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May 5, 2005

John Roland
Washington Department of Ecology
4601 N. Monroe
Spokane, WA 99205-1295

Sent by e-mail and hand-delivery

Dear Mr. Roland,

The following comments are submitted on behalf of the Upper Columbia Group of the Sierra Club (Sierra Club), regarding the Washington Department of Ecology's (Ecology) Spokane River Upriver Dam PCB Cleanup Plan and its supporting documents:

- The Draft Final Focused Remediation Investigation Report and Appendices (RI);
- The Draft Final Focused Feasibility Study (FS);
- The Draft Cleanup Action Plan (DCAP);
- The Draft Consent Decree (Kaiser Bankruptcy);
- The Draft Consent Decree (Ecology and Avista); and
- The Draft State Environmental Policy Act Checklist and Determination of Nonsignificance.

In addition to the comments below, the Sierra Club attaches hereto and incorporates by reference herein the Final Comments entitled "Draft Cleanup Action Plan, Spokane River Upriver Dam PCB Site" by Peter deFur, PhD, an expert in environmental health and ecological risk assessment.[1] The Sierra Club and The Lands Council retained Dr. deFur to analyze the above documents and assess the adequacy of the proposed cleanup plan.

[1] Dr. deFur is president of Environmental Stewardship Concepts, an independent private consultant which serves as a technical advisor to citizen organizations and government agencies. In addition, he is an Affiliate Associate Professor in the Center for Environmental Studies at Virginia Commonwealth University where he conducts research on environmental health and ecological risk assessment. Dr. deFur serves as President of the Association for Science in the Public Interest (ASIPI) and on the board of the Virginia Conservation Network (VCN). His resume is included with his comments.

In his report, Dr. deFur concludes that capping is contraindicated at Deposit 1 where there is significant groundwater/surface water interchange and where ongoing sources of contamination have not been identified or controlled. Further, he maintains it is critical that the cleanup plan be coordinated with the PCB TMDL and other upstream cleanup activities.

The Sierra Club agrees and thus concludes that the RI/FS fails to provide enough information about in-situ capping at Deposit 1 to enable the decision makers and the public to appropriately analyze the environmental significance of the alternatives, their attendant risks to the environment, and potential to maximize remediation goals.

The purpose of a remedial investigation/feasibility study is to collect, develop, and evaluate information regarding a hazardous substance site sufficient to select an appropriate cleanup action.[2] Data collection and analysis must likewise be sufficient to enable Ecology to make its threshold determination of significance or nonsignificance.[3] Thus, where information is insufficient to analyze the alternatives, minimize risk, and choose an option that maximizes the cleanup objectives, Ecology must request additional information and studies.

Therefore, the Sierra Club asks Ecology to request additional information and/or studies on the following issues, as required by MCTA and SEPA, prior to selecting a cleanup option for Deposit 1:

1. The impact of the hazardous materials on groundwater;
2. The identity and impact on the capped site of continued PCB and other contaminate release;
3. The impact at the site on ecological receptors;
4. The geotechnical problems and short/long term risks associated with in-situ capping;
5. A more thorough analysis of Alternative 4, dredging, at Deposit 1;
6. A more thorough cost analysis as required under WAC 173-340-360(3)(f)(iii);
7. A more thorough examination of monitoring requirements associated with in-situ capping;
8. A more detailed Public Participation plan as required by WAC 173-340-140;
9. Appended comments from the scientific advisory board pursuant to SEPA and MCTA; and
10. An analysis of cleanup levels for multiple hazardous substances pursuant to WAC 173-340-708.

In addition, after receipt of such information, Sierra Club asks Ecology to put the supplemental environmental documents out for additional public review and comment

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[2] WAC 173-340-350.
[3] WAC 197-11-335.

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followed by the engineering design reports, as part of its Public Participation Plan and to amend the Consent Decrees as necessary.

1. Groundwater

Testing - The purpose of the RI, in part, was to evaluate the potential effects of sediment contaminants on groundwater and drinking water wells. (RI, p. 15.) According to EPA Guidance, a detailed evaluation and understanding of the site's hydrogeology is a critical component in evaluating the acceptability of a capping proposal at a proposed capping site and a prerequisite to proper cap design.[4] State regulations also require investigations of site hydrogeology to adequately characterize the areal and vertical distribution and concentrations of hazardous substances in the ground water and those features which affect the fate and transport of these hazardous substances.[5]

Although the RI notes that the impoundment of water behind Upriver Dam causes exfiltration of surface water from the reservoir to the aquifer with a resumption of groundwater flow patterns downriver, it concludes there is minimal PCB groundwater contamination from the site. (RI, p. 20.) Here, however, the RI relies in part on phone conversations to support groundwater contouring and on regional contouring which, the RI admits, "may not reflect localized conditions immediately in the vicinity of the dam," the area in question for this study. (Id.) Due to the potential for drinking/groundwater contamination in the vicinity of the dam, adequate investigations require localized study.

