



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

September 5, 2007

Reply to
Attn Of: ECL-111

MEMORANDUM

SUBJECT: Responses to CSTAG Recommendations for the Upper Columbia River Site

FROM: Sally Thomas and Kevin Rochlin, Remedial Project Managers
U.S. Environmental Protection Agency, Region 10

TO: Stephen J. Ells
Leah Evison
Co-chairs, Contaminated Sediments Technical Advisory Group

Region 10 appreciates the time spent by the Contaminated Sediments Technical Advisory Group (CSTAG) and thanks them for their comments and recommendations on the Upper Columbia River site. As these recommendations have been made relatively early in the Remedial Investigation/Feasibility Study (RI/FS) process, you will see that many of Region 10's responses are based on plans for future work. The CSTAG comments and this response letter will be part of the Administrative Record for the site.

Principle #1, Control Sources Early

CSTAG Recommendations

- Conduct monitoring to determine the contaminant loads that enter the UCR site at the Canadian border.
- Determine which tributaries may be contributing meaningful contaminant loads to the UCR, and conduct monitoring in those tributaries to determine the load.

Region 10 Response (to above two bullets)

Monitoring will be conducted during the RI/FS to determine the contaminant loads entering the UCR site. This will be done pursuant to

the Settlement Agreement signed June 2, 2006, by Teck Cominco Metals Ltd.(TCAI) and EPA (Settlement Agreement), including Exhibit A: Statement of Work for Remedial Investigations and Feasibility Studies for the Upper Columbia River Site (SOW). The SOW describes work needed to characterize sources of contamination as part of Task 3, Site Characterization: “The Company shall identify the sources of contamination and define the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents as well as their concentrations at incremental locations to background in the affected media.”

- Further evaluate the source and potential significance of the apparent loading of PCBs to the UCR between River Miles 687 and 690.

Region 10 Response

The SOW describes work needed to characterize sources of contamination as part of Task 3, Site Characterization. The Phase I sediment sampling effort conducted by EPA prior to implementation of the Settlement Agreement, identifies the lack of a known source for this PCB contamination as a data gap. Existing PCB sediment data will be carbon-normalized and reevaluated to assess the “apparent loading” as part of the RI/FS work pursuant to the Settlement Agreement and SOW. In addition, and as required, information collected during sediment sampling efforts will be used to further evaluate the apparent PCB “loading” between River Miles (RMs) 687 and 690 in the UCR and its potential significance.

Principle #2, Involve the Community Early and Often

CSTAG Recommendations

- In an effort to further improve relations with the affected communities, clarify which draft reports and other site documents will be provided to the public for review. EPA should also explain how it plans to consider public comments as well as any unsolicited comments submitted on documents not undergoing a formal public review.

Region 10 Response

EPA is currently working with a local citizens' group on options for providing them with a Community Technical Advisor. After a technical advisor has been selected, EPA will share draft reports and technical documents with the advisor at the same time they are shared with the Participating Parties for comment. The technical advisor will be responsible for sharing this information with the community and coordinating comments to submit back to EPA. Comments from the Community Technical Advisor will be considered by EPA before

documents are finalized. EPA will also accept and consider all unsolicited comments during the RI/FS process. However, the only required formal public comment period will occur when the Proposed Plan is released at the end of the RI/FS process. EPA will prepare a Responsiveness Summary for all comments received during the formal public comment period.

Principle #3, Coordinate with States, Local Governments, Tribes, and Natural Resource Trustees

CSTAG Recommendations

- The CSTAG commends the Region 10 UCR Site Team in its efforts to work effectively with the State, Tribes, and Natural Resource Trustees.
- CSTAG supports Region 10's outreach efforts in trying to garner upstream UCR environmental data and Trail smelter operational information from Teck Cominco, Environment Canada, and the British Columbia Ministry of Environment.

Region 10 Response (to above two bullets)

Thank you.

- Consider gathering information to estimate fish ingestion rates among Colville tribal members.
- Evaluate whether other non-tribal ethnic groups living adjacent to the study area are represented within the range of exposure scenarios to be evaluated in the human health risk assessment.

Region 10 Response (to above two bullets)

We will evaluate whether non-tribal, ethnic groups living adjacent to the study area are represented within the range of exposure scenarios in the human health risk assessment. Site-specific surveys will be designed to address both tribal and recreational exposures. Because the HHRA is in its early planning stages, we do not yet have sufficient data to determine if the tribal and recreational scenarios will encompass those of other non-tribal ethnic groups, but it's likely that the non-tribal residential scenario will be bounded by the recreational and tribal scenarios.

