ATTACHMENTS

Attachment B

SUMMARY OF DISPUTED COMMENTS
ARKEMA EE/CA WORKPLAN
(2-28-06)

No.	Comment submitted 11-01-05	Arkema Response 11-28	GOVERNMENT REPLY 12-29	ACCEPTED	OUTSTANDING	Government Position
D1	Because of the lack of sufficient data presentation, data evaluation, figures and CSM development in the EE/CA Work Plan (WP), EPA is not able to adequately evaluate the Field Sampling Plan (FSP). Therefore, before the next version of the FSP is submitted, Arkema must resolve Work Plan comments prior to completing a revised FSP.	Arkema agrees to resolve comments on the draft work plan before submitting a revised work plan (including FSP, QAPP, and HASP). See response to comment 2 below.	Response accepted pending review of revised work plan.	X		Resolved
D2	EPA considers the Summary of Previous Investigations inadequate. Arkema shall revise the summary of data needs in order to adequately assess: (1) the nature and extent of contamination; (2) the COIs that are known to exist at the site, including all contaminants from boundary to boundary; and (3) the mechanisms that move contaminants through the environment. Additional data for both upland and in-water conditions are needed to develop the CSM at a level that will allow for informed analysis and decision-making for this response action.	Arkema has proposed a revised data presentation and screening approach to address this and other EPA comments on the draft work plan (refer to memorandum dated November 30, 2005). Arkema is unclear what is meant by "the COIs that are known to exist at the site, including all contaminants from boundary to boundary."	Arkema shall respond and list contaminants, including but not necessarily limited to chromium, perchlorate, MCB, DDT, and refer to other comments regarding contaminants that are COPCs (i.e., Dioxin). Boundary in this context means property boundaries. Refer to EPA's 12/06/05 reply that requests further input from Arkema regarding the directed comments.		X	Refer to EPA Understanding 2-27-06
D3	Throughout the removal action data collection and analysis, EPA must be able to determine how the removal furthered remedial work that is part of the Harbor-wide RI/FS. Arkema is directed to collect data during the removal action that supports the harbor-wide RI/FS and its analysis of pre- and post-removal risks to human and ecological receptors.	Please clarify. Arkema agrees that post remedy sample collection activities will be an element of any removal action selected for the site. The post-remedy sampling will be documented in the Removal Action work plan. Arkema will share any data collected as part of the EE/CA process with the LWG Portland Harbor RI/FS.	This is a statement for Arkema's reference. The comment is clear as written. EPA may require certain data collection that is not limited only to "post-remedy sample collection activities."	1/25/06 Arkema accepts this directed change with the understanding that nay data collected by Arkema for this early action EE/CA can be used in the harbor wide RI/FS. Arkema will not be collecting data for the Harbor wide RI/FS.	X	EPA may require that Arkema collect data to fill specific data gaps/data needs for the RI/FS.
D4	The document does not adequately delineate the areal or vertical extent of contamination identified in the previous investigations. The EE/CA work plan should include a map for each COI showing extent and estimated thickness of each COI in sediment over the entire river area between thalweg and shoreline and the Arkema south and north property lines.	Refer to directed comment response 2.	See EPA reply to Arkema response to directed comment #2		X	Refer to EPA Understanding 2-27-06
D5	Based on information from the Portland Harbor Phase 2A sampling, the data presented in Appendix D of the draft Work Plan and the findings of the upland investigations being performed at the site by ERM and others, additional COIs need to be further investigated. At a minimum, Arkema shall add PCBs, chlorinated dioxins/furans, PAHs, hexachlorocyclohexane, and VOC to the list of COI. Other COI should be added as determined by Arkema through their continued review of background documents and existing data sets.	Refer to directed comment response 2.	See EPA reply to Arkema response to directed comment #2		X	Refer to EPA Understanding 2-27-07
D6	The Work Plan does not include sufficient information for EPA to evaluate potential releases from from Lots 1 and 2, or what the sediment quality is adjacent to Lots 1 and 2. Existing data shall be assessed and new data collected as necessary to ensure there is no significant contamination beyond the DDT area. Arkema shall include data from Lots 1 and 2 and show the distribution of data from upland and in water environs. Arkema shall also propose methods to complete data gaps identified for Lots 1 and 2.	With the proposed screening approach outlinled on Nov 30th, existing data will be further evaluated in the revised work plan. A few sediment cores will be collected off of Lots 1 and 2. The information on location and depth will be provided in the revised work plan.	EPA has reviewed and provided specific objections to the 11/30 proposal. References to a screening approach that was not accepted by EPA should be removed.		X	Refer to EPA Understanding 2-27-08
D7	Arkema shall provide a more comprehensive presentation of potential ARARs given the known circumstances at the site and likely removal action alternatives.	Arkema will include a broader list of ARARs and TBCs for the revised work plan.	Response accepted pending review of revised work plan.	X		**Resolved**
D8	Within the Work Plan, Arkema shall present a methodology that will be used or a set of criteria for how the RAA boundary will be delineated. Several criteria that may be used are, but are not be limited to: dredging restrictions generated from material stability, water depth, limiting factors on containment options; dredge methods; recontamination impacts; hydraulic containment alternatives; cost and schedule limitations; institutional controls; and technology limitations.	Arkema's November 30th proposed screening approach provides a revised data comparison, data evaluation, and data presentation approach that would be used to evaluate COIs for the site and define the RAA boundary. The criteria mentioned in this comment will also be reviewed in determining the RAA boundary and evaluated in selection of appropriate remedial alternatives and technologies within the RAA boundary.	See response to directed comment #6. As stated in the directed comment, methodology and criteria (other than contaminant concentrations) should be presented.		X	Refer to EPA Understanding 2-27-06
D9	Given the source control evaluation schedule proposed by Arkema in the September 28 meeting (no complete source control evaluation until post EECA), Arkema shall evaluate hydraulic control measures in the EECA for the plumes across the site (DDT, MCB, chromium, perchlorate). Please discuss the data gaps for this effort related to engineering analyses and controls.	Arkema will evaluate hydraulic control measures in the EE/CA and a revised source control schedule will be provided in the EE/CA work plan.	Response accepted pending review of revised work plan.	X		**Resolved**
D10	Arkema shall perform characterization activities that assess contaminant conditions at the entire site in order to determine the RAA boundaries for the EECA.	Refer to directed comment responses 2, 6, and 8.	See EPA reply to response to directed comments #2, 6, and 8		X	Refer to EPA Understanding 2-27-06
D11	Arkema shall include in the work plan the process to be used and the performance standards to be applied in evaluating upland source control effectiveness. Also the work plan needs to provide a schedule for when EPA will receive the upland source control evaluation effectiveness and recontamination potential.	Refer to directed comment response 9. Arkema will include text and an updated schedule in the EE/CA work plan to more fully describe the upland source control evaluation process.	Response accepted pending review of revised work plan.	X		**Resolved**
D12 (#16)	Additional surface water baseline data should be collected to establish existing values for all COCs. These will be useful in determining which alternative to select, and later to serve as a measure of baseline conditions pre-dredging, etc	12/2/05: Please clarify. We assume this a request for additional sampling of Willamette River surface water. Selected LWG Portland Harbor surface water sampling data will be included in the pooled data table summary and data dredging, etc screening. This request was made in a Category 1 comments as well (e.g., #256). Arkema knows of three surface water samples collected within the boundaries of the site as part of the Portland Harbor RI. Arkema is also proposing to collected surface water in support of water quality testing associated with dredging and capping alternatives (refer to Section 6 of the Draft Work Plan). Arkema has also collect stormwater samples as part of the stormwater source control evaluation. These data will also be used to evaluate baseline conditions prior to additional stormwater source control remedies. 1/25/06: Issues related to this Directed Change are currently part of the formal dispute filed by Arkema on January 5, 2006. Arkema will provide any additional briefing on this Directed Change to EPA by February 3, 2006.	Three samples from basically one location are inadequate. Arkema shall propose a comprehensive, site specific surface water sampling regime to establish baseline conditions; this is to include multiple locations during varying weather/flow conditions. This data will be used for cleanup alternative discussion as well as a baseline for short term impact discussion in the EE/CA and in the Biological Assessment during design. Stormwater is a separate issue.		X	
D13 (D3 and 215)	Throughout the removal action data collection and analysis, EPA must be able to determine how the removal furthered remedial work that is part of the Harbor-wide RI/FS. Arkema is directed to collect data during the removal action that supports the harbor-wide RI/FS and its analysis of pre- and post-removal risks to human and ecological receptors.	12/2/05: Please clarify. Arkema agrees that post remedy sample collection activities will be an element of any removal action selected for the site. The post-remedy sampling will be documented in the Removal Action work plan. Arkema will share any data collected as part of the EE/CA process with the LWG Portland Harbor RI/FS.	Response is adequate. Arkema is directed to collect samples in the RAWP to fill both early action and RI/FS data gaps for the RAA. EPA may request that additional samples beyond "post-remedy sampling" be completed.	1/25/06 Arkema accepts this directed change with the understanding that nay data collected by Arkema for this early action EE/CA can be used in the harbor wide RI/FS. Arkema will not be collecting data for the Harbor wide RI/FS.	X	EPA may require that Arkema collect data to fill specific data gaps/data needs for the RI/FS.