In addition, the study concludes that drinking water contamination is deminimus based on what appears on its face to be statistically inadequate sampling. According to the RI, there were two sampling events, one in the spring and one in the fall. In May 2003, two wells immediately downstream of the dam were sampled, D-14 and D-16, and another, the Electric Well, in June. (RI, p. 22.) In September, only one sample was obtained, D-16. (RI, p. 23). The intent was to obtain samplings representative of high and low flow conditions, however, the environmental consultant, Anchor, was unable to "to collect a representative groundwater sample in this area during low flow." (Id.)

This limited sampling is unacceptable and can only produce equally limited data, data that cannot support the conclusion that PCBs from the Upriver Site pose no threat to groundwater. Sampling should have taken place over the course of several months and should have included as many wells as possible, especially in light of the hydrophobic nature of PCBs.

Capping in areas with groundwater/surface interactions –Because of the localized exfiltration of surface water to groundwater at Deposit 1, and the potential for recharge during low flow conditions, there is a possibility for continued PCB release to the

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[4] EPA Guidance for In-Situ Subaqueous Capping of Contaminated Sediments (Palermo, 1998). http://www.epa.gov/glnpo/sediment/iscmain/about.html

[5] WAC 173-340-350(7)(c)(3); 173-340-720.

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groundwater and then later back to the river. In addition, because PCBs preferably bond with soils and sediment over water, very high sediment concentrations are required to have a net flux into groundwater. Thus any groundwater contamination downriver of the dam is cause for concern and will be inconsistent with the goals of the PCB TMDL.

For these reasons, EPA disapproves of capping where there is a high rate of groundwater interchange.[6] Yet there was no analysis of how capping at this site would eliminate contamination to groundwater. If, as is probable, exfiltration continues despite capping, one would expect continued release of metals contaminants as well as PCBs. Incredibly low levels of lead can cause adverse effects on children, so even small amounts of contamination can have disastrous effects, effects that could be more effectively reduced through removal. If capping remains the preferred alternative, despite EPA Guidance, additional studies must be conducted to show how capping will reduce contamination of groundwater through exfiltration.

2. Ongoing PCB Releases

EPA guidance requires that long term trends be evaluated and upstream sources of contaminants eliminated before capping can take place.[7] In fact, according to the Draft Peer Review, conducted in part by Anchor, an important component of any cleanup plan is identification and control of contaminant sources.[8] Here, the RI admits that the co-occurrence of different sediment contaminants, with significantly elevated levels of wood waste, metals, and associated degradation products, may have implications for appropriate cleanup strategies, however, it deferred evaluation of potential integration and coordination with the various cleanup and TMDL efforts to the FS. The FS, however, merely assumed that upstream controls would be achieved through future TMDLs, wastewater permitting, or Superfund cleanup by the state and EPA, and did not address the problems associated with potential continued contaminant deposition on the capped areas.(FS, p. 44).

Moreover, until continued PCB releases and heavy metals are controlled, they will presumably continue to be deposited on the cap. Without an adequate understanding of how capping would limit options for addressing contaminated sediments that settle on top of the cap, it is inappropriate to assume that the short term implementation of capping outweighs the benefits of permanent removal through dredging. As stated by EPA, "[b]ecause of the additional cost of removing, treating and/or disposing of cap materials in addition to contaminated sediments, in-situ caps should only be proposed where the

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[6] EPA's Revised Draft of Contaminated Sediment Remediation Guidance for Hazardous Waste Sites for Peer Review (Jan. 2005, 7-5), http://www.epa.gov/superfund/resources/sediment/guidance.htm. Interestingly, one of the peer reviewers for this document was Clay Patmont, M.S., currently a Partner at Anchor Environmental, LLC. *See also* EPA Guidance (Palermo 1998).

[7] Palermo (1998).

[8] Draft Peer Review, Executive Summary (2005).

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performance of cap design functions required to meet remedial objectives can be assured."[9]

Finally, USEPA is investigating hazardous substance contamination in the Couer d'Alene basin and the upper Spokane River and has designated the Spokane River as part of its Operable Unit 3 in its Record of Decision (ROD). Evaluation and remedy selection for the cleanup of heavy metals is ongoing and includes the Upriver Site. The USEPA ROD proposed capping or dredging as remedy alternatives to reduce metals risks in sediments immediately behind Upriver Dam. (Consent Decree, p. 3.) It would be highly imprudent and fiscally irresponsible to proceed with capping if USEPA determines that dredging is the appropriate remedy for heavy metals at this site.

In addition, the Consent Decree limits Avista's remediation responsibilities to those hazardous substances at the site at the date of the entry of the Decree which further complicates cleanup in the event of future contaminant deposition on top of a cap.