Principle #4, Develop and Refine a Conceptual Site Model that Considers Sediment Stability

CSTAG Recommendations

- The existing EPA Conceptual Site Model (CSM) is too generic and implies that little is known about the site. The data available from EPA's Phase 1 effort should be used to refine the CSM.

Region 10 Response

Based on this recommendation it is unclear what CSM is being referred to. However, the EPA sediment CSM is presented in considerable detail in the Phase I Sediment Data Evaluation Report, dated August 25, 2006. Additional detail concerning transport and fate and ecological risk has been further developed via workshops with participating parties and TCAI. A revised CSM will be included in the RI/FS Work Plan.

- Use existing site data to perform a preliminary risk assessment and use the findings along with the refined CSM to prioritize and identify the most significant exposure pathways that are expected to be the greatest contributors to overall site risk. This information should be used to effectively target the upcoming sampling programs. This streamlining should also facilitate reaching earlier cleanup decisions.

Region 10 Response

The approach described in the recommendation is the approach that EPA anticipates TCAI will use to establish the proposed DQOs for the next phases of site investigation. This approach will also be used by EPA as the basis for the human health risk assessment work plan.

- If the baseline risk assessment documents unacceptable site risks, a background contamination analysis may need to be completed. This should include consideration of the potential load of naturally occurring metals into the UCR due to the sloughing of riverside banks and cliffs and development of contaminant background levels for sediment, surface water, and fish.

Region 10 Response

Task 3 of the SOW states: “The Company shall identify the sources of contamination and define the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents as well as their concentrations at incremental locations to background in the affected media.” And Section 3.2.1 of Appendix A to the SOW states: “A study may be needed to identify locations that are suitable to represent in-water and upland background contaminant concentrations for the UCR. If EPA requires this study, background areas should be as similar as possible to the UCR locations being sampled to ensure that contaminant concentrations in background areas are representative of the range of physical and habitat conditions being evaluated. These locations may be in Canada.”

- As part of the refinement of the CSM and if warranted based on the preliminary risk analysis, evaluate potential risks to human health at potential exposure locations not previously evaluated, such as the Lock

picnic and camping area and nearby “swimming hole” identified by stakeholders.

Region 10 Response

Potential risks to human health at potential exposure locations not previously evaluated will be conducted as appropriate.

- Determine the amount of contaminant releases to the water column within the UCR site from the slag in the thalweg/main channel and from the deposits at Marcus Flats; from the fine-grained sediment in the littoral areas; and from the slag at the black sand beaches and bars. Evaluate the relative significance and contribution of these fluxes to potential site risks.

Region 10 Response

Previous studies have identified the importance of ascertaining risk posed by the slag. Chapter 3, Section 3.1.1 of Appendix A to the SOW states: “In addition to sediment analyses, the Company must conduct chemical analyses of slag. Analyses must include obtaining information on comparative chemical composition of newly exposed faces versus weathered slag, metals speciation in slag leachate, and rate of chemical release during slag weathering. This will help to understand current contaminant distribution of metals, and future releases of metals.” EPA anticipates that the RI/FS effort will fully characterize the relative significance and contribution of release to the water column from the slag throughout the site, as determining the contaminant releases to the water column is critical for determining contaminant loading (and associated site risks) and for assessing potential for increases (or decreases) in contaminant loading in the future.

- Evaluate the effects that the annual water level changes and the changes in redox conditions might have on the contaminant fluxes from the slag and sediments.

Region 10 Response

A number of factors may influence releases to the water column including potential effects from the changes to site water levels, and/or potential concomitant differences in redox potential which might impact contaminant fluxes from the slag and sediments. Studies will be designed to consider the effects that annual water level changes and concomitant differences in redox potential might have on contaminant fluxes from the slag and sediments. NOTE: The largest changes in reservoir elevations occur in April when Lake Roosevelt is drafting from a March 31 flood control elevation to an April 30 elevation. These flood control drafts can exceed 1ft/day for the entire month of April. In order to accurately model sediment movement in the reservoir, these flood control drafts will have to

be accurately and carefully analyzed. The effects that annual water level changes and concomitant differences in redox potential might have on contaminant fluxes from the slag and sediments will be evaluated as part of the RI/FS. Flood control drafts at Grand Coulee are a function of the runoff forecast at The Dalles adjusted for upstream available storage capacity. 2006 was an average forecast year at The Dalles (100 % of normal) and the April 30 required flood control elevation was 1229 feet or 61 feet down. Over the last 10 years required flood control elevations have ranged from 1220.2 ft to 1283.3 ft with an average draft of 30 feet on April 30. The maximum that Grand Coulee can be drafted for flood control is 82 feet to elevation 1208 ft and the minimum flood control elevation is 1283.3 ft.

