/19/07
07244111		7	Sediment/Soil	1590		mg/Kg dw	05/14/07	07/19/07
07244112		8	Sediment/Soil	6380		mg/Kg dw	05/14/07	07/19/07
07244113		9	Sediment/Soil	2540		mg/Kg dw	05/14/07	07/19/07
07244114		10A	Sediment/Soil	11000		mg/Kg dw	05/14/07	07/19/07
07244115		10B	Sediment/Soil	7480		mg/Kg dw	05/14/07	07/19/07
MB07199I2	Lab BLNK		Sediment/Soil	5.0	U	mg/Kg dw		07/19/07
ML07199I2	Lab LCS-		Sediment/Soil	115		%		07/19/07

Authorized By: *M. J. [Signature]*

Release Date: 7/19/07