3. Natural Resources and Ecological Receptors

Another purpose of the RI/FS was to determine the impact of the hazardous substances at the site on ecological receptors, including wildlife. The DCAP notes that the primary potential ecological receptors of PCBs in surface water and sediment at the site are species that live in the river bottom sediments, ingest river sediments or water, live in the river, or ingest surface water and organisms that live in the water. (DCAP, p. 12.) However, the RI/FS did not conduct field or literature studies to identify these species, including any federal or state endangered/threatened species, or priority wildlife species, and the specific threats to these as required by WAC 173-340-350(7)(iii). Furthermore, it would appear there was no consultation with aquatic biologists about the bioturbation habits of benthic organisms native to the area to determine their effect on capping as required by EPA Guidance.

4. Geotechnical Problems Associated with In-situ Capping

EPA guidance notes numerous geotechnical problems associated with in-situ capping including 1) cap failure due to shear strength of underlying sediment, 2) the potential mixing of capping and contaminated materials during placement, 3) potential cap instability or sliding due to consolidation, 4) resuspension of contaminants, and 5) the release of porewater during placement due to compression or uncontrolled placement, all of which pose distinct short-term risks to the environment. For some reason, these were not adequately identified as potential short-term risks associated with capping. For example, according to EPA Guidance, contaminated sediments are often subject to pore pressure buildup as cap material is deposited on the surface. The buildup of excess pore water pressure can then reduce the shear strength of the contaminated soil and increase bearing capacity failure. Further, compression and consolidation can release

[9] Id.

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contaminants in porewater. In this case, the porewater was not directly measured nor the risks analyzed. (RI, p. 52; FS, p.10). The failure to measure porewater greatly limits the power of the associated data and could result in a significant underestimation of risk associated with capping at Deposit 1.

In addition, there was no analysis of the problems associated with consolidation of capping materials or contaminated sediments, especially as the degree of consolidation may indicate the volume of porewater that will be expelled through the contaminated and capping layers and into the water column. Consolidation may also decrease the vertical permeability of the capped sediment and thus reduce long term flux. Clearly, more analysis is needed to adequately gauge the risks associated with such problems for in-situ capping.

The RI/FS also conclude that Alternative 3D will work equally well for the co-occurring contaminants as it does for PCBs without adequate analysis. The efficacy of capping depends not only on physical isolation of contaminants, but on chemical isolation as well. EPA Guidance states that hydrophobic organic pollutants, such as PCBs, are typically strongly bound to the organic fraction of the contaminated sediment and that fresh sorption sites in the cap should reduce the rate at which these chemicals move through the cap during consolidation and long-term diffusive processes. However, the migration of metals is more complex and affected by numerous other factors. This was not addressed in the RI/FS. Without this analysis, it is impossible to know whether or not the capping will be as equally effective to prevent further migration and transport of the other contaminants in Deposit 1 as dredging would be and hence impossible to know what other steps regarding these contaminants will be needed in the future.

5. Dredging

Dredging offers the greatest opportunity for permanence and has been the chosen option at over 100 Superfund sites, yet the FS allots little more than one page to this alternative. There was no analysis of the numerous dredging techniques available or the various containment barriers and techniques used to limit resuspension of contaminants and their relative efficacy. By comparison, capping analysis covered ten pages. The paucity of information on dredging renders effective comparative analysis impossible in violation of SEPA and MCTA.

In general, the DCAP chose capping at Deposit 1 over dredging largely due to alleged reduction of short term risks and a shorter implementation period. As stated above, however, there was an incomplete analysis of short term risks associated with capping. Nevertheless, even assuming the short term risks are manageable, one has to question whether speed should be the guiding factor here where upstream sources are not controlled and will not be for many years. EPA guidance indicates that institutional controls such as fish advisories will need to remain in place for years with either option. Moreover, monitoring, maintenance and repair associated with capping will be ongoing for decades, while that associated with dredging will be much shorter. As PCBs and

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other heavy metals are expected to remain toxic for decades if capped, the benefit of permanence through sediment removal, especially in conjunction with upstream source control, outweigh the benefit of implementation two years earlier, especially where a case has not been made that the cost of permanent removal through dredging is disproportionate to its benefits. (*See* WAC 173-240-360.)

6. Cost Analysis

The cost analysis, FS, Table 4, appears to have omitted the following as required by WAC 173-340-360(3)(f)(iii):

a. The net present value of any long-term costs;
b. Long-term costs such as operation and maintenance costs, equipment replacement costs, the cost of maintaining situational controls; and
c. The design life of the cleanup action and the cost of replacement or repair of major elements (e.g. capping failure).

Because the long term plan must ensure the integrity of the cap at Deposit 1, Avista and Kaiser should also be required to post a bond or other financial instrument to guarantee that the containment system is maintained as long as contamination is present at the site, presumably decades into the future.