- Conduct water-column monitoring at several locations within the UCR and at the Grand Coulee Dam in order to develop a contaminant mass balance for the overall site and between the major segments of the site; i.e., the upstream river, the transition zone near Marcus Flats, and the Lake. Monitoring should be conducted at a frequency that will reflect potential differences due to changing pool elevations. Additional studies should be conducted to determine whether there may be different strata in Lake Roosevelt that impact contaminant fate and transport.

Region 10 Response

Chapter 4, Section 4.2.3 of Appendix A to the SOW, states: “The Company will conduct a study to characterize surface water quality. The objective of this study is to collect suitable data needed to determine potential source areas, and whether contaminants in surface waters, based on total, dissolved and bioavailable metal and other contaminants, pose an unacceptable risk to organisms. This study may also include the direct determination of surface water toxicity using chronic toxicity tests including of the plankton *Ceriodaphnia dubia*. Water shall be sampled in the euphotic zone, where plankton predominate, and in the water overlying the sediments (surface water).” A surface water sampling program that considers seasonal and spatial (e.g., longitudinal) variances within the UCR will be conducted. A “contaminant mass balance” may not be needed to characterize the site, but may be required to determine effectiveness of potential remedial actions.

- The CSTAG currently does not have sufficient information to determine whether a complex numerical sediment transport and/or a contaminant transport and fate model is necessary to evaluate the effectiveness of potential remedial alternatives at the site. If it is determined that at least a sediment transport model is likely to be necessary, the following tasks should be performed:
- Conduct a bathymetric survey within the UCR site to use in setting up the

hydrodynamic and sediment transport models.

- Conduct a Sedflume or equivalent study to evaluate sediment erosional properties (i.e., erosion rates and critical shear stress for resuspension) and sediment properties (i.e., grain size distribution and bulk density) with depth into the sediment bed. Sedflume cores should be collected in the Marcus Flats area, along the thalweg a short distance downstream of Kettle Falls, and in the fine-grained sediment (i.e., silts and clay) that dominates side embayments along Lake Roosevelt. It is highly recommended that the Sedflume study be performed at the site as opposed to having the cores shipped back to a laboratory for analyses.
- Measure the settling velocity of the fine-grained sediment (i.e., flocs of clays and silts) that is in suspension downstream of the Kettle Falls area.
- Perform a laboratory flume study to evaluate the transport characteristics of slag and the slag “floaties” that are transported at the water surface. Typically, lab flume studies on sediment transport are performed in a straight, recirculating flume that has a false bottom in which slag material collected from the site is placed. The slag material (containing both slag and sediment) should be collected in a free-flowing portion of the UCR. Evaluate the following properties of slag: 1) settling velocities and erosion rates as functions of slag diameter, 2) critical shear stress for incipient motion, 3) critical shear stress for suspension, and 4) transport modes and properties of the slag (e.g., angle of repose). This lab flume study is in addition to the recommended on-site Sedflume study. The latter is not capable of determining the following: 1) settling velocity of slag, 2) transport modes of slag (e.g., is slag transported as bedload, and if so, at what rate as a function of excess bed shear stress), or 3) transport characteristics of the slag (e.g., do bedforms occur in slag dominated beds?). It is important to know if bedforms occur as these affect the total drag exerted by the slag on the flow and, therefore, the shear stress exerted by the flow on the slag.
- Collect TSS data at multiple locations during multiple high-flow events. These data would be used to calibrate and validate the sediment transport model.
- Once the sediment transport model has been satisfactorily calibrated and validated, evaluate the effects that the annual reservoir drawdown has on sediment transport in typical years and in years when the draw-down is at the maximum.

Region 10 Response (to above seven bullets)

The need for a sediment transport model has not as yet been determined. However, Chapter 3, Section 3.1.1 of Appendix A to the SOW states: “The Company will investigate sediment and contaminant fate and transport. This task will support all risk assessments, and may include fate and transport modeling of contaminants of potential concern.” If a sediment transport and/or a contaminant fate and transport model(s) is determined to be necessary, the CSTAG recommendations will be

thoroughly considered and evaluated prior to model development and implementation. As outlined in the Settlement Agreement, potential modeling approaches will be summarized in a technical memorandum and submitted to EPA for review and approval. It is anticipated that the technical memorandum would describe the proposed approach and data needed to populate the model(s).

