STATE OF WASHINGTON
DEPARTMENT OF ECOLOGY
4601 N. Monroe Street • Spokane, Washington 99205-1295 • (509) 329-3400

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June 17, 2005

Attention: Commenters and other interested parties

In response to comments received within the March 22 through May 6, 2005 public comment period for the Spokane River Upriver Dam PCB site (the Site), Ecology is providing the enclosed Responsiveness Summary. The summary includes generalized comments and Ecology's responses to comments received on the Site's Remedial Investigation/Feasibility Study (RI/FS) and the draft Cleanup Action Plan (DCAP).

While evaluating the comments received, it became apparent that many of the comments received expressed similar concerns. Ecology deemed it most efficient to address concerns collectively instead of by reference to individual letters. Comments received that suggested specific reference to textual changes to the RI/FS and DCAP were not responded to directly but are under consideration, and appropriate changes will be made to the final versions of the documents.

Ecology would like to thank those who reviewed and provided comments on the documents.

John Roland
Project Manager
Toxics Cleanup Program
509/329-3581

RESPONSIVENESS SUMMARY

SPOKANE RIVER UPRIVER DAM PCB SITE
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
&
DRAFT CLEANUP ACTION PLAN

Prepared by:

WASHINGTON DEPARTMENT OF ECOLOGY

Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295

June 2005

Responsiveness Summary
Spokane River Upriver Dam PCB Site

Response to Comments on Site RI/FS and draft Cleanup Action Plan

Introduction

The public comment period for the Spokane River Upriver Dam PCB site was conducted from March 22, through May 6, 2005. The Department of Ecology (Ecology) received seven responses to the department's call for public comment on the RI/FS and Draft Cleanup Action Plan. A two-week extension of the traditional 30-day comment period was granted by Ecology to facilitate greater public involvement. Ecology would like to thank those who reviewed the Remedial Investigation and Feasibility Study (RI/FS) and Draft Cleanup Action Plan (DCAP) for providing comments. Ecology has closely considered concerns expressed regarding the planned remedial actions for the Spokane River Upriver Dam PCB Site. Considerable effort and analysis occurred during the completion of the RI/FS and the subsequent cleanup action planning. Although Ecology's preference of remedial actions for Deposit 1 differs from the preference of dredging offered by some of the commenters, Ecology believes that the preferred remedy will address the various concerns raised and will be fully protective. Active-barrier capping using a carbon layer for chemical isolation in addition to sand and armor layers for physical isolation and erosion control provides for the long-term protection of human health and the environment desired by all parties. After careful evaluation Ecology concludes that the cleanup level and remedy previously defined in the DCAP will be protective of all the media found on the Site. Measures will be taken to assure proper performance monitoring. Section 5.2 of the DCAP elaborates on Ecology's selection of a conservative cleanup level that will be protective of soil and groundwater in the area influenced by the Dam. Ecology's preferred remedy will also be protective of surface water and the aquatic inhabitants of the Spokane River. Detailed responses to the primary issues and concerns raised in the comments submitted to Ecology are provided below. Many of the comment letters expressed similar concerns. Those concerns were addressed collectively instead of by reference to individual letters:

Detailed Responses

***(1) Comment**: Concerns were raised over the risks of exposure to the public from Deposit 1, a 3.7 acre deep-water sediment deposit located in the old river channel directly upstream of the Upriver Dam (approximately RM 80.1 to RM 80.6) , and from Deposit 2 which is a shallow water deposit located in an area known locally as Donkey Island on the north bank of the Spokane River at RM 83.4.*

Response: The pathway of concern from the PCBs in sediments is via the aquatic food chain, principally the bioaccumulation of PCBs in fish. Direct contact exposure risks of sediments where they currently lay are low due to their locations. Remobilization due to

river processes is a concern, which contributed to the selection of the cleanup actions. River water PCB concentrations are well below documented screening levels of concern for dermal contact. Swimming is safe in the River.

***(2) Comment**: A concern was raised by a citizen commenter that sludges generated by past processes and handling practices at the Inland Empire Paper Company Millwood plant resulted in the disposal of sludges east of the plant near and in a gravel pit along the south shore of the river. The commenter suggested that monitoring wells may exist in this area, which could provide information on potential additional sources of contamination, either currently or historically, to the River.*

Response: Ecology has reviewed available records that may be related to this concern and has contacted the Spokane Regional Health District (SRHD), which is the lead entity in Spokane County on solid waste permitting. No direct information was found, though an unrelated Ecology inspection of stormwater discharge in 1999 linked to the inferred gravel pit in question did record the presence of materials that may have been paper process sludges. Ecology is requesting further information from Inland Empire Paper on this area, past sludge management and disposal practices, current status of any sludges deposited in the area east of the plant, and any information associated with possible monitoring wells in the area. The SRHD also has been notified of this records and information request, and will be provided any applicable information.

***(3) Comment**: Commenters voiced their concerns regarding the assessment and protection of groundwater and other media in the area of Deposit 1 at the Upriver Dam PCB Site.*

Response: Ecology shares concern over the protection of other media including groundwater at the site. Ecology spent extensive time ensuring that the selected sediment cleanup level will be protective of other media, including groundwater, at the Upriver Dam PCB Site. Specifically, equilibrium modeling described in the DCAP was used to determine if the selected 62 µg/kg SQV-based cleanup level was appropriate to protect both groundwater and surface water at the Site. Ecology considers the selection of this site-specific cleanup level critical to achieving protective remediation at the Site. Section 5.2 of the DCAP describes range of cleanup levels/criteria examined by Ecology. Table 2 summarizes the criteria considered by Ecology as well as the maximum sediment concentrations of PCBs required to meet the criteria specified for a variety of media. As presented in Section 5.2 and summarized in Table 2, the selected sediment cleanup level is protective of human health and the environment. Further, as part of the remedial investigation (RI), piezometers and a municipal water supply well were tested to evaluate potential risks to groundwater in the area hydrologically influenced by the Upriver Dam and proximal to the contaminated sediments. Analysis of the samples revealed no appreciable concentrations of PCBs. These results and other data obtained from the City of Spokane also indicate that groundwater in the vicinity is typically indicative of river surface-water chemistry. Although the RI indicates surface water quality in the area as the primary media of concern, both the selected sediment cleanup level and post-

construction monitoring activities planned for the Site will enable Ecology to evaluate the continued protectiveness of the proposed remedies on the groundwater in the area.

***(4) Comment**: Concerns were raised over conducting remedial actions in areas with co-located heavy metal contamination requiring future remedial and source control measures.*

Response: The active sediment cap design incorporates a multilayer cap design capable of sequestering hydrophobic compounds including PCBs while incorporating additional sand and armor layers which have historically been used to isolate contaminants from aquatic species and the water column. Physically isolating metals such as cadmium and lead is a well recognized remediation strategy. Both cadmium and lead are effectively remediated by appropriately designed sediment caps. A capping system construction will result in significant reduction in ecological risks posed by elevated metals in the sediments at Deposit 1. Further, the design of the proposed cap will aid significantly in isolating particulate metals, and the reactive barrier cap design will enhance natural properties of the sediments in Deposit 1. The addition of the reactive carbon barrier will also assist in chemically isolating dissolved zinc from surface waters and the overlying biologically active layers of the cap by supporting reducing conditions that may aid in precipitating out dissolved metals that are frequently found in area sediments. Furthermore, extensive groundwater monitoring along the Spokane River has demonstrated that drinking water quality remains high. Therefore, Ecology has determined the physical and chemical isolation properties of the sediment cap (Alternative 3D) will be protective of humans and wildlife. The selected remedial action will incorporate a state of the art in-situ sediment cap design to minimize the mobility of PCBs and metals by effectively immobilizing and isolating them resulting in the protection of other media, humans, and other species that use the Spokane River.

The Site lies within the EPA's Coeur d'Alene Basin Superfund Site and is included in their Record of Decision (ROD) for the Basin. Metals contamination from the Idaho mining districts of the Silver Valley is widespread along the upper Spokane River and reliant on the EPA implementation of the Operational Unit 3 (OU3) interim Record of Decision. Ecology will continue to push for the cleanup of metal contaminants originating in the Coeur d'Alene Basin. The proposed Upriver Dam PCB remedial actions are consistent with the EPA's OU3 ROD for the Site. Ecology recognizes the importance of the upstream source controls and believes that expeditiously remediating sediments behind Upriver Dam contaminated by historical releases of PCBs in the river is prudent and appropriate to protect both human health and the environment. Ecology's objective to limit current or future PCB inputs into the Spokane River is demonstrated by the ongoing PCB Total Maximum Daily Load (TMDL) study which is expected to further ensure the long-term effectiveness of the remedies selected for both of the identified PCB deposits. Ecology does not believe that postponing the cleanup of PCBs in sediments while waiting for metals source control activities to be implemented is in the public's best interest.

***(5) Comment**: Commenters voiced concerns regarding the effectiveness of the in-situ sediment cap in protecting aquatic and terrestrial ecological receptors from the deleterious affects of PCBs.*

Response: Ecology recognizes the importance of minimizing the detrimental impacts of contaminants of potential concern (COPCs) in the sediments of Deposit 1 on ecological receptors inhabiting the Site. In fact, recognizing the inherent tendency for PCBs to bioaccumulate up the food chain and, in turn, pose a risk to human health is a primary concern to Ecology and is a driving force behind Ecology's cleanup actions planned for the site. The remedies selected for both Deposit 1 and Deposit 2 will effectively remove a major source of PCBs from negatively affecting ecological receptors by preventing the PCBs and heavy metals from entering the river while providing a clean bioturbation layer to ensure that the contaminants are both chemically and physically isolated from benthic species inhabiting the Site. As proposed in the cleanup plan, the carbon-based active capping solution selected by Ecology is physically separated from and will be protective of both the benthic food chain and the surface waters of the Spokane River while minimizing potential for exposure of ecological receptors to the more highly contaminated sediments found buried deeper in Deposit 1.

***(6) Comment**: Commenters raised concerns regarding site-specific hydrogeological conditions associated geotechnical problems and their effects on the placement and long-term integrity of the Ecology's selected remedy for Deposit 1.*

Response: Ecology evaluated geotechnical factors and associated short and long term risks associated with each deposit, consistent with EPA Guidance for In-Situ Subaqueous Capping of Contaminated Sediments (EPA 905-B96-004). Site-specific evaluations were used in the selection of appropriate remedial actions for both Deposit 1 and Deposit 2. A determination was made that the active capping alternative was appropriate for consideration at the Deposit 1 site based on the bathymetric features of the site, the historic stability of the sediment deposit, the capability of long-term protectiveness of the selected remedy, the minimization of potential short-term risks associated with residual sediments left behind or disturbed by dredging operations, and other short- and longer-term factors consistent with the intentions of State Environmental Policy Act (SEPA). Site-specific factors including river currents, the channel substrate, and debris which has collected in the depositional area increase uncertainty factors associated with the dredging and removal of contaminated sediment from Deposit 1. A site-specific determination was made by Ecology that risks associated with disturbing the most highly contaminated sediment, currently buried beneath the bioturbation zones, could potentially result in increased levels of PCBs becoming bioavailable. The potential of PCB-laden sediment locally entering the water column was one of several factors considered. Employing best management practices could minimize short-term risks of dredging, but does not reduce them to levels associated with the active sediment capping remedy selected by Ecology, which also can be deployed in a notably more rapid manner, further reducing short-term environmental and cultural disturbances. For this Site, capping the

contaminants in Deposit 1 meets all project goals while minimizing short-term risks and providing a high degree of long-term effectiveness.