7. Monitoring

According to the Draft Peer Review and EPA Guidance, intensive monitoring is necessary at capping sites during and immediately after construction, followed by long-term monitoring at less frequent intervals. Identifying monitoring methods for cap placement and long-term assessment of cap and biota should be addressed by the feasibility study. This should include assessment of erosion or other physical disturbances, contaminant flux into cap material from underlying sediment contamination (e.g. ground water advection, molecular diffusion); contamination of cap surface from other sources, and recolonization of cap surface and resulting bioturbation. Similarly, EPA Guidance states that intensive monitoring is necessary at capping sites during and immediately after construction and that management and any additional remedial actions necessary as a result of the monitoring should be clearly defined as part of the overall project design. The cost and effort involved in immediate and long-term monitoring and the potential necessary actions should also be evaluated as part of the initial feasibility study.

Here, monitoring was only addressed in very general terms and the costs of immediate and intensive monitoring after capping were omitted thus denying Ecology and the public a meaningful comparative analysis of alternatives.

8. Public Participation Plan

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A potentially liable person will ordinarily be required to submit a public participation plan as part of its request for a consent decree pursuant to WAC 173-340-600. This regulation also allows the plan to become part of a consent decree.

Here, the Consent Decree between Ecology and Avista states that Ecology will maintain responsibility for public participation, but it does not lay out the plan with the specificity required by WAC 173-340-600(9).

9. Peer or Scientific Review

RCW 43.21C.030(d) states that prior to making any detailed statement concerning a proposed action, Ecology should consult with and obtain comments from any public agency with jurisdiction by law or special expertise with respect to any environmental impact involved. Copies of such statements and responses should accompany the proposal through the agency review process. RCW 70.105D.020 requires Ecology to establish a scientific advisory board to render advice to the department with respect to cleanup standards, remedial actions, deadlines for remedial actions, and monitoring.

Here, prior to issuing these documents, Ecology should have availed itself of the board's advice and its recommendations should accompany the proposal through agency and public review.

10. Clean-up Standards

Under WAC 173-340-740(1)(c), Ecology may require more stringent cleanup standards where it is necessary to protect human health and the environment based on a site-specific evaluation. In addition, 173-340-708 requires that the adverse affects, including cancer risks, resulting from exposure to multiple hazardous substances are assumed to be additive unless scientific evidence is available to indicate otherwise. There appears to be no analysis of the added risks from exposure to the co-occurring contaminants or correlated adjustments to the cleanup levels as required by law.

Conclusion

Removal of PCBs and other contaminates presents a permanent solution to this problem. The Sierra Club strongly objects to utilizing the river, which is a public resource, as a long-term storage facility for upstream polluters The desire to bind Kaiser to this cleanup strategy is understandable but does not excuse Ecology of its duty under the law to select a cleanup plan that maximizes cleanup objectives for the long term. Here, the supporting documents are inadequate to allow a reasoned decision, unless expediency is the overriding factor. Ecology must require the PLPs to fill in the gaps in the studies as outlined above so that the public can be assured this clean up will be done the right way the first time around, even if it costs more and takes longer to achieve permanence than the current proposal. We are hopeful the parties can find some legal solution to the

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financial difficulties should the appropriate course of action require more time and money than expected.

The Sierra Club appreciates this opportunity to comment on the proposed PCB cleanup plan and would welcome further dialogue with Ecology about the concerns outlined above.

Sincerely,

Bonne W. Beavers
Attorney for the Upper Columbia Group
of the Sierra Club

Cc: The Lands Council

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Biographical Sketch for Peter L. deFur

Dr. Peter L. deFur is president of Environmental Stewardship Concepts, an independent private consultant, serving as a technical advisor to citizen organizations and government agencies. He is an Affiliate Associate Professor in the Center for Environmental Studies at Virginia Commonwealth University where he conducts research on environmental health and ecological risk assessment. Dr. deFur is President of the Association for Science in the Public Interest (ASIPI) and on the board of the Virginia Conservation Network (VCN).

Funding: Dr. deFur serves as a technical consultant to citizen organizations that are involved in cleanup actions at contaminated sites around the country. He also serves as a peer reviewer on EPA projects, programs and reports. He performs technical analysis and assessments for several non-profit organizations regarding site-specific or programmatic environmental risks.

- Fort Ord, in Marina, CA- WW I and II military base that was closed and is a Superfund site with numerous contamination problems; funded by EPA TAG to Fort Ord Environmental Justice Network
- Spring Valley, Washington DC- WW I chemical weapons residues from Department of Defense weapons research and development; funded by DoD TAPP grant to Spring Valley RAB
- Lower Duwamish River, Seattle WA- contamination with various chemical from industrial and municipal sources; funded by EPA Superfund TAG grant to Waste Action Project
- Olympic Environmental Council (OEC), Port Angeles WA- technical advisor to citizen coalition for cleanup of industrial site being remediated under state law; funded by Washington Dept Ecology PPG grant to OEC
- Delaware River TMDL for PCB's- technical consultant to environmental organizations that serve on the Implementation Activities Committee for the TMDL, funded by a grant to the Delaware River Basin Commission
- Housatonic River Initiative (HRI)- PCB contamination by GE in Massachusetts and Connecticut; Funded through EPA Region I grant to HRI
- Chemical Weapons Working Group, Berea KY- technical expert witness regarding emissions from incinerators in Utah, Oregon, other states; private funding from foundation grants and donations
- Technical Expert and expert witness for Mississippi Sierra Club
- Technical analysis for Sierra Club
- Peer review contract with EPA, ORD, NCEA on ecological risk assessment procedures
- Peer reviews for Versar, Inc. and ERG of EPA documents, reports etc.