Attachment B

SUMMARY OF DISPUTED COMMENTS
ARKEMA EE/CA WORKPLAN
(2-28-06)

No.	Comment submitted 11-01-05	Arkema Response 11-28	GOVERNMENT REPLY 12-29	ACCEPTED	OUTSTANDING	Government Position
D14 (458)	Section 3.5.1 and 3.5.2 - For human health, the following values should be used for screening of groundwater, TZW, and surface water: (1) EPA's WQC and ODEQ WQC for fish consumption assuming consumption rates of both 17.5 and 175 grams per day and (2) EPA's MCLs and Region 9 tapwater PRGs. This includes the use of a tapwater PRG of 3.6 ug/l for perchlorate. For impacts to ecological receptors for screening of groundwater, TZW and surface water, the following values should be used: (1) EPA's and ODEQ's 2004 chronic WQC and Oak Ridge National Laboratory's Tier II SCVs. Language referring to principal threats should be deleted.	12/13/05: Arkema has proposed to EPA a revised screening approach which includes a comparison to the JSCS values listed in this comment (November 30th proposal). However, MCLs and tapwater PRGs assume a lifetime of drinking water ingestion exposure, which is not consistent with the AOC SOW.	Response not accepted--see EPA response to 11/30 Arkema proposal. MCLs are consistent with the SOW (see RAOs section). MCLs shall also be included as an ARAR. Tap water PRGs shall also be used in the screening process.		X	Refer to EPA Understanding 2-27-06
D15 (420)	Figure 4-4. The ammonium perchlorate plume in the Acid Plant Area should be shown on the figure. The riverward extent is uncertain and can be qualified with question marks.	12/13/05: Perchlorate in Acid Plant area groundwater did not exceed the groundwater concentration of 20 mg/L that was used as the definition of the perchlorate boundary. To provide additional information on upland groundwater plumes that are being addressed by IRMs, Arkema intends to include the revised upland RI report as an appendix to the EE/CA work plan. Narrative will be included in the EE/CA work plan to help locate appropriate information and figures in the upland RI report. 1/25/06: Issues related to this Directed Change are currently part of the formal dispute filed by Arkema