Ecology agrees that the risks identified are relevant to cleanup efforts involving in-situ sediment caps. Ecology has considered each of these risks and selected cleanup alternatives which will minimize any risks associated with the placement of cap materials while ensuring the long-term effectiveness of the cap. Engineering consultations and information provided during the remedial investigation work have led Ecology to the conclusion that the shear strength of the contaminated sediment will support the placement of a cap while best management practices will be used to minimize mixing of the cap materials and contaminated sediments. For example, an underwater diffuser or similar technology will likely be utilized to minimize mixing of clean cap materials while minimizing re-suspension of the contaminants. A complete description of the methods used to place materials will be provided in the engineering design document to be developed for this site.

Ecology previously considered each of the major concerns raised by commenters prior to and during the preparation of the March 2005 Draft Cleanup Action Plan. For instance, the additional capping materials required by Ecology for both the carbon and sand layers of the cap will provide a conservative level of protection. A safety margin was applied to the thickness of the carbon layer and Ecology is insisting on a minimum 4-inch layer of coal. PCBs in any pore water released during the placement of the cap will tend to bind to available organic constituents of the underlying sediment and to the carbon layer of the sediment cap. The additional sand layer will provide benthic organisms with a bioturbation layer that is both chemically and physically isolated from the underlying contaminated sediment and reactive media. Ecology utilized accepted analytical models to predict the influence of the contaminated sediment on surface water and groundwater in the area. Equilibrium partitioning (EqP), based on the contaminant concentration in the sediments, enabled Ecology to predict the concentration of PCBs in pore water and other media in direct contact with the contaminated sediments within the site. EqP models indicate that the cleanup levels selected by Ecology will be protective of the surface and groundwater in the area. Prior to implementation of remedial actions for the Site, engineering designs will be completed, reviewed by Ecology and commented on by the public.

*(7) **Comment**: Concerns were expressed over the failure of the Dam and the likelihood that the in-situ sediment cap planned for Deposit 1 would negatively influence Dam operations.*

Response: Ecology considered local site conditions while evaluating the remedial alternatives presented in the FS. A determination was made that site conditions at Deposit 1 were conducive for the placement and long-term effectiveness of the reactive barrier in-situ sediment cap (ISC). Consistent with EPA guidelines for the use of ISCs, Ecology considered hydrologic conditions specific to the impoundment area of the Upriver Dam. Design requirements for the proposed ISC account for both average and extreme hydrologic conditions occurring at the Site. In fact, catastrophic events were

considered. While the failure of the Upriver Dam in 1987 produced extreme hydrologic conditions at the site and resulted in significant erosion of the banks, sediment core samples provide evidence that contaminants in Deposit 1 were generally stable even under these extreme conditions. The natural stability of the sediment deposit, due to the favorable bathymetric conditions existing on the site, support the reactive-barrier ISC proposed in the DCAP. The addition of an armor layer will ensure the selected remedy will be capable of withstanding erosional and other forces greater than those associated with these two major events. The Upriver Dam originally created the depositional areas in which the sediments have settled, and Dam operations in the area of the Site also help to ensure the long-term protectiveness of the cap. Furthermore, long-term and event-driven monitoring activities will ensure remedial actions taken at the Site remain effective into the foreseeable future. The remedies selected by Ecology will only help the environment, and no negative impacts on the flood-control related properties of the Dam are expected. However, any short-term impacts on Dam operations are expected to be addressed in the forthcoming engineering design phase of the remediation.

(8) Comment: *– Commenters expressed concern over the adequacy of the discussion of dredging in the Feasibility Study (FS) which Ecology used, in part, during the selection of the sediment capping (Alt. 3D) alternative as the remedy for Deposit 1.*

Response: Dredging and removal of contaminated sediments located within the Upriver Dam PCB Site was considered as a potential remedial alternative for both sediment deposits at the Site as evidenced by its selection as Ecology's preferred alternative for Deposit 2. Ecology deemed the discussion of the dredging and removal option adequate to evaluate each of the alternatives discussed in the FS. Evaluation of preferred remedial actions was conducted in accordance with the Model Toxics Control Act (MTCA) including a disproportionate cost analysis enabling Ecology to make informed decisions regarding remedial actions for the Site. Site-specific factors associated with Deposit 1 are discussed in Ecology's response to comment 7 and throughout this responsiveness summary. After considerable evaluation of dredging aspects and best management practices for residual contamination control, Ecology determined that the capping remedy selected for Deposit 1 will be both protective and meet all cleanup objectives. Capping the contaminants in Deposit 1 with the reactive barrier proposed in Alternative 3D provides long-term environmental protection while minimizing short-term risks. Conversely, in evaluating an appropriate remedy at Deposit 2, Ecology has selected excavation of the contaminants due to the relative efficiencies of accessing the sediments as well as the ease of implementing residual control measures which minimize risks associated with the excavation of the contaminated sediments.

(9) Comment: *- Comments were received and concerns were raised related to the implementation and long-term maintenance of remedial alternatives considered in the FS.*

Response: Ecology approval of remedial alternatives considered for the two PCB-contaminated sediment deposits located in the Upriver Dam Site is consistent with regulations governing the selection of cleanup actions as described in WAC 173-340-360. The analysis of cleanup alternatives was completed and the results were provided in the

FS for the Site. The dredging option was given in-depth consideration by Ecology, and the preparation of that section of the FS was deemed to be acceptable. Perceived discrepancies between the lengths of the capping and dredging discussions were largely driven by Ecology's desire to have a comprehensive evaluation of a number of different alternatives in order to evaluate dredging against the range of remedial alternatives discussed in the FS. Significant time was spent by Ecology evaluating the removal alternative and best management practices that would be required. The selection of remedial actions for both Deposits 1 and 2 complies with MTCA. Ecology's selection of the cleanup actions for each of the deposits was made after consideration of all the criteria specified by WAC 173-340-360. The final selection of the preferred cleanup actions was strongly influenced by site-specific factors affecting the benefits and risks associated with the implementation of the various alternatives.

Ecology intends on ensuring the long-term integrity of the selected remedies. This is of particular importance when considering the cleanup action for Deposit 1. While the reactive-barrier sediment cap will be designed to effectively chemically and physically isolate PCBs and metals from other environmental media as well as ecological and human receptors in perpetuity, Ecology holds an oversight responsibility to ensure the continued effectiveness of completed remedial actions at contaminated sites. Consent Decrees under MTCA generally include re-opening clauses. These re-opening clauses help to address certain concerns raised by commenters. Specifically, the clauses ensure that responsible parties remain liable for additional remediation activities in the case that additional contamination is identified in the future. Ecology reserves the right to readdress contamination issues in the case that cleanup actions fail to meet the agency's goal of protecting human health and the environment. Continued long-term monitoring of remedial actions taken at the site will ensure the selected remedies meet Ecology's goals.

***(10) Comment**: Commenters were concerned over the implementation of short and long-term environmental sampling and monitoring plans to ensure the effectiveness of remedial actions.*

Response: Ecology will require monitoring activities during and following the implementation of the selected remedies. Ecology will require sampling to further define the nature and extent of the PCB-contaminated sediments at Deposit 2. Monitoring will be conducted in order to ensure that the effectiveness of the selected remedies will continue into the future, although the frequency and intensity of monitoring activities will diminish over time. Unscheduled monitoring or inspections will also be conducted following major flood events in order to confirm that the additional armor layer included in design specifications for the sediment cap (Alt. 3D) effectively protects the underlying layers of the cap from extreme erosional forces.

Ecology considered costs associated with the long-term monitoring of the contaminated sediment deposits and will require more extensive monitoring of the reactive-barrier cap placed over Deposit 1 in relation to the removal alternative chosen for Deposit 2. These costs were considered by Ecology and provided to the public in the Site's Feasibility Study. The costs of monitoring during the excavation and/or capping of the two deposits

are included in the costs associated with each remedy considered. Effectively, variations in costs associated with the different alternatives occur following the implementation of the selected remedies and were, therefore, considered under the long-term monitoring section of the cost estimate (FS, Table 4). Ecology will require the inclusion of a detailed sampling and analysis plan at the time of the engineering design document. The sampling plan and engineering design document will be released to the public and other regulatory authorities charged with protecting the Spokane River. Initiation of the remedial actions will only begin after engineering designs and a sampling and analysis plan are accepted by Ecology.

***(11) Comment**: A more detailed Public Participation plan is needed for the Cleanup Action Plan, as required by WAC 173-340-140.*

Response: WAC 173-340-140 does not make reference to requirements for a Public Participation Plan. However, WAC 173-340-660 outlines requirements for Public Participation Plans. See response to Comment (12) for additional information.

***(12) Comment**: 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. The proposed 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).*

Response: A Public Participation Plan was developed in October 2002 as part of the Consent Decree to conduct a Remedial Investigation/Feasibility Study at the Upriver Dam PCB Sediments Site. The plan was developed in accordance with WAC 173-340-600(9). The Plan was updated in March 2005 and is a part of the Consent Decree to implement a Cleanup Action Plan.

***(13) Comment**: Commenters raised concerns over the peer and scientific processes used by Ecology to ensure adequacy of the RI/FS and the effectiveness of the remedial alternatives selected by Ecology in the Cleanup Action Plan.*

Response: The RI/FS and the Draft Cleanup Action Plan were made available to all interested parties including the public and governmental agencies. Ecology also supported requests to extend the comment period in order to enable adequate review of the documents. Notice of the review and comment periods for the documents was made through the media, direct mailings, and other procedures. Ecology actively supports review and comment of technical documents associated with cleanup sites and provides funding to environmental non-profit groups including the Washington Citizens' Advisory Committee, the Center for Justice, and the Lands Council, which in this case chose to sponsor the independent review of this DCAP.

*(14) **Comment**: Comments were received regarding the stringency of the cleanup levels selected by Ecology. Particular emphasis was placed on the need for Ecology to consider the co-occurring heavy metals found at the Site and throughout the Coeur d'Alene Basin.*

Response: In accordance with WAC 173-340-7401(1)(c) , Ecology is exercising regulatory authority to select cleanup standards. For this Site, Ecology has deemed it appropriate to adopt a sediment cleanup level consistent with recently reported potential interim freshwater Sediment Qualities Values (SQVs). The selected cleanup level was developed by evaluating Lowest Adverse Effects Threshold (LAET) levels experimentally determined and published in peer-reviewed journals. The selection of this sediment cleanup level ensures that PCB levels remain well below action levels for all media of concern on the Site. While this cleanup effort is focused on sediments which contain PCBs, remedial actions selected by Ecology will address co-located heavy metals. Both the reactive barrier cap and the removal alternative proposed for Deposit 1 and Deposit 2, respectively incorporate a sand layer to physically isolate remaining contaminants from the upper biologically active habitat layer ensuring that the substrate will be free of both heavy metals and PCBs.

*(15) **Comment**: Concern was raised that the potential risks to ecological receptors were not adequately evaluated or considered in the selection of the proposed cleanup actions and knowledgeable biologists were not consulted.*

Response: While a comprehensive ecological risk assessment was not necessary or required by Ecology at the Site, a previously published Ecology document: An Ecological Hazard Assessment of PCBs in the Spokane River, April 2001, Publication No. 01-03-015 was referred to in the decision-making process. Also, a member of the Ecology project team is a professional biologist who further evaluated potential receptors.