Education: Dr. deFur received B.S. and M.A. degrees in Biology from the College of William and Mary, in Virginia, and a Ph.D. in Biology (1980) from the University of Calgary, Alberta. He was a postdoctoral fellow in neurophysiology in the Department of Medicine at the

University of Calgary. Dr. deFur held faculty positions at George Mason University and Southeastern Louisiana University before joining the staff of the Environmental Defense Fund (EDF) in Washington, DC. He was a AAAS Environmental Policy fellow at EPA At EDF, deFur was involved in policy issues that include habitat preservation and quality, wetlands regulations, water quality analysis and risk assessment.

Research Interests: Dr. deFur conducts academic research on the identification of and effects of endocrine disrupting chemicals, particularly in aquatic crustaceans. He is also interested in the effects of low oxygen conditions on aquatic animals and systems in estuaries and coastal environments. deFur also conducts research on precautionary approaches to environmental regulations and on citizen involvement in environmental programs, policies and regulations

Experience: Dr. deFur was previously a senior scientist at the Environmental Defense Fund (now ED) in Washington, DC and held faculty positions at two universities before that. He has extensive experience in risk assessment and ecological risk assessment regulations, guidance and policy. He served on the NAS/NRC various study committees, including the Risk Characterization Committee that released its report, Understanding Risk in June 1996. Dr. deFur served on numerous scientific reviews of EPA ecological and human health risk assessments, including the assessment for the WTI incinerator in Ohio and EPA's Ecological Risk Assessment Guidelines. deFur served on EPA's Endocrine Disruptor Screening and Testing Advisory Committee and the follow-up federal advisory committee, EDMVS.

Dr. deFur was appointed to BEST of the National Academy of Sciences/National Research Council in 1996. Dr. deFur was recently appointed to a federal advisory committee on endocrine disrupting chemicals. He is on the Advisory Committee to the Board of the Coalition to Restore Coastal Louisiana, and the Board of the Virginia Conservation Network. He is a peer reviewer for several professional journals, and has published numerous peer reviewed articles, invited perspectives and review articles for the public on subjects ranging from habitat quality to wetlands, toxic chemical and risk assessment.

During the past ten years, Dr. deFur has been extensively involved in scientific research, regulation and policy concerning the generation, release and discharge of dioxin and related compounds. He has published a number of papers on regulation and policy aspects of these compounds, considered in many ways prototype endocrine disruptors. Dr. deFur has been extensively involved in the EPA reassessment of dioxin since 1991. He was a technical analyst for the EPA Superfund Ombudsman office, and is presently technical advisor for the clean-up of the Rayonier mill site in Port Angeles, WA, the clean-up of the Spring Valley FUDS site in Washington DC and the Lower Duwamish River Superfund site in Seattle, WA.

March 2005

Comments on
"Draft Cleanup Action Plan, Spokane River Upriver Dam PCB Site"
By Dr. Peter L. deFur of
Environmental Stewardship Concepts
On Behalf of
The Center for Justice
May 5, 2005

Introduction

In March of 2005, Avista and Washington State Ecology issued a Draft Cleanup Action Plan to address PCB contamination at the Spokane River Upriver Dam site. Sediments at the site are contaminated with a combination of PCBs, heavy metals and wood products, and are located primarily in two deposits. The largest deposit (Deposit 1) is located next to the dam and along the northern shore of the river. The smaller deposit (Deposit 2) is located upstream of the dam adjacent to Donkey Island. The plan calls for sediments in Deposit 1 to be capped with a combination of clean sediment, a reactive layer, and an armored layer to prevent erosion. Dredging is the preferred alternative for Deposit 2, with clean sediment backfilled over the area where the sediment was removed. The Center for Justice has requested that Dr. Peter deFur of Environmental Stewardship Concepts (ESC) review and provide comments on the Draft Cleanup Action Plan and its supporting documents.

The Draft Cleanup Action Plan (DCAP) acknowledges many of the problems at the Spokane River Upriver Dam PCB site, offering remedies for the PCB contamination. Unfortunately, the DCAP does not go far enough and stops short of complete consideration or full protection. Groundwater in the areas adjacent to the dam is fed by water from the river, and this groundwater is already contaminated with PCBs. The proposal to cap the greatest amount of contaminated sediment will not stop the groundwater contamination and will do nothing to treat the PCB contaminated sediment. Leaving this sediment in place simply puts off the time when the sediment will have to be removed or treated.