Principle #5, Use an Iterative Approach in a Risk-Based Framework

CSTAG Recommendations

- Evaluate opportunities to accelerate some of the data collection efforts; e.g., institute a phased approach.

Region 10 Response

The RI/FS is currently being conducted using a phased approach. A Phase I sampling effort has been completed. EPA anticipates that the RI/FS work plan will provide the basis for future phases. Furthermore, the SOW states that the RI/FS is to be conducted using a phased approach, with information learned in earlier phases used to identify data gaps and data needs to be collected in subsequent phases.

- If slag is determined to provide a significant release of contaminants, consider early actions (including pilot or treatability studies) to minimize this loading.

Region 10 Response

Task 9 of the SOW states: “Based on the results of the Human Health or the Ecological Risk Assessments or screening assessments, EPA may require that the Company plan and conduct early response actions to protect public health and/or the environment.”

Principle #6, Carefully Evaluate the Assumptions and Uncertainties Associated with Site Characterization Data and Site Models

CSTAG Recommendations

- Evaluate the degree to which contaminants within the slag material and fine sediments are bioavailable. CSTAG recommends that a sequential extraction procedure be conducted on a subset of sediment samples to determine the concentrations of each geochemical fraction (e.g. residual, oxidizable, easily reducible, and exchangeable). The greater the metal concentrations in the exchangeable and easily reducible fractions of the sediment, the greater the likelihood that metals will be released from sediment and thus be potentially bioavailable. [ref: Appendix I, Final RI

Region 10 Response

Determining the bioavailability of contaminants within the slag and fine sediments is a critical part of the RI/FS. Chapter 4, Section 4.2.4 of Appendix A to the SOW states: “The Company will collect the data needed to characterize the composition of the bulk and bioavailable sediments and associated porewater in terms of contaminant, particle size and physicochemical properties that affect metal and other contaminants’ bioavailability and toxicity. This study would supplement the EPA study conducted in spring 2005. If required by EPA, additional sampling shall be conducted to measure variables associated with the factors affecting bioavailability and toxicity, as well as fill data gaps identified by EPA’s 2005 sampling. This study should also be tied to the direct determination of sediment toxicity using toxicity tests of benthic macroinvertebrates.” During site characterization activities, potential bioavailability of constituents of interest (COIs) within geochemical fractions of UCR sediments will be evaluated. It is anticipated that this testing will be performed on a subset of samples as part of the sediment sampling program.

- Ensure that detection limits for uranium are adequate to evaluate site risks.

Region 10 Response

The required detection limits for future sediment samplings are to be assessed through development of DQOs to support risk assessment and nature and extent determinations. Where possible, the target detection limits for COIs in environmental media (i.e., water, sediment, and tissue), will be 5 to 10 times lower than the applicable risk-based criterion or benchmark for either ecological receptors and/or the protection of human health.

Principle #7, Use an Iterative Approach in a Risk-Based Framework

CSTAG Recommendations

- The CSTAG will evaluate adherence with this principle later in the process

Region 10 Response

Region 10 will respond upon receipt and consideration of CSTAG’s recommendations.

Principle #8, Ensure that Sediment Cleanup Levels are Clearly Tied to Risk Management Goals

CSTAG Recommendations

- The CSTAG will evaluate adherence with this principle later in the process.

Region 10 Response

Region 10 will respond upon receipt and consideration of CSTAG's recommendations.

Principle #9, Maximize the Effectiveness of Institutional Controls and Recognize their Limitations**CSTAG Recommendations**

- Collect site-specific information to predict the effectiveness of any institutional controls that may be required as part of any selected remedy (e.g., fish consumption advisories).

Region 10 Response

If unacceptable risks are identified, candidate institutional controls that have the greatest likelihood of being implemented at the site will be identified. Relevant site-specific information that would be useful in assessing the effectiveness of these institutional controls (e.g., the potential effectiveness of fish advisories) will be identified and evaluated.

Principle #10, Design Remedies to Minimize Short-term Risks while Achieving Long-term Protection**CSTAG Recommendations**

- The CSTAG will evaluate adherence with this principle later in the process

Region 10 Response

Region 10 will respond upon receipt and consideration of CSTAG's recommendations.

Principle #11, Monitor During and After Sediment Remediation to Assess and Document Remedy Effectiveness**CSTAG Recommendations**

- The CSTAG will evaluate adherence with this principle later in the process

Region 10 Response

Region 10 will respond upon receipt and consideration of CSTAG's recommendations.

Region 10 looks forward to continued coordination with and support from CSTAG. If you have any questions regarding these matters, please contact Sally at (206) 553-2102 or Kevin at (206) 553-2106.

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