*(16) **Comment**: Questions were posed related to the impacts of the carbon barrier on oxygen levels in the surface waters of the Spokane River.*

Response: Ecology's preferred cleanup action plan for the contaminated sediments in Deposit 1 will isolate the PCBs and heavy metals from the overlying water column as well as from the biologically active surface area of the deposit. Concerns over potential increases in biochemical oxygen demand (BOD), due to the placement of the reactive carbon layer, were duly noted and a literature review confirmed that the placement of the coal will not negatively affect dissolved oxygen in the river. Conversely, the same chemical property of the coal that binds PCBs should also effectively lower BOD processes related to the underlying wood waste and organic matter in the deposit. Activated carbon sources, including anthracite coal, are commonly used by wastewater treatment plants to effectively control BOD levels.

*(17) **Comment**: Comments were received indicating that some Potentially Liable Parties (PLPs) had no potential for participation in cleanup activities completed and or planned for the Site.*

Response: Ecology has actively communicated with and also encouraged the involvement of all PLPs in all phases of remedial actions. PLP involvement and contribution in remedial activities is clearly desired and is firmly established by statute and rule. Kaiser and Avista voluntarily entered into agreements supporting investigative activities that have been completed on the Site. Ample opportunities to participate in remediation efforts will continue to be provided. All documents relating to ongoing remediation activities at the Upriver Dam PCB Site have been announced and made available to PLPs and to the public for comment.

***(18) Comment**: Commenters raised concerns over the methods used to calculate PCB concentrations during the remedial investigation phase of the cleanup action. Specifically, the appropriateness of using a "blank adjusted' method of determining total PCB concentrations rather the more common EPA "blank qualified" method was questioned.*

Response: In the interest of providing an accurate and full portrayal of levels of contamination at the Site, Ecology chose to present data using both methods. Ecology believes that there are benefits to using both of the methods. The EPA "blank qualified" method is well recognized by regulatory authorities and the use of the method allows for site to site comparison of current and historic chemical data. Use of the EPA method also ensures that contaminant levels are rarely overestimated. However, it should be noted that the "blank qualified" method has been around for many years and does not account for advances in analytical chemistry. The "blank qualified" method has the potential to omit any PCB concentrations that are not at least five times the concentrations reported in the control "blank" samples. Intuitively, this method has the potential to significantly underestimate PCB concentrations when it is used to determine total PCB concentrations from 209 individual PCB congeners. The "blank qualified" method also fails to account for advances in sample handling procedures performed at nationally accredited laboratories. Conversely, the "blank adjusted" method continues to be refined as technology and procedures advance. The "blank adjusted" method is a common method for the reporting of PCB concentrations in scientific peer-reviewed journals. Ecology believes that the total PCB values reported by a nationally accredited laboratory using the "blank adjusted" method are scientifically sound and assist in accurately representing the concentrations of PCBs found at the Site.

***(19) Comment**: A PLP commenter suggested that incorporating dichloro-biphenyls (PCB-11) in calculations of total PCBs was not appropriate based on the laws of other countries (e.g. Germany).*

Response: Ecology supports the inclusion of dichloro-biphenyls in calculations of total PCBs. Ecology's position is supported by federal and state environmental programs throughout the U.S. Ecology also believes that inclusion of these lightly chlorinated PCBs is necessary to protect human health and the environment and also to properly investigate fate and transport. As such, Ecology dismissed other comments received based on total PCB concentrations that do not include dichloro-biphenyls including PCB-11.

(20) Comment: A PLP commenter expressed concerns that PLPs named by Ecology were not equally responsible for PCBs found in the sediment deposits located within the Upriver Dam PCB Site.

Response: Ecology is conducting this cleanup in accordance with regulations promulgated by the State of Washington (RCW 70.105D.010 (5)). Per statute, "because it is often difficult or impossible to allocate responsibility among persons liable for hazardous waste sites and because it is essential that sites be cleaned up well and expeditiously, each responsible person should be liable jointly and severally."

(21) Comment: A PLP commenter expressed concerns that the RI did not provide evidence that dichloro-biphenyls were present in recently deposited sediments or were the responsibility of current dischargers of PCBs into the Spokane River.

Ecology Response: Data exists that shows elevated levels of dichloro-biphenyls are found in both of the sediment deposits identified in the RI. Furthermore, data exist indicating that these PCBs are found in the recently deposited upper (0-10 cm) fraction of the sediment deposits.

Conclusion

After reviewing comments provided and additional evaluation, Ecology has determined that the Final Cleanup Action Plan to be developed will select the same cleanup options as those previously proposed in the DCAP for Deposit 1 and Deposit 2. Certain corrections and clarifications will be made to the Final Cleanup Action Plan, including improved discussion on the importance and necessity of long-term monitoring of performance. Consent Decree negotiations will commence to implement the final Cleanup Action Plan with the goal of starting cleanup actions in 2006.

CENTER FOR JUSTICE

COMMUNITY BUILDING
35 WEST MAIN AVENUE
SUITE 300
SPOKANE, WA 99201
TELEPHONE: 509.835.5211
FAX: 509.835.3867

ATTORNEY & ADVOCATES

JIM SHEEHAN
Founder
BREEAN BEGGS
Chief Catalyst

BONNE BEAVERS
RICK EICHSTAEDT
ANDREA POPLAWSKI
TERRI SLOYER

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.

Center for Justice
35 W. Main, Ste. 300
Spokane, WA 99201
Ph:509.835.5211
Fax:509.835.3867

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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Fax:509.835.3867

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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Fax:509.835.3867

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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35 W. Main, Ste. 300
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Ph:509.835.5211
Fax:509.835.3867

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

Center for Justice
35 W. Main, Ste. 300
Spokane, WA 99201
Ph:509.835.5211
Fax:509.835.3867

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

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INLAND EMPIRE PAPER COMPANY

3320 N. ARGONNE
SPOKANE, WASHINGTON 99212-2099

PHONE 509/924-1911
FAX 509/927-8461

April 20, 2005

Mr. John Roland
Washington Department of Ecology
Eastern Regional Office
4601 N. Monroe Street
Spokane, WA 99205-1295

RE: Comments to PCB sedimentation in the Spokane River

Dear Mr. Roland:

The information provided herein is in response to Washington Department of Ecology's (DOE) investigation and proposed clean-up of polychlorinated biphenyl (PCB) sediments in the Spokane River at Upriver Dam and Donkey Island. The following comments are presented by Inland Empire Paper Company (IEP) after review of the Remedial Investigation (RI) and Feasibility Study (FS) reports prepared by Anchor Environmental for Avista Development Inc. and Kaiser Aluminum Corp. IEP also received a letter dated December 17, 2002, from the DOE that named IEP as a Potential Liable Party (PLP) for clean-up of the PCB contamination at Upriver Dam and Donkey Island.

The RI was intended to investigate and address proposed clean-up alternatives for the contaminated sediments at Upriver Dam and Donkey Island. However, it appears that this report went to great lengths to shift the focus from those actually responsible for the PCB contamination to IEP. It is also apparent that the report attempts to divert attention from the PCB contaminated sediment to IEP's current low-level surface water discharge of a dissimilar congener. The report uses questionable data and draws unsupported conclusions to implicate IEP as a responsible party for the PCB sediment deposits at the Upriver Dam and Donkey Island sites. One of the most obvious conclusions is that IEP could not have contributed PCBs at the Donkey Island site since this area is more than one-half mile upstream of IEP's effluent outfall.

Prior to 1991, IEP's effluent stream was free of PCBs as confirmed by the Washington DOE Class II inspections and NPDES permit application testing. During the 1990 Class II inspections, the DOE concentrated the solids in IEP's effluent with a centrifuge, but were still unable to detect any evidence of PCBs. Furthermore, U.S. EPA research studies performed from 1976 to 1978 show no potential for PCBs in pulp and paper mills processing "virgin" wood stock. IEP used only virgin wood fiber for pulp manufacturing until 1991.

The only historically known PCBs at the IEP site prior to 1991 were those contained in the oils used in two electrical transformers and one bank of capacitors. In the 1980's, IEP spent significant capital to replace all transformer oil containing PCBs, and by 1995 had removed all capacitors with oils containing PCBs. This proactive effort was completed to ensure IEP's status as a PCB-free mill and to avoid any possible contamination to the environment. There are no records or knowledge of PCB fluids ever being lost to the environment.

The RI report indicates that the highest concentrations of sediment PCBs peaked at 8 to 16 inches below the sediment surface and decreased steadily at shallower intervals. At the sedimentation rates reported in the RI report, this indicates that the high concentration PCB sediment deposits preceded 1980 when IEP's effluent was confirmed by DOE to be PCB-free.

In the 1980's, there was a movement to begin recycling old newspapers (ONP). Pressure from this movement eventually resulted in IEP's customer's demanding recycled fiber in our products. In addition, a law was enacted in California that required publishers to include a minimum percentage of ONP content. In order to meet this demand and to remain a viable business, it was necessary for IEP to invest $10 million into a new ONP recycling process that began production in September 1991.

EPA regulations ended the manufacture and distribution of products containing PCBs in 1977. However, the EPA Code of Federal Regulations and the Toxics Substances Control Act (TSCA) still allow printing inks to enter this country from overseas manufacturers with PCB contents up to 25 ppm. This federally defined "PCB-free" ink is used to print newspapers and magazines. The EPA allowable PCBs contained in these inks are diluted several million times through the recycling process, resulting in minute quantities of PCBs in IEP's effluent. Ironically, these minute quantities of PCBs are enough to classify IEP as a PCB discharger and as a PLP for PCB contamination in the Spokane River. In lieu of penalizing U.S. businesses, the DOE and EPA should be taking action to eliminate the import of these PCB sources into our country and into our environment. We have been informed by experts at the National Council for Air and Stream Improvement that alternative PCB-free ink products are available, but that there is no incentive for change because of the current regulations.

The total PCB content in IEP's effluent as measured by the DOE in 2001 and 2002 was 2,400 to 4,500 pg/L. This minute quantity is equivalent to approximately 0.034 to 0.062 pounds/year. At this rate, it would take **3,000 to 5,000** years for IEP to discharge the reported quantity of PCBs located in the Upriver Dam site. Furthermore, it would take between **2,000 and 4,000** years for IEP to discharge the 143 pounds of PCBs released by Kaiser Aluminum in just three months (November 2002 to January 2003). Therefore, it is improbable that IEP has contributed to the PCB contaminated sediment accumulations at the Upriver Dam site, not only because of the low contribution levels, but also since the company has only been recycling ONP for less than 14 years.

The RI and FS reports attempt to infer that IEP's current low-level surface water discharge is somehow related to sediment deposition that occurred at least 30 years ago. They also go to great lengths to point out that IEP's current low-level PCB discharge is the primary source of dichlorinated PCB congeners in

the surface waters. These reports focus on the dichlorinated PCB congeners rather than the tri, tetra, and penta congeners that the reports show to make up the primary contamination in the sedimentation at Upriver Dam. In fact, these tri, tetra, and penta PCB congeners are the same type of deposits that are found at the Donkey Island site which is upstream of IEP's effluent outfall.

The studies also insinuate that sediment PCB contributions originated from wood fibers, with IEP identified as the only potential source of wood waste. It is more likely that the hydrophobic nature of PCBs resulted in absorption to woody substances contained in the river since PCBs have an affinity for organic substances and not water. The report does not address natural or other upstream wood sources, such as the many sawmills, which have undoubtedly contributed large quantities of wood fiber to the river system.

IEP could not have contributed to the accumulations at the Donkey Island site since this location is upstream of IEP's effluent outfall. It is improbable that IEP has contributed to the PCB accumulations behind Upriver Dam since these accumulations occurred when IEP's effluent was free of PCBs. Furthermore, the deposits at the Upriver Dam and Donkey Island sites consist primarily of PCB congeners not common to IEP's effluent system. The Anchor Environmental commissioned RI and FS reports are a biased attempt to deflect attention away from the primary contributors - Avista Development Inc. and Kaiser Aluminum Corp.

This letter provides a general overview of the evidence to support our position on this matter. A more detailed technical review on this subject will be presented by Esvelt Environmental Engineering on our behalf. Based on the enclosed information and that forthcoming from Esvelt Environmental Engineering, we expect the DOE to reconsider its classification of IEP as a PLP for the PCB contamination at Upriver Dam and Donkey Island. Please contact me should you have any questions or require additional information.

Sincerely,

Wayne D. Andresen

Wayne D. Andresen
President and
General Manager

c: Larry Esvelt, Esvelt Environmental Engineering

ESVELT ENVIRONMENTAL ENGINEERING
7605 EAST HODIN DRIVE, SPOKANE, WA 99212-1816
Phone: 509-926-3049
Fax: 509-922-3073

April 19, 2005

MEMO RE: PCB Contribution to Sediments in the Spokane River from Inland Empire Paper Co.

COMMENTS BY: Larry A. Esvelt PhD PE DEE

ON BEHALF OF: INLAND EMPIRE PAPER CO.

REF: Draft Remedial Investigation Report (RI)
Draft Feasibility Study Report (FS)
Draft Cleanup Action Plan (CAP)

SUMMARY OF COMMENTS AND CONCLUSIONS

Following review of the RI Report it is concluded that:

- It is extremely unlikely that Inland Empire Paper Co. contributed to the PCB accumulation in sediments upstream of Upriver Dam, since nearly all of the accumulated PCBs are in sediments 10 cm or more below the surface, believed to have been deposited before 1990.
- Discharge from IEP would take 2,300 to 4,200 years to accumulate the amount of PCBs that was discharged in a 3-month period in 2002-2003 from a single upstream source.
- Discharge from IEP would take 2,700 to 5,000 years to accumulate the amount of PCBs estimated to be contained in the sediment deposit upstream of Upriver Dam.
- The RI Report asserts at several locations that the PCB concentration at Boulder Beach is associated with the IEP outfall, while offering extensive qualifications regarding a similar conclusion regarding the PCB concentration at Upriver Dam being associated with the known PCB contaminated sediments. The evidence is equally compelling, and both are based on correlations with unknown factors. The continued emphasis appears to be unjustified since the purpose of the RI, FS and CAP are intended to address PCBs in the sediments.
- It is unlikely that Inland Empire Paper Co. contributed more than a small fraction of the wood waste that is incorporated in the sediment deposit where the PCBs are accumulated.
- Current, short term, concentrations of PCBs in the Spokane River surface water may be a result of wastewater discharged from Inland Empire Paper Co. newsprint mill, where Old Newspaper processing began in 1991. It now appears that PCBs may be present in some inks, in spite of PCB manufacturing and distribution halting in 1978, and the inks being considered PCB free. PCB content may be up to 25 mg/l in some inks, according to unverified information, while still being considered PCB free. The Congeners of PCB noted to increase downstream of Plante's Ferry appear to be those known to be in the IEP effluent from earlier sampling.

- Monochlorinated biphenyls and dichlorinated biphenyls comprise the congeners that are not included when calculating total PCBs by some regulators (e.g. Germany). They include the congeners of the highest percentage in IEP effluent.
- The "Blank Qualification" method for considering significance of PCB contamination is apparently the EPA approved method.
- It is unclear why the "Blank Adjustment" method for considering significance of PCB contamination is used. It is referenced as "Alternative" to the EPA approved "Blank Qualification" method. Verbal response to the question appeared to be that "it was more conservative". While this may be true, it is difficult to accept as a justification for the use.
- The RI discussion appears to overemphasize the impact of alleged PCBs that may have been discharged at IEP, and the correlation of river PCB content with IEP discharge is made, even though the IEP PCB discharge data was a year earlier than the RI sampling studies.
- The data collected using the SPMD technique seems to indicate that the discharge from IEP may have been inconsequential compared to sediment released PCB homologues between Boulder Beach and Upriver Dam, even though the correlation between Upriver Dam water sample PCB content with the sediments is "qualified" in the RI.
- Unwarranted emphasis in the FS as well as in the RI appears to be placed on the potential for discharges from IEP to affect water quality. The potential for affecting the sediments, which are the concern of these documents (RI, FS, CAP), is miniscule to non-existent.
- The assertion in the RI that there was an increase in PCBs between Plante's Ferry and Boulder Beach according to the SPMD testing (included in the CAP) does not appear to be supported by data presented in the RI Report.
- The statement in the RI and CAP that the increase in PCB concentrations at depth near Boulder Beach is a result of IEP discharge does not appear to be supported by data presented in the RI Report.
- It appears that Inland Empire Paper Co. would have no potential for participation in the cleanup alternatives, due to lack of information that they contributed to the accumulation of PCBs in the sediments of concern.
- It is also observed that the recommended cleanup alternative, while providing very conservative protection from PCB entering the Spokane river food chain upstream of Upriver Dam, does not appear to improve protection from PCBs entering the ground water that then emerges into surface waters downstream of Upriver Dam. The sampling for the RI did not apparently include any points downstream of Upriver Dam, even though the review of information presented on groundwater gradients clearly indicated that water percolating out of the river upstream of the dam would potentially reenter the river downstream. The groundwater not entering the river downstream of the dam migrates northward and enters the Little Spokane River north of Spokane.

INTRODUCTION

Draft reports regarding PCBs in sediments behind Upriver Dam on the Spokane River have been made available by the Washington Department of Ecology for public review. The reports are:

- Draft Final Focused Remedial Investigation Report[1],

[1] Draft Final Focused Remedial Investigation Report Upriver Dam PCB Sediments Site, Prepared for Avista Development, Inc. and Kaiser Aluminum & Chemical Corporation, for Submittal to Washington Department of Ecology, by Anchor Environmental, LLC, Seattle WA 98101,F ebruary 2005.

- Draft Final Focused Feasibility Study[2], and
- Draft Cleanup Action Plan[3].

The RI and the FS were prepared by Anchor Environmental, LLC, Seattle, WA for Avista Development, Inc. and Kaiser Aluminum & Chemical Corporation. The CAP was prepared by the Washington Department of Ecology using the RI and the FS as source material. The RI and FS reports were prepared under the terms of a Consent Decree with the Washington Department of Ecology.

The section of river addressed in the reports is from Upriver Dam at approximately river mile 80 to the Centennial Trail footbridge at approximately river mile (RM) 85. This stretch of river encompasses the Inland Empire Paper Co. (IEP) treated process wastewater outfall to the Spokane River, at approximately RM 82.8. There are numerous references to the IEP discharge to the river and apparently tentative conclusions regarding PCB discharge from the outfall.

This review of the draft RI and draft FS is focused on interests of IEP with regard to accumulation of PCB in sediments behind Upriver Dam, and any potential for IEP to be responsible for PCB contamination of the sediments which would result in a responsibility to participate in their remediation.

As background information:

- IEP, in response to the Toxic Substances Control Act (TSCA) removed all devices (transformers and capacitors) containing PCBs from service at the paper mill, and removed them from the site for proper disposal by September 12, 1995. There were no documented spills, leaks or discharges of PCB containing oil while the transformers or capacitors were in service. The removal is documented in Reports maintained at the mill.
- In December 1990 the Washington Department of Ecology performed a Class II inspection of IEP wastewater treatment facilities. No PCBs were found in effluent or sludge samples collected during the inspection according to the report issued by Ecology.[4] Quantitation limits for the effluent were 0.5 µg/L (500,000 pg/L) for Aroclor-1016, -1221, -1232, -1242, and -1248, and 1.0 µg/L (1,000,000 pg/L) for Aroclor-1254 and -1260. Quantitation limits for sludge samples were 1,100µg/kg-dry for Aroclor-1016, -1221, -1232, -1232, -1242, and -1248, and 2,200 µg/kg-dry for Aroclor-1254 and –1260.
- Studies by EPA at several newsprint mills during 1976 to 1978 showed no potential for PCBs in the effluent from all mills processing virgin stock (wood chips, etc.).[5]
- IEP began processing "Old Newsprint" in 1991 in response to public and publisher demand for maximization of "recycled" fiber in newsprint. It has since been established that although manufacturing and distribution of PCBs was terminated in 1979, that some printers inks may

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2 Draft Final Focused Feasibility Study Upriver Dam PCB Sediments Site, Prepared for Avista Development, Inc. and Kaiser Aluminum & Chemical Corporation, for Submittal to the Washington Department of Ecology, by Anchor Environmental, LLC, Seattle, WA 98101, February 2005.

3 Draft Cleanup Action Plan, Spokane River Upriver Dam PCB Site, Spokane, WA, Washington State Department of Ecology, Toxic Cleanup Program, Eastern Regional Office, Spokane, WA, March 2005.

4 Class II Inspection Results, Inland Empire Paper Co., Washington Department of Ecology, Eastern Regional Office, Spokane, WA, December 1991.

5 Development Document for Proposed Effluent Limitations Guidelines New Source Performance Standards and Pretreatment Standards for the Pulp, Paper and Paperboard and the Builders' Paper and Board Mills Point Source Categories, U.S. Environmental Protection Agency, December 1980.

contain PCBs while still being considered as "PCB free". Thus, since 1991, there is a potential source of PCBs in IEP effluent.

- Inland Empire Paper Co. had PCB analysis performed on its effluent to the Spokane River in 1984, 1988, 1990, 1996, 2001, and 2002 according to EPA methods, but not Method 1668 (High Resolution Electron Capture Detector (ECD) Gas Chromatograph. All tests were below detectible limits, which ranged from 0.1 to 1.0 µg/L (1984 through 2001 testing), and 0.005 to 0.010 (2002 testing).[6]
- Maximum acceptable concentration of PCBs in pigments is 25 mg/kg (USA, Germany) calculated as the sum of effective single isomer concentrations exceeding 2.0 mg/kg.[7] Some of the compounds that are measured as PCBs in printers ink may be the result of chemical side reactions in azo dye synthesis. In calculation of PCB concentration in the inks, discount factors are used in the case of mono-CBs (f = 0.05) and di-CBs (f = 0.20).
- Foreign consideration of PCBs in manufacturing do not necessarily correspond to US regulations:
    - Definition of PCB in the regulations includes only polychlorinated (trichloro- to decachloro-) biphenyls (PCB)[8], and excludes monochloro- and dichloro-biphenyls.
    - Wastes containing up to 50 mg PCB/kg are considered 'PCB-free'.[9]
    - Regulation of PCBs as a constituent in various situations is limited to specific congeners: PCB 28, PCB 52, PCB 101, PCB 138, PCB 153 and PCB 180 in sewage sludge applied to agriculture; PCB 28, PCB 52, PCB 101, PCB 180, PCB 138 and PCB 153 in milk, meat, fish, eggs and products thereof; PCB 28, PCB 52, PCB 101, PCB 138, PCB 153, and PCB 180 in drinking water.[10]
    - Production of PCBs in Germany, by the only manufacturer, Bayer, was not reported as discontinued until 1985, and the German ordinance prohibiting PCBs in preparations, products and substances, passed on July 1989, limited PCB content to 50 mg PCB/kg.[11]

  These discrepancies in international regulation of PCBs could result in introduction of PCBs into the US market (e.g. printers inks) from foreign sources unbeknownst to the users of internationally marketed products.

DRAFT REMEDIAL INVESTIGATION REPORT (RI)

Investigations in conjunction with preparation of the RI report were conducted in the Spokane River in August-September and in December 2003. During those periods water quality studies were conducted by sampling at 3 locations:

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6 "Inland Empire Paper Co. Paper Mill Discharge to the Spokane River, Polychlorinated Biphenyl (PCB) Compounds", Memo by Esvelt Environmental Engineering, February 18, 2002.