The DCAP does not consider the other regulatory actions that are currently in place or being considered for the Spokane River such as the TMDL for metals and dissolved oxygen. The proposed remediation alternative for Deposit 1 could hamper efforts to attain the goals of the heavy metal and possibly PCB TMDLs. Instead, the document examines only the PCB contamination at the site without integrating their cleanup into other remediation efforts planned for the Upriver Dam site.

At present, water seeps from behind the dam into the groundwater and returns to the river below the dam, bringing PCBs into the system. The cap will not

eliminate this flow, will not treat the PCBs, and will do nothing to remediate the groundwater contamination. In both the Remedial Investigation and the Feasibility Study; fish, piscivorous birds, aquatic mammals were not evaluated. Without these evaluations, the DCAP is not sufficient to protect all the ecological receptors in and associated with the Spokane River.

General Comments

While ESC agrees with most of Ecology's recommendations for Deposit 2, the alternatives proposed for Deposit 1 are unacceptable for a wide variety of reasons. The suggested alternatives do not address significant ongoing issues at the site such as sediment contamination from metals and other sources or required issues such as the potential to harm endangered species. The decision to cap the site is in direct contradiction with EPA guidance on capping, notwithstanding the low long-term effectiveness of capping to address heavy metal contamination.

The DCAP's primary flaw is that it appears to examine the PCB contamination around the dam in a vacuum, with no consideration of the other TMDLs or cleanup actions that involve the site. None of the alternatives proposed are evaluated for how they may affect other remediation goals, including TMDLs for metals, dissolved oxygen, or total dissolved gas. The placement of a cap over Deposit 1 will likely adversely affect remediation goals for heavy metals. Metals by their nature are stable within sediments, and will remain under the cap and potentially be released if and when the cap fails, be it 10 or 100 years after its installation. In the interim, the cap will not prevent or treat groundwater contamination at the site.

Both the Remedial Investigation (RI) and the Feasibility Study (FS) for the site (Anchor 2005a, 2005b) note that the Spokane River actively recharges the Spokane Valley Aquifer in the vicinity of the dam. However, neither the Work Plan nor the FS evaluate the potential effects of the proposed alternatives on the hydrogeology of the site as required by EPA guidance on capping (Palermo 1998). Capping could potentially alter hydrogeology in the area by restricting flow into the aquifer. Capping would also not prevent the filtration of PCBs and metals such as lead into the aquifer, which is already occurring (Anchor 2005a, Ecology 2001). Lead is an incredibly toxic metal, and adverse effects related to lead exposure are being discovered at increasingly lower concentrations. The RI does not fully investigate the hydrodynamics of the site presumably because of the focused nature of the document. This illustrates the flawed nature of this approach, which fails to account for the wide variety of issues at the Spokane River Upriver Dam.

Another potential consequence of placing a cap on Deposit 1 that the DCAP, RI, and FS do not account for is how raising the bed of the river one foot will affect the flow of the river itself. In May of 1986, the Dam suffered a significant failure

due to a lightning strike during a major rain event. The placement of the cap could increase water flow and pressure against the dam. While improvements to the dam have been made since the 1986 event, it is unclear if the engineering designs accounted for the hydrological changes that would be brought about by the placement of the cap. Another rain event of equal or greater magnitude could have disastrous consequences, potentially compromising both the dam and the cap. The effects of the cap on waterflow and the integrity of the dam should be identified and evaluated before the recommendation to cap could be accepted.

Dam failure or removal is not addressed by the DCAP as required by EPA capping guidance. The following is an excerpt from the EPA guidance by Palermo:

> Because in-situ caps are intended to function for extended periods of time, if not in perpetuity, it is not sufficient to just examine the existing conditions of the site. The evaluator must also consider future conditions that might significantly alter cap integrity or function. Examples might include the removal of a dam or controlling structure on a river, decay or removal of breakwaters or other protective structures, changes in the type or draft of vessels navigating the waterway, or long-term trends in land or groundwater use. The permanence or stability of site conditions for the long-term future should be factored into the evaluation of site conditions.

The removal of the dam or a catastrophic failure brought on by an unforeseen sequence of events could destroy the effectiveness of the cap given its proximity to the dam. Rivers are not static features; they are dynamic and can change substantially over time. The DCAP does not consider this.

Severe flood events could potentially damage the cap, even if the integrity of the dam is maintained. One hundred year floods are incredibly powerful, and will dislodge trees and other large debris that could penetrate the armoring of the cap. This would cause the failure of the cap and release contaminants back into the river. Armored caps are designed primarily to prevent erosion during flood events, but not to withstand impact from large debris during a storm event. The FS assumes a best case scenario where there is a low likelihood of large debris impacting the cap during a severe rain event because the river's flow over Deposit 1 would prevent large debris from impacting the cap. It does not evaluate how the cap's integrity would hold if such an event were to occur. One hundred year flood events would produce unpredictable flow patterns, making the projections made in the FS about settling patterns of debris during storm events moot. Avista and Kaiser cannot guarantee the integrity of the cap for the decades that would be required to degrade the PCBs under the cap, even with a reactive barrier.

Capping will also not completely stop the release of PCBs into the Spokane. Caps must be water permeable in order to maintain their integrity under conditions where there is flow to or from an aquifer. As a result, contaminants may flow through the cap and back into the river. According to EPA guidance on

in-situ capping, this may occur even when there is no groundwater flow at the site due to the compression of pore water from the weight of the cap (Palermo 1998). Groundwater activity is present at the site, with the river usually contributing to the aquifer. However, this may not always be the case, contrary to statements within the FS and DCAP. Ecology's investigation of the Spokane River's interactions with the Spokane Valley Aquifer found that during periods of low flow and the lowest water levels, the aquifer actually contributes to the Spokane's water flow (Ecology 2001). The RI also notes that groundwater is discharged downstream of the dam, releasing the PCB contaminated groundwater back into the river. The continued release of PCBs will make it more difficult to meet the goals of the TMDL when they are established.

Considering that the final guidelines of the PCB TMDL have not been set, capping is not an acceptable remedial alternative for a variety of reasons. The first is that stringent source controls have not yet been implemented. EPA guidance for the selection of remedial alternatives states that capping is appropriate if "point source discharges have been halted" (EPA, 1993). All documents relating to the proposed remedial acknowledge that upstream sources are still contributing to the PCB load of the Spokane. The assumption is made that by the time that the cap is installed the TMDL will be in place. Most TMDLs take a significant amount of time to finalize, and even longer to implement. The DCAP calls for the cap to be in place within one to two years, potentially well before the TMDL is implemented. If this is the case, additional sedimentation on top of the cap may create a situation where water quality criteria for metals and PCBs are not met because of continued sedimentation. Addressing that contamination would be made more complicated by an armored cap located underneath the contaminated sediments.

The DCAP has underestimated the short term risks associated with capping. During the installation of a cap, contaminated sediments will be resuspened as the clean sediments are placed on top. This can be exacerbated by poor placement techniques. EPA guidance also notes that as the clean soils settle, porewater will be released due to the compression of the contaminated sediments under the weight of the cap (Palermo 1998). There are little data regarding the extent of these initial releases, so comparisons to releases caused by the resuspension of contaminated sediments during dredging is difficult. However, tremendous advances have been made in dredging technology and techniques that can minimize resuspension and risks to aquatic life (ESC 2004).

The most effective and most permanent solution to remove and treat PCB contamination at the Upriver Dam is to remove the sediments containing the contamination. Dredging will be as logistically feasible at Deposit 1 as capping would be, and better meets the evaluation criteria. The dredge and backfill alternative is both more permanent and better manages long-term risks. Short-term risks would be comparable to those of capping, which also resuspends sediments during its installation (Palermo 1998). While capping may be able to

be implemented in a shorter timeframe, is not the best option at the Upriver Dam due to the current lack of source control, its inability to protect groundwater, continual releases, and the pending TMDL. The two to four year timeframe for implementation of the dredging alternative may better fit into the schedule of the TMDL and minimize the amount of PCB contaminated sediment that may settle onto the area after the remedial action.

While ESC agrees with the decision to dredge contaminated sediments in Deposit 2, the disposal of those sediments and any removed from Deposit 1 should be further evaluated. The PCBs contained within the sediments will be incredibly stable and have the potentially persist within the landfill for decades. The Superfund site at the Lower Duwamish River is currently evaluating the feasibility of treating dredged sediment before its disposal (RETEC, 2005). Ecology should evaluate the potential for treating contaminated sediments from the Upriver Dam site in the same fashion.

The DCAP and its supporting documents to not adequately evaluate the risks posed to wildlife from PCB contamination in the river. The only wildlife addressed within the documents are fish and benthic invertebrates, and even these are only addressed through basic contaminant screening levels. No risk assessments were performed, and there is no mention of endangered species, piscivorous birds, or aquatic mammals such as mink and otter. The Endangered Species Act requires an evaluation of the impacts to endangered or threatened species, and this should be performed before any decision is made regarding remediation alternatives at the site. Risks to piscivorous birds and aquatic mammals should also be evaluated because of these organisms' susceptibility to PCBs and related compounds.

Specific Comments:

Section 2.3

Pages 4-5:

This section should also note and include discussion of the other remedial actions affecting the site (TMDLs, etc)

Section 2.5.2

Page 6:

Last paragraph- The citation of a personal communication is not sufficient enough of a reference to discuss the hydrogeology at the site. A formal document should be cited here. In addition, a formal report issued by Ecology in 2001 states that in some areas near the Upriver Dam the aquifer recharges the river during the periods of low flow in August and September. This should be noted here.

Section 3.4

Page 11:

First paragraph – Where are the data for the bioassays? These should be included here either in the text or in a table.