7 Sistovaris, N., Ulrich Donges, and Beate Dudek, "Determination of Traces of Polychlorinated Biphenyls in Pigments", Journal of High Resolution Chromatography, 1990.

8 Fiedler, Heidelore, "Regulations and Management of PCB in Germany", Bavarian Institute for Waste Research – BifA BmbH, Am Mittleren Moos 46a, D86167 Augsburg, Germany, http://www.chem.unep.ch/popl/stpeter/stpete2b.html.

9 Ibid.

10 Ibid.

11 Neumeier, Dr. Gunther, "The Technical Life-Cycle of PCB's (Case Study for Germany)", http://www.chem..unep.ch/pops/POPs_Inc/proceedings/slovenia/neumeier2.html.

- Sample point AN-01 in the vicinity of the Plante's Ferry Centennial Trail footbridge at RM 185.
- Sample point AN-02 at "Boulder Beach", approximately RM 81.4.
- Sample point AM-03 in the Upriver Dam forebay, approximately RM 80.

Water samples collected at the three locations were analyzed for PCB congeners by "High Resolution Electron Capture Detector (ECD) Gas Chromatograph", now known as EPA Method 1668, at AXYS Laboratories, Victoria, BC. In addition, sampling was done with a Semi Permeable Membrane Device (SPMD) that remains in the water for an extended period (usually 30 days), accumulating PCBs into a fatty substance contained in the SPMD. The fatty substance content of the SPMD is then analyzed for PCBs. The SPMD PCB accumulation rate is calibrated against loss of a reference compound, which residue loss is proportional to the rate of uptake of PCBs, which is used to adjust SPMD-derived estimates of ambient concentrations to reflect site-specific environmental conditions of exposure.

Direct Water Sampling Results

The direct water sampling was performed in early September 2003 and in mid-December 2003. The sample times were designed to coincide with low river flow and median river flow. This appeared to be nominally successful. The flow was reported as approximately 500 cfs during the September sampling event and approximately 4,000 cfs in December, both measured at the Spokane Gage.

Results were corrected or qualified for presentation in the report. "Corrected" means that the result for each congener had the average of all blanks (e.g. travel blanks, laboratory blanks) subtracted. "Qualified" means that the result for each congener that was not at least five times the maximum value for the relevant blanks was considered "not detected" (referenced as EPA Region 10 guidance). Total PCBs under each procedure were calculated as the total of all congeners with positive values following the correction or qualification.

An EPA approved procedure was referenced as the source for determination of "Qualified" results. There was no procedure referenced for determination of "Corrected" results. Data indicates that the blank results, and range of results, sometimes, and perhaps frequently, exceeded the values from testing of the samples. This casts a question regarding interpretation of results of sampling and any conclusions when low levels of PCBs are present.

September sampling results showed an increase in total PCBs between Plante's Ferry and Boulder Beach, and minimal total PCB increase from Boulder Beach to Upriver Dam. The most striking increase was for Dichlorinated Biphenyls at shallow depth. Dichlorinated Biphenyl concentration was also higher in the Upriver Dam forebay than at the Centennial Trail footbridge. The RI Report asserted (executive summary (p. 2), discussion of water quality data summary (p. 31)) "the apparent increase in total PCB concentrations observed during September 2003 between Stations AN-01 and AN-02 is indicative of surface water releases of predominantly PCB-11 to the river system between Plante's Ferry and Boulder Beach." This assertion was repeated throughout the RI Report.

The RI Report states that previous sampling (e.g. June 2002, July 2002) indicated that PCB-11 is the highest concentration PCB congener in the effluent from IEP mill, which is between Station AN-01 and AN-02. PCB-11 is a Dichlorinated Biphenyl.

Using the "Blank Corrected" results the total PCBs increased from 60 to 75 picograms per liter (pg/L) at AN-01 (Plante's Ferry) to 80 pg/L (deep samples) to 180 pg/L (shallow sample) at AN-02 (Boulder Beach), and to 170 to 190 pg/L at AN-03 (Upriver Dam). Thermal stratification is used to justify the difference between deep and shallow sample at Boulder Beach, and the Dichlorinated Biphenyl concentration was notably higher in the shallow sample (80 pg/L vs. 10 to 20 pg/L). At Upriver Dam the Dichlorinated Biphenyl was higher in the shallow sample (80 pg/L) than in the deep sample (10 pg/L), but total was approximately the same, with the higher homologues (congeners with similar number of chlorine attachments) much higher (esp. Trichlorinated Biphenyls and Tetrachlorinated Biphenyls). Using the blank adjusted results, the total PCBs exceeded the National Toxics Rule Criterion 170 pg/L at Boulder Beach in the shallow sample, and for both the shallow and deep samples. Total PCBs using blank adjusted data at all locations and depths approached or exceeded the National (EPA) Recommended Water Quality Criterion 64 pg/L.

Using the "Blank Qualified" (apparent EPA approved protocol) results the total PCBs went from about 17 pg/L at Plante's Ferry to about the same concentration at Boulder Beach in the deep sample, but to about 120 pg/L in the Boulder Beach shallow sample. Again the Dichlorinated Biphenyl (including PCB-11) at 80 pg/L in the shallow Boulder Beach sample made up a large portion of the total for blank qualified data. Using the blank qualified adjustment of values at the Upriver Dam sample point Dichlorinated Biphenyl made up a substantial portion of the shallow total PCB concentration, about 80 pg/L of 110 pg/L. Blank qualified results in the deep sample at Upriver Dam showed the total PCB is to be approximately 100 pg/L, which is shown to be composed largely of Tetrachlorinated Biphenyls.

December water sample results indicated no measurable increase in PCBs between AN-01 and AN-02, or between AN-02 and AN-03. Blank Corrected totals were between 25 pg/L (at Boulder Beach) to 45 pg/L (at Plante's Ferry). Concentrations were 40 pg/L at the Upriver Dam forebay. Blank Qualified results also indicated no increase, and total PCB concentrations were shown as 30 pg/L at Plante's Ferry, 18 pg/L at Boulder Beach, and 23 pg/L at Upriver Dam.

It is notable that the results, presented after adjustment according to the "blank adjusted" method indicated that there is a pronounced increase in PCBs and apparent violation of current water quality standards. Using the EPA approved blank qualified date there may have been a water quality violation, but the violation was for total PCBs including dichloro-biphenyls. These compounds are not included in "poly chlorinated biphenyl" total in some regulations for this class of compounds (e.g. Germany).

SPMD Water Quality Results

The water quality monitoring results were obtained from Semi Permeable Membrane Device sampling during 30-day submersion periods in August 2003 and December 2003. The SPMDs were suspended about 1.0 meter above the bottom during the sampling period. This apparently

resulted in sampling from below the thermocline during the stratified reservoir conditions in August. Again the results of the testing were presented as "Blank Corrected" and as "Blank Qualified" values.

Blank Corrected total PCBs from the SPMD data for August showed about 55 pg/L at both Plante's Ferry (AN-01) and Boulder Beach (AN-02) sampling locations, with predominant homologues trichlorinated and tetrachlorinated biphenyls, and noticeable contribution from pentachlorinated biphenyl. At Upriver Dam the total PCB concentration using blank adjustment of results was shown as about 115 pg/L. The trichlorinated, tetrachlorinated, and pentachlorinated biphenyl homologues made predominate contributors to the total. The total PCB concentration was below the National Toxics Rule Criterion 170 pg/L. Only the total PCB concentration at Upriver Dam was above the National (EPA) Recommended Water Quality Criterion 64 pg/L.

The Blank Corrected December SPMD data showed total PCB concentration at all three sampling locations below the National Recommended Water Quality Criterion 64 pg/L.

Blank Qualified SPMD data results for August showed that total PCBs are below 30 pg/L at both Plante's Ferry and Boulder Beach locations, but over 80 pg/L at the Upriver Dam forebay location, and consists of mostly Tetrachlorinated and Pentachlorinated Biphenyls.

Blank Qualified SPMD data for December show Total PCBs at 1 pg/L or less at all three sampling locations.

Discussion of Water Quality Results

The draft RI discussion appears to focus on the reported increase in total PCBs in surface depths between AN-01 (Plante's Ferry) and AN-02 (Boulder Beach), which "was attributable to a single dichlorobiphenyl congener (PCB-11)". Discussion does go on to say that "increases in bottom water concentrations of certain PCB homologue groups (e.g. tetrachlorobiphenyls) near the Dam Forebay were potentially attributable to sediment-associated releases from deposits near the dam (primarily between RM 80.1 and 80.6), though uncertainties associated with low-level PCB analyses and the degree of water column stratification and mixing in this area precluded more definitive source and mass balance analyses." The document again says, in the same discussion section, "Based on the available data, the apparent increase in total PCB concentrations observed during September 2003 between Stations AN-01 and AN-02 is indicative of surface water releases of predominantly PCB-11 to the river system between Plante's Ferry and Boulder Beach." Further it adds "Increases in surface water PCB concentrations in the site area, relative to more upstream sampling locations, were attributable at least in part to specific congeners (especially PCB 11 apparently from treated wastewater discharged from the Inland Empire Paper Company outfall."

This RI discussion appears to overemphasize the impact of alleged PCBs that may have been discharged at IEP, and the correlation is made in spite of the IEP PCB discharge was a year earlier than the RI sampling studies. The data collected using the SPMD technique seems to indicate that the discharge from IEP may have been inconsequential compared to sediment

released PCB homologues between Boulder Beach and Upriver Dam, even though the correlation between Upriver Dam water sample PCB content with the sediments is qualified due to uncertainties.

An unjustified aspect of the water quality results presentation and its discussion is the use of "Blank Adjusted" results. There is no explanation of the decision to use of the "Alternative" method in the report, as opposed to use of only the "Blank Qualified" results, for which there is EPA guidance.

Ground Water Test Results

Ground water was sampled in wells in the vicinity of Upriver Dam. The surface water elevation in the Upriver Dam pool is higher that the ground water level in the vicinity, indicating that river water exfiltrates to the groundwater in this area. The samples were collected in May and September 2003. The RI Report indicated that all May concentrations were below the minimum blank concentration except one duplicate, which was below the blank average. September data indicated that monitoring well total PCB concentrations were from 100 to 120 pg/L, approximately the same as the river water concentration at that time. Total PCB concentration in a City of Spokane supply well (Electric Well) was less than 20 pg/L. Drinking water standards Maximum Contaminant Level (MCL) is 500,000 pg/L (0.5 mg/L).

The discussion did not indicate the generally accepted groundwater flow in the area, which results in percolation to groundwater upstream of the dam and discharge from the groundwater (Spokane-Rathdrum Aquifer) to the river downstream of the dam. The indicated groundwater PCB content would enter the river. In addition water percolating through the sediments containing PCBs would reenter the river downstream of the dam, or enter the aquifer flow northward for discharge to the Little Spokane River.

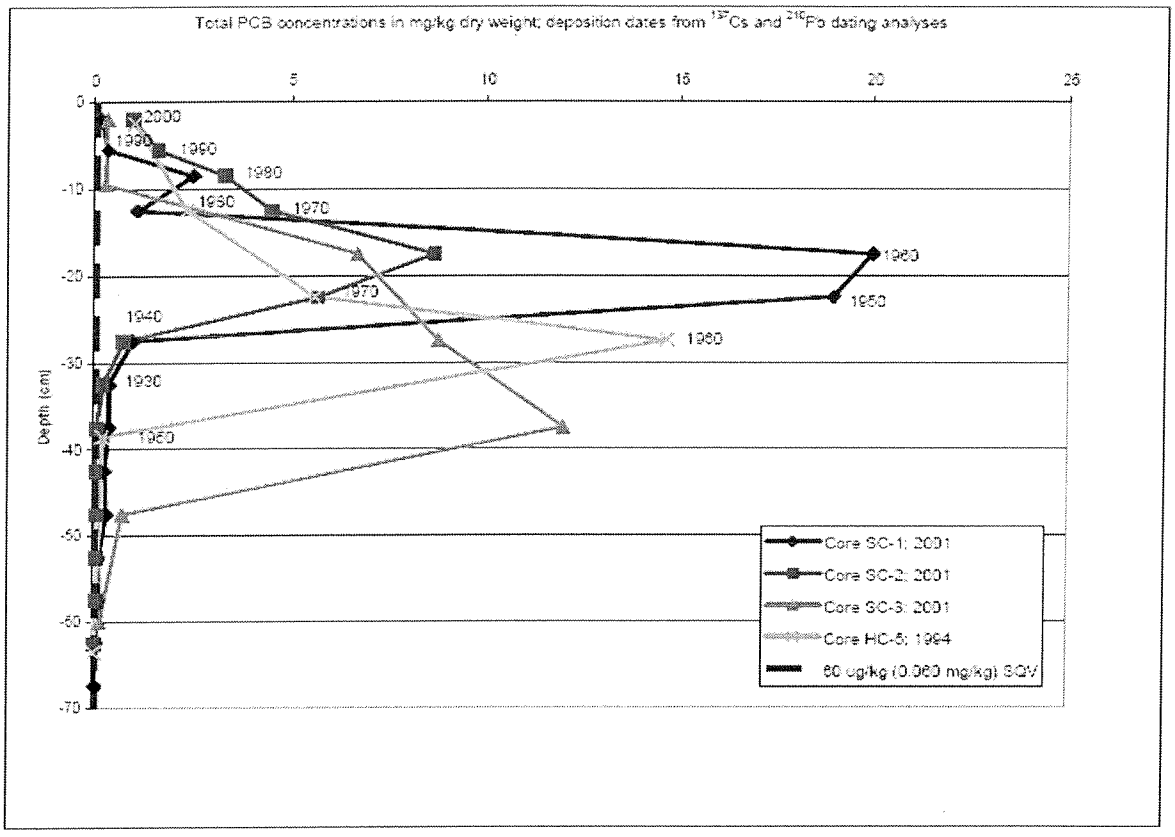
Sediment Testing Results

Testing of sediment core samples from the PCB contaminated sediment deposit just upstream of Upriver Dam was performed on samples according to depth below the sediment surface. As described, "The coring data was consistent between sampling stations located within the deposit, and defined a pronounced vertical profile of PCB concentrations within the sediments (Figure 27). Sediment total PCB concentrations peaked at depths approximately 20 cm (8 inches) below the sediment surface, and decreased steadily in shallower intervals".

Figure 27 (reproduced below) indicates that PCB concentrations are much lower within 10 cm of the sediment surface than below approximately 15 cm. An attempt was made in the RI to date the sediment levels, which is shown on the figure. Sediment accumulation rates have been 0.4 to 1.0 cm/year. It appears that the high PCB concentrations in the sediment preceded 1980. PCBs were banned in 1978, and the discussion indicates that decrease in PCB in sediment profiles analogous to that shown on the figure are common at various locations in the US.

Since IEP did not initiate processing of Old Newspapers, potentially the source of PCBs in the IEP wastewater, until 1991, it appears very unlikely that IEP has contributed to any of the

accumulation of PCBs in the sediments behind Upriver Dam that have resulted in its designation of a site in need of remediation.



ANCHOR ENVIRONMENTAL, L.L.C.

Figure 27
Depth Profiles of PCB Concentrations in Sediments Above Upriver Dam
Upriver Dam Spokane, WA

Wood Waste Products

Sediment sampling determined that wood waste products are present in the Site 1 area of high PCB sediment concentrations (just upstream of Upriver Dam). Wood waste is organic and PCBs are hydrophobic (water hating) chemicals that preferentially are attracted to organics. This may be a partial cause of the PCB accumulation and retention in the sediments at this location. The text implies (p. 47) that this is the result of "wood fibers", and IEP is the only named potential source of wood waste (p. 12), even though numerous wood processing installations have been and are located adjacent to the Spokane River in Idaho. One mill is currently still in operation. In the past log flotation on Coeur d'Alene Lake was a common practice to deliver logs to the two large mills in Coeur d'Alene and the large mill in Post Falls. It is likely that the other mills are larger potential historical sources of wood waste than IEP. A considerable amount of wood debris, old piles and logs still clutters the Coeur d'Alene outlet area and the Spokane River above Post Falls Dam.

Cleanup Alternatives

Alternatives for cleanup of the contaminated sediment locations were discussed, as was the potential cleanup level appropriate. This information is normally a part of an RI, but us used primarily for screening alternatives for further development in the Feasibility Study (FS).

PCBs Contained in IEP Wastewater Effluent

Sampling of the effluent from the Inland Empire Paper Co. processing wastewater treatment system was performed in 2002 for testing by EPA Method 1668. PCB Congeners detected in the effluent included PCB-11, PCB-18, PCB-22, PCB-28, PCB-31, PCB-44, PCB-66, PCB-70, and PCB-110. Approximately 50% was typically PCB-11, a dichloro-biphenyl.[12]

The RI finds increase in dichloro-biphenyl PCBs in the river stretch between Plante's Ferry and Boulder Beach sampling locations. The RI Report correlates PCB concentrations in shallow water samples at Boulder Beach with presumed PCBs in the IEP outfall, based on the IEP outfall content a year earlier.

For reference:

- The total PCB content of the IEP effluent, as measured in 2002 was 2,500 to 4,500 pg/L, without Blank Adjustment or Blank Qualification.
- The effluent flow averaged about 4.5 million gallons per day (MGD).
- The calculated total PCB in the effluent, without Blank Adjustment or Blank Qualification, is approximately 0.04 to 0.06 grams per day or 15.5 to 28 grams per year. This calculates to 0.034 to 0.062 pounds per year.
- For comparison, it has been reported[13] that 143 pounds of PCBs was released to the Spokane River from November 2002 to January 2003 from one point source upstream of IEP.
- Also for comparison, calculation of the total amount of PCBs in the 13,600 cubic yards of sediment deposit upstream of Upriver Dam, at a presumed average concentration of 5 mg/kg dw (see RI Figure 27 reproduced above) results in a value of about 77 kg or 170 pounds.
- It is calculated that it would take 2,300 to 4,200 years for IEP to discharge the quantity of PCBs reportedly released in 3 months from the other source (based on un-adjusted and unqualified values for IEP PCBs).
- It is calculated that it would take from 2,700 to 5,000 years for the discharge from IEP to accumulate the amount of PCBs contained in the contaminated sediment at Upriver Dam (based on unadjusted and unqualified values for IEP PCBs).
- River flow ratio at Upriver Dam has been estimated relative to flow at the Spokane Gage.[14,15,16] At a flow of 500 cfs at the Spokane Gage, it is expected that flow at Upriver

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12 Ibid. No. 6.

13 Spokesman Review, March 23,2005.

14 Esvelt, Mark, Memorandum: Spokane River low flows in the vicinity of Inland Empire Paper Co. Discharge, June 9, 1997.

15 Esvelt, Mark H., Engineering Report: Water Quality-Based BOD_5 Restrictions on Treated Process Wastewater from Inland Empire Paper Company, Esvelt Environmental Engineering, June 30, 1999.

16 Unpublished Data: Flow at Upriver Dam compared to flow at Spokane Gage, 2001-2002.

Dam is approximately 150 cfs, and at Inland Empire Paper Co. outfall approximately 400 cfs. At 400 cfs river flow and 4.5 MGD effluent flow, the diluted total PCB concentration (without adjustment or qualification of the IEP effluent PCB concentration) would be 43 to 77 pg/L. Total PCB measured at Plante's Ferry was about 20 pg/L, which increased to about 120 pg/L at Boulder Beach at shallow depth measurements. This increase is conceivable, although the IEP effluent measurements were from summer 2002.

Conclusions from Review of RI Report

Following review of the RI Report it is concluded that:

- It is extremely unlikely that Inland Empire Paper Co. contributed to the PCB accumulation in sediments upstream of Upriver Dam, since nearly all of the accumulated PCBs are in sediments 10 cm or more below the surface, believed to have been deposited before 1990.
- The RI Report asserts at several locations that the PCB concentration at Boulder Beach is associated with the IEP outfall, while offering extensive qualifications regarding a similar conclusion regarding the PCB concentration at Upriver Dam being associated with the known PCB contaminated sediments. The evidence is equally compelling, and both are based on correlations with unknown factors
- It is unlikely that Inland Empire Paper Co. contributed more than a fraction of the wood waste that is incorporated in the sediment deposit where the PCBs are accumulated.
- Current, short term, concentrations of PCBs in the Spokane River surface water may be a result of wastewater discharged from Inland Empire Paper Co. newsprint mill, where Old Newspaper processing began in 1991. It now appears that PCBs may be present in some inks, in spite of PCB manufacturing and distribution halting in 1978, and the inks being considered PCB free. PCB content may be up to 25 mg/kg in some inks, according to unverified information. The Congeners of PCB noted to increase downstream of Plante's Ferry appear to be those known to be in the IEP effluent from earlier sampling.
- It is unclear why the "Blank Adjustment" method for considering significance of PCB contamination is used. It is referenced as "Alternative" to the EPA approved "Blank Qualification" method.
- Discharge from IEP would take 2,300 to 4,200 years to accumulate the amount of PCBs that was discharged in a 3-month period in 2002-2003 from a single upstream source.
- Discharge from IEP would take 2,700 to 5,000 years to accumulate the amount of PCBs that is estimated to be contained in the sediment deposit upstream of Upriver Dam.

DRAFT FOCUSED FEASIBILITY STUDY REPORT

The Draft Focused Feasibility Study Report for remediation of PCB contaminated sediments in the Spokane River upstream of Upriver Dam (FS) is based on and extrapolates on the findings presented in the Remedial Investigation (RI).

Focused Feasibility Study Overview

The overall FS evaluation is intended to provide sufficient data and engineering analysis to enable Ecology to select a cleanup action that is protective of human health and the environment.

The Focused FS considered four interrelated remedial action objectives for the Upriver Dam Site, which are stated to be consistent with a conceptual site model developed with Ecology and EPA regulatory guidance.

1. Control of benthic biota exposure to PCB-contaminated sediments located within the biologically active sediment zone (defined as 0 to 10 cm below mudline).
2. Minimization of benthic biota exposure to PCB-contaminated subsurface sediments (i.e., located more than 10 cm below mudline), considering sediment stability under potential future conditions.
3. Reduction of potential remobilization of PCB-contaminated sediments by hydraulic or other physical processes.
4. Reduction of potential transport (flux) of PCBs into the overlying water column.

Remedial action alternatives were developed to accomplish the objectives. The Model Toxics Control Act (MTCA) calls for cleanup levels to be at least as stringent as established state or federal standards or other laws (applicable or relevant and appropriate requirements, ARARs). A Sediment Quality Value (SQV) of 60 µg/kg dw PCB concentration was selected as the basis for remedial action. The National Toxics Rule ARAR for human health protection of 170 pg/L for surface water quality was quoted. In addition, the ambient water quality standard for protection of aquatic life from chronic PCB exposure, 14,000 pg/L, and the drinking water maximum contaminant level, 500,000 pg/L were listed, both being less stringent than the bioaccumulation-based cleanup level. Since EPA has suggested that the bioaccumulation-based standard for water quality be lowered to 64 pg/L, this value may be appropriate for use as a cleanup level.

Again, the low flow September 2003 PCB concentrations at Boulder Beach and at Upriver Dam, following EPA blank-qualification exceeding 64 pg/L was presented. Also again the now-apparently standard wording was inserted: "Increases in surface water PCB concentrations in the site area, relative to more upstream sampling location, were likely attributable at least in part, to specific congeners (especially PCB-11) apparently associated with treated waste water from Inland Empire Paper Company outfall. In addition, increases in bottom water concentrations of certain PCB homologue groups near the dam forebay were potentially attributable to sediment-associated releases from deposits near the dam (primarily between RM 80.1 and 80.6), though uncertainties associated with low-level PCB analyses and the degree of water column stratification and mixing in this area precluded more definitive source and mass balance analyses."

Concerns with the wording cited in the previous paragraph were discussed above in the review discussion of the RI, where potentially unwarranted emphasis is placed on the potential for discharges from IEP on water quality, where the potential for affecting the sediments, which are the concern of these documents (RI, FS, CAP), is miniscule.

Range of remediation alternatives include:

- Natural recovery – allow continued sedimentation to continue to cap existing sediments containing contamination with lower concentration material.
- Enhanced natural recovery – cover sediments with thin layer of capping, then allow natural sedimentation to continue to cover contaminated material.

- Capping – place cap material over existing contaminated sediments. There are subsets of this alternative with respect to the type of material used for the capping, from sand to coal and sand, at various thicknesses.
- Dredge removal of material and off-site disposal – disposal would be to a regional facility suitable for receiving contaminated material (e.g. Roosevelt Regional landfill).

The effectiveness and opinion of cost for each of the alternatives is presented for use by Ecology to select the preferred alternative for inclusion in the Cleanup Action Plan (CAP). The FS recommended the following:

- Site 1, Upriver Dam – Capping with 6 inches of crushed coal overlain with sand and a gravel armor was recommended for this site.
- Site 2, Donkey Island – Dredge removal of contaminated material for disposal at the Roosevelt Landfill was recommended for this site.

It appears that Inland Empire Paper Co. would have no potential for participation in the cleanup alternatives, due to lack of information that they contributed to the accumulation of PCBs in the sediments of concern.

DRAFT CLEANUP ACTION PLAN

The Draft Cleanup Action Plan[17] (DCAP) was prepared by the Washington Department of Ecology. It was prepared using the information provided in the Remedial Investigation (RI) and Feasibility Study (FS) for the site, discussed above, both of which were prepared by Anchor Environmental LLC.

This document cited data and discussions contained in the RI and FS documents. It reiterated the presentation of river water PCB concentrations, which included reference to the increase in dichlorinated biphenyls between Plante's Ferry and Boulder Beach, and attributing the increase to IEP discharge. It also reiterated that increases between Boulder Beach and Upriver Dam were found, and attributed the increase to homologues of PCB apparently released from sediments.

The Semi Permeable Membrane Device (SPMD) data is also referenced, and attributes increases in PCBs between Plante's Ferry and Upriver Dam to a combination of locally treated wastewater releases of PCB-11 between Plante's Ferry and Boulder Beach, and releases of dissolved PCBs from the sediment deposits behind the Upriver Dam. They indicate that the SPMD data corroborate direct water monitoring data that PCBs were below the current 170 pg/L water quality standard, but above the National Recommended Criterion of 64 pg/L under the low flow conditions sampled. The discussion indicates that the SPMD results showed:

- A common shift in predominant dissolved PCB congener homologue groups or individual congeners between Boulder Beach and Upriver Dam.
- An apparent increase in dissolved PCB concentrations at depth near Boulder Beach, likely due to a combination of wastewater sources and potential sediment releases.

[17] Draft Cleanup Action Plan, Spokane River Upriver Dam PCB Site, Spokane, WA, Washington State Department of Ecology, Toxics Cleanup Program, Eastern Regional Office, Spokane, WA, March 2005.

The assertions that there was an increase in PCBs between Plante's Ferry and Boulder Beach according to the SPMD testing do not appear to be supported by data presented in the RI Report. Neither does the statement regarding increase in PCB concentrations at depth near Boulder Beach appear to be supported by data presented in the RI Report.

Following discussion of the extent of deposits containing unacceptable PCB contamination and environmental and human health implications, the DCAP reiterates the cleanup objectives expressed in the FS Report. After discussion of the alternative evaluated in the FS Report, the DCAP accepts the recommended actions from the FS Report for implementation. These actions will be presented to the public for review before adoption.

CONCLUSION

It is concluded that:

- Contribution of Inland Empire Paper (IEP) to accumulation of PCBs in sediments in the Spokane River upstream of Upriver Dam was minimal to non-existent.
- Inland Empire Paper Company (IEP) treated processing wastewater discharges may contribute to PCB concentrations in the Spokane River downstream of the effluent outfall.
- Contribution by IEP is extremely low when compared to other known discharges or the amount of PCBs in the sediment. It was calculated take over 2,000 years of discharges from IEP at the present rate to equal either a known release of PCBs by another discharger between November 2002 and January 2003, or the quantity of PCBs in the sediment deposit upstream of Upriver Dam.
- However, it is also observed that the recommended cleanup alternative, while providing very conservative protection from PCBs entering the Spokane River food chain upstream of Upriver Dam, it does not appear to improve protection from PCBs entering the ground water that then emerges into surface waters downstream of Upriver Dam.

Phone 509.838.4912 *Fax* 509.838.5155 *Email* tlc@landscouncil.org *Website* www.landscouncil.org

423 W. First Ave., Suite 240
Spokane, WA 99201

May 6, 2005

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

Dear Mr. Roland,

The Lands Council (TLC) is a non-profit conservation organization dedicated to protecting the woods, wildlife and waters of the Inland Northwest. We thank you for extending this comment period so that we can submit the following comments on behalf of our over 1200 members 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 these comments, I have attached a reference document that TLC wishes to put into the official comment record. Please see "Draft Cleanup Action Plan, Spokane River Upriver Dam Site" by Peter deFur, PhD, an expert in environmental health and ecological risk assessment. TLC and The Upper Columbia Group of the Sierra Club retained Dr. deFur to analyze the above documents and assess the adequacy of the proposed cleanup plan. Most of these comments are derived from his reading of the DCAP and further study of the above draft documents.

Based on Dr. deFur's analysis, the cleanup alternative for Deposit 2 (Donkey Island) of removal of PCBs by dredging is appropriate because it removes the contaminants for the long term. We encourage Ecology to pursue this selected cleanup action.

We are concerned, however, about the selected cleanup alternative for Deposit 1: the integrated cleanup remedy that blends a number of remedial technologies including in-situ treatment, off-site disposal, in-situ engineered containment, and compliance monitoring (Alternative 3D). In his report, Dr. deFur raises many questions about the adequacy of in-situ capping to safely isolate the PCBs well into the future because of variable groundwater/surface water interchange, the possibility of dam removal, and/or 100 year flood events.

TLC agrees with the Sierra Club[1] that the RI/FS fails to provide enough information about in-situ capping at Deposit 1 to enable decision-makers and the public to analyze all the alternatives and make an educated decision. At this juncture, based on this need for further study (or inclusion of additional information), TLC finds the selected cleanup action for Deposit 1 unacceptable.

Groundwater

The Lands Council wants the cleanup of PCBs behind Upriver Dam to be as protective as possible. We want to ensure the cleanup will remove PCBs from re-entering the surface water and groundwater. One of the major concerns raised by Dr. deFur about the selected cleanup action for Deposit 1 is that in-situ capping may not provide adequate protection of the groundwater near the dam, which is fed by the river. Although data collected of PCB amounts in wells near the Spokane River shows concentrations to be well below MTCA limits (DCAP, pages 9-10), capping will not stop the release of PCBs into the Spokane and, thus, the groundwater. According to guidance on in-situ capping, contaminants may flow through the cap and into the river even when there is no groundwater flow at the site due to the compression of pore water from the weight of the cap.[2]

During low flows, there is some evidence that groundwater from the aquifer actually recharges the river.[3] EPA disapproves of capping where there is a high rate of groundwater interchange.[4] In order to ensure that our drinking water is protected, The Lands Council recommends additional study into the hydrogeology of this potential cleanup site, especially additional tests of wells adjacent to the River during low flow periods. In order to determine the most protective cleanup, we need additional investigation to understand groundwater flow patterns above and below Upriver Dam.

Ongoing PCB Releases/TMDLs

The DCAP does not consider the other regulatory actions that are currently in place or being considered for the Spokane River, most particularly the TMDL for PCBs and the TMDL for heavy metals. The RI notes that groundwater is discharged downstream of the dam, releasing the PCB contaminated groundwater back into the river. (See discussion of groundwater/river interchange above). The continued release of PCBs will make it very difficult to meet goals of a TMDL for PCBs.

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[1] Sierra Club comments on Upriver Dam PCB Site Clean-up (May 2005).
[2] EPA Guidance for In-Situ Subaqueous Capping of Contaminated Sediments (Palermo, 1998).
[3] Washington State Department of Ecology, 2001. "Spokane River/Aquifer Interaction Project Results, May-November 1999." Publication No. 01-03024.
[4] Palermo, 1998.

EPA guidance states that capping is appropriate if "point source discharges have been halted"[5]. We know that PCBs are still being released upstream of Upriver Dam. We should not assume that the TMDL will be in place by the time cleanup begins on Deposit 1. It is irresponsible to choose a remedial action now without a final decision on a TMDL. Capping the site in the next one to two years will be a waste of taxpayer dollars if then there are additional PCBs and sedimentation coming downstream that will not meet standards.

Also, there will be a TMDL for heavy metals in the Spokane River. The draft documents do not look at the effectiveness of the selected cleanup action for cleanup up or isolating heavy metals in sediments. It would also be highly irresponsible to proceed with capping if USEPA determines that dredging is the appropriate remedy for cleaning up heavy metals at this same site.

Dam Failure/Flooding

Dam failure and/or removal are not addressed by the DCAP as required by EPA capping guidance[6]. Because in-situ caps do not last forever, we must look at future possible conditions, such as removal of Upriver Dam or some other catastrophic failure. If these conditions occurred, the cap would not be effective. Also, severe flood events could alter the river and could cause failure of the cap in any number of ways. The FS looks at various scenarios, but not at how the cap's integrity would hold if such an event were to occur.

Natural Resource and Ecological Receptors

Another purpose of the RI/FS was to determine the impact of PCBs on ecological receptors, including wildlife. The only wildlife addressed within the documents are fish and benthic invertebrates. No risk assessments were performed, and there is no mention of endangered species, piscivorous birds, or aquatic mammals such as mink and otter. Risks to these creatures should be evaluated because of these organisms' susceptibility to PCB and related compounds.

Conclusion

Based on our read of the draft documents and the expert advice of Dr. deFur, The Lands Council agrees that the most effective and permanent solution to remove and treat PCB contamination at the Upriver Dam is to remove the sediments containing the contamination, NOT do a combination of in-situ capping and containment at Deposit 1. According to EPA guidance, short-term risks of dredging the contaminated sediments would be comparable to those of capping.[7]

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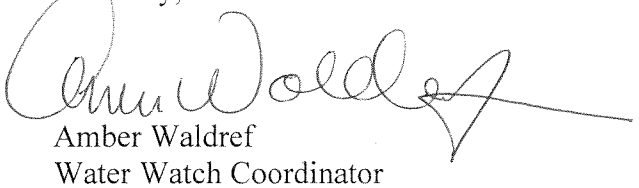
[5] Palermo, 1998.
[6] Palermo, 1998.
[7] Palermo, 1998.

While we understand that the Kaiser Bankruptcy is taking place within certain limits and a short timeframe, implementing capping of Deposit 1 would be, in the long run, a quick fix and not the best option due to its inability to protect groundwater, protect from future catastrophic events, or stand up against the possibility of dam removal. The Lands Council is worried that the studies and alternatives provided in the RI/FS and DCAP have been done without coordination with other ongoing processes. Capping should not be the selected alternative with the current lack of source control (connected to the lack of PCB TMDL) or without knowing what remediation USEPA will choose for heavy metals behind Upriver Dam.

We, as Ecology, want a cleanup that will withstand the long haul. With the information provided in the draft documents, however, it seems clear that additional data must be collected to prove that in-situ capping is the most protective cleanup option. Even if it takes additional time or money, we fell it is extremely important to make a cleanup decision that will be right the first time.

The Lands Council appreciates the opportunity to comment on the proposed PCB cleanup plan and would welcome a future meeting to discuss the concerns outlined in this comment letter.

Sincerely,



Amber Waldref
Water Watch Coordinator
The Lands Council

Sent by email and mail.
Cc: Bonne Beavers, Attorney for the Upper Columbia Group of the Sierra Club

CITY C. SPOKANE ENVIRONMENTAL PR. RAMS
Dave Mandyke, Deputy Director Public Works & Utilities
Lloyd Brewer, Environmental Programs Manager

6 May 2005

Mr. John Roland
WA Dept. of Ecology
4601 N. Monroe
Spokane, WA 99205-1295

RE: Comments on the Upriver Dam PCB Sediments Site documents

Dear Mr. Roland:

Thank you for this opportunity to provide comment on your cleanup plans for the Upriver impoundment. I appreciate the effort that has been made to date in working with the City regarding this cleanup action. We also appreciate the effort that has been made to date in attempting to identify the areas of concern and an appropriate cleanup plan.

General Comment
I know this action is being taken by Ecology and two of the potentially liable parties in mutual agreement and without any admission of wrong doing regarding the discharge of PCB's. What are a little troubling to me in both the RI and FS are the emphasis on Upriver Dam history, operation, and impoundment contamination with no recognition of the major roles weather, the Post Falls Dam, and Lake Coeur d'Alene have on Upriver flows and transport; and then a very generalized discussion of sources with a total lack of specifics.

Draft Remedial Investigation
1) Exec Summary; pg. 2; par. 2: Boulder Beach at RM 82 –where is this mapped? You could point out figure D-1 in the RI.

2) Exec Summary; pg. 2; par. 3; PCB 11 associated with Inland Empire Paper Co. treated wastewater – As this is discharged to an area known to charge the aquifer and in the vicinity of a large drinking water production well, what can reasonable be done to limit the PCB 11 discharge?

3) Introduction; pg 4; par 2; last sentence: Says prior investigation found PCBs in the Upper Spokane River only behind Upriver Dam – Do you mean to say that no PCBs have been found in the upper river associated with the original discharge points? All upstream PCB detections in water (groundwater, surface water, and discharged water), sediment, and surface soils should be identified. The points of discharge to the river from all identified potentially liable parties should be mapped and displayed in this section.

4) Introduction; pg 5; par 1; last sentence: and
Section 2.2.2; pg 12; last sentence: Notes Coeur d'Alene RI/FS found 17 acres of the Upriver dam impoundment contaminated with heavy metals. Where is this mapped in this report to show how the metal contamination relates to the PCB cleanup areas?

5) Section 4.1; pg 15; 1st sentence: Why was the bathymetric survey and sediment classification limited to the two sub reaches within the impoundment? Couldn't one argue that since the impoundment was not fully surveyed areas of contamination may have been overlooked?

6) Section 5.2.6; pg 24; 1st sentence: "levels were low enough" should be high enough

Draft Feasibility Study
1) pg. 1; Section 1.1; 1st bullet; 2nd to last sentence: "...and alternative blank adjustment method indicates that concentrations were greater than 170 micrograms/liter" - A reference back to the appropriate part of the RI would be good here.

2) pg 10; 1st Para: Due to the proximity of this site to two major City drinking water wells, we support using the more conservative cleanup figure of 64 pg/L.

3) pg 41; 2nd full Para: I appreciate the flagging of the potential for contaminants to be brought in with the coal. With the proximate wells the coal detailed specification will be important and should be appropriately conservative to prevent groundwater impacts.

4) pg 48; 1st para. Chemical immobilization as discussed here would be limited to the time that the coal in an aquatic environment persisted. What is the half-life of coal in this aquatic environment? What is this quantity of coal's projected impact on reservoir dissolved oxygen levels?

Draft Cleanup Action Plan
1) I support the cleanup actions proposed to be taken. In particular assuming the answer to comment 4 above is that the coal to be used will not impact reservoir DO and will persist for a very long time, I like the idea of having a coal sink which will further limit the migration of existing PCB contaminants.

Thanks again for this opportunity.

Sincerely Yours,

Lloyd R. Brewer

2nd Floor City Hall; 808 W. Spokane Falls Blvd.; Spokane, WA 99201-3334; (509)-625-6570; FAX 625-6274

Roland, John L.

From: Bergin, Carol
Sent: Wednesday, April 27, 2005 4:03 PM
To: Roland, John L.; Sternberg, David
Subject: Comment for Responsiveness Summary

Yes, I was responding to the Forum on the upriver dam. I just wish the EPA would do more to evaluate the kids in the region, especially the ones with learning disabilities.

Thank you

Jenny

Jenny,

Thank you for your e-mail and important comments. Could you please clarify if you are you responding to Ecology's formal public comment period on documents about cleaning up PCBs behind Upriver Dam? I want to make sure that we include your comments and get a formal response back to you from the project manager if that is the case.

Also, I will forward a copy of your comments to EPA so they may have the feedback for their work on cleaning up heavy metals in the Spokane River.

-----Original Message-----

From: Jenny Greenwood [mailto:greenwoodj@evsd.org]

Sent: Friday, April 22, 2005 10:45 AM

To: Bergin, Carol

Cc: Jenny Greenwood

Subject: PCB

The tragic issue we are not facing is an explosion of disabled and behavioral kids in the East Valley School District (in the area of contamination). There has been many studies linking neurological

problems in developing children with PCB and heavy metal exposure. For

the EPA not to be working directly with the school district to identify problems in children is outrageous.

Our children are our future. Not only have we poisoned our environment, but our children as well. Don't ignore this urgent problem.

Jenny Greenwood

Carol Bergin, Public Involvement
Toxics Cleanup Program
4601 N. Monroe
Spokane, WA 99205-1295
Phone: 509-329-3546
Fax: 509-329-3572
e-mail: cabe461@ecy.wa.gov

SIT 7.12.1

Roland, John L.

From: Bob Darilek [rmdarilek@asisna.com]
Sent: Thursday, April 07, 2005 6:59 PM
To: Roland, John L.
Subject: Re: Upriver Dam Meeting

Actually, the comments were from me, not my husband...our e-mail must just identify him exclusively! I will anticipate hearing back from you. Thanks! Marilyn Darilek

----- Original Message -----
From: Roland, John L.
To: 'Bob Darilek'
Sent: Wednesday, April 06, 2005 10:02 AM
Subject: RE: Upriver Dam Meeting

Mr. Darilek - I have received your comments. Thank you. At the close of our comment period we will provide responses and answers to yours and other comments/enquiries received.

Sincerely,
John Roland

-----Original Message-----
From: Bob Darilek [mailto:rmdarilek@asisna.com]
Sent: Tuesday, April 05, 2005 10:15 PM
To: Roland, John L.
Subject: Upriver Dam Meeting

I attended the meeting held at SCC last Monday evening. I was able to follow most of what was discussed but I must admit I am "just" a citizen with feeble scientific understanding of the complexities represented in these various water/river/aquifer quality & restoration issues. However, I do believe these issues to be very important and want to ask a few questions about the alternatives #'s 2-4 that involve covering over the invertebrate sediments (that 10cm. of living organisms like worms, crayfish, etc.). If that "living" layer is covered up by clay, sand, coal, gravel, etc. are those same living organisms reintroduced on top of the new layers of materials to help achieve a balanced river ecosystem? Or do those capped sections of the river become sterile to living bottom-dwelling organisms? Also, over time, would not more contaminated sediments flush onto the capped sections and what impact does flame retardant (PBTE's??) residue have on the mix of pollutants?

One piece of the presentation I found disturbing was during the question & answer period when a gal asked about Anchor, James Keithly's employer. He said most of Anchor's work is for Kaiser. I couldn't help but think of BNSF's favorite contracting company out of Kansas City that apparently does most of its "state of the art" construction. Scary parallel but not too far off the mark. In my opinion, it is appropriate that the chief polluters pay to clean up their mess. I think it is also appropriate for the taxpayers to insist that the government agencies charged with monitoring & negotiating these mitigations assure that the work is done well. Cost is certainly a factor, but public health and environmental integrity should trump fiscal bottom-lines.

Thanks for getting back to me with answers to my questions. The presentation was informative.

STATE OF WASHINGTON

Office of Archaeology and Historic Preservation

1063 S. Capitol Way, Suite 106 • Olympia, Washington 98501
(Mailing Address) PO Box 48343 • Olympia, Washington 98504-8343
(360) 586-3065 Fax Number (360) 586-3067

April 18, 2005

Mr. John Roland
Department of Ecology Eastern Regional Office
4601 North Monroe
Spokane, WA 99205-1295

Log: 032805-24-ECY
Property: Upriver Dam PCB Sediments Site Spokane River

Dear Mr. Roland:

We have reviewed the materials forwarded to our office for the proposed project referenced above. There are possibly as many as four recorded archaeological sites in the vicinity of Deposit 2 project area, and two in the vicinity of Deposit 1 project area. These sites could be impacted by proposed remediation activities. We recommend you conduct a professional archaeological survey of the project areas, including access roads, staging areas, excavation areas and fill areas prior to project commencement. We would like the opportunity to review this report. We also recommend consultation with the concerned tribes cultural committees and staff regarding cultural resource issues.

In addition, if federal funds or permits are involved Section 106 of the National Historic Preservation Act, as amended, and its implementing regulations, 36CFR800, must be followed. This is a separate process from SEPA and requires consultation with OAHP and the affected Tribes, as well as the identification of any historic properties and archaeological sites that could be adversely affected by the proposed project. It is usually initiated by the responsible federal agency. If you have any questions about the Section 106 process, please contact Dr. Rob Whitlam, State Archaeologist, at (360) 586-3080.

These comments are based on the information available at the time of this review and on behalf of the State Historic Preservation Officer. Should additional information become available, our assessment may be revised. Thank you for the opportunity to comment on this project and we look forward to receiving the survey report. Please note that as of July 1, 2005, OAHP will be requiring the use of OAHP Archaeology Site Forms for all archaeological survey projects. You can obtain a copy of the Archaeology Site form from our website at www.oahp.wa.gov. Also note that as of January 1, 2005, OAHP requires that all historic property inventory forms provided to our office be submitted in an electronic version using the Historic Property Inventory Database. If you have not registered for a copy of the database, please log onto our website and go to the Survey/Inventory page for more information and a registration form.

Sincerely,

Stephenie Kramer
Assistant State Archaeologist
(360) 586-3083
StephenieK@cted.wa.gov

cc: Randy Abrahamson
Camille Pleasants