Last paragraph – This paragraph asserts that all remedial actions considered for PCBs will be effective for other COPCs. This assertion cannot be made without careful and detailed evaluation, and in fact data show that capping may not be effective to treat the metal contamination at the site.

Section 4.2

Page 12:

Last paragraph – This paragraph is unclear and should be reworded. Also, dermal exposure can be a significant pathway, particularly for those working on or around the dam.

Section 4.2.1

Page 13:

First paragraph – This document has to discuss inhalation. With water concentrations elevated, then volatilization has to be considered. If volatilization is occurring, then recreational exposures include inhalation.

First paragraph, con't – There is abundant literature on the bioaccumulation of PCB, and should be cited here. The transplacental transfer of PCBs should also be included in the text discussing breast feeding.

Section 5.2.1

Page 17:

Ecology equation 730-2 is not protective of children and other susceptible populations. The equation assumes a body weight of 70kg for 75 years, which is not an accurate value for children.

Section 5.2.2

Page 18:

Fourth Paragraph- Scour and more significant bioturbation may result in the suspension of sediments at greater than 10cm of depth. Simply because only the top 10cm of sediment are biologically active does not mean that sediments below that depth will not be disturbed.

Last paragraph – replace ug/Kg with ppb and replace pg/L with ppt

Page 19:

First paragraph – This porewater is the source of contamination of the groundwater which is now contaminated. A cap will not prevent water infiltration, and may in fact increase PCB concentrations in groundwater by preventing its dilution into the river.

Second paragraph – "maintain surface water PCB concentrations" change to "maintain surface water for river [PCB] concentrations"

Second paragraph, con't – If the site is already oozing PCBs into groundwater adjacent to the ponded water, the cap will do little to alleviate this.

Con't – The problem with this line of reasoning is that PCB levels in groundwater should be zero and ANY should be considered serious.

Section 5.2.4

Page 20:

Bullets 1 and 2 – Fish and mink should be considered in the analysis as well. Benthic invertebrate assays are not incredibly effective in determining the long term risks posed by contaminants such as PCBs.

Section 5.3

Page 20:

Fourth paragraph – Standards should be protective of both fish and aquatic mammals. Due to the tendency of PCBs to bioaccumulate in these organisms, more stringent requirements may need to be used

Table 2 – replace 62 ug/Kg with 62 ppb

Section 6.2.1

Page 23:

"Monitored Natural Recovery" is the equivalent of a "no action" alternative, and should not have been considered.

Section 6.2.2

Page 24:

Also a waste of time for PCBs – they do not "naturally recover"

Section 7.2.2

Page 27:

"Alternatives 2,3, and 4 … requirements" How do these alternatives address groundwater?

Page 28:

(B) Permanence - "Impedes hazardous… reactive amendments"
But not for the groundwater

Page 29:

Third paragraph – Where are the data to support this position?

Section 9.0

Page 36:

"A public comment period may be provided" Must be provided

Summary

The DCAP and accompanying documents fail to address a variety of factors at the Upriver Dam site. It does not factor in the other TMDLs that cover the site and does not fully evaluate risks to wildlife, particularly endangered species. While dredging Deposit 2 is the preferred alternative for that area, the capping alternative selected for Deposit 1 is not protective of either human health or wildlife. Capping does not proved the permanent solution to contamination at the site and does not prevent the continued contamination of groundwater. Dredging is a much more effective alternative for Deposit 1, especially if contaminated sediments are treated prior to disposal.

References

Anchor Environmental, 2005a. "Draft Final Focused Remedial Investigation Report, Upriver Dam PCB Sediments Site." Prepared for Avista Development Inc. and Kaiser Aluminum and Chemical Corporation.

Anchor Environmental, 2005b. "Draft Final Focused Feasibility Study, Upriver Dam PCB Sediments Site." Prepared for Avista Development Inc. and Kaiser Aluminum and Chemical Corporation.

Anchor Environmental, 2005c. "Draft Cleanup Action Plan, Spokane River Upriver Dam PCB Site, Spokane WA." Prepared for Avista Development Inc. and Kaiser Aluminum and Chemical Corporation

Environmental Stewardship Concepts, 2004. "Lower Duwamish Treatment Report, Slip 4 and T-117." Prepared for Duwamish River Cleanup Coalition.

Palermo, M., Maynord, S., Miller, J., and Reible, D. 1998. "Guidance for In-Situ Subaqueous Capping of Contaminated Sediments," EPA 905-B96-004, Great Lakes National Program Office, Chicago, IL.

RETEC, 2005. "Draft Identification of Candidate Technologies for the Lower Duwamish River Waterway." Prepared for USEPA and Washington State Department of Ecology.

USEPA, 1993. "Selecting Remediation Techniques For Contaminated Sediment" USEPA Doc EPA-823-B93-001.

Washington State Department of Ecology, 2001. "Spokane River/Aquifer Interaction Project Results, May-November 1999." Publication No. 01-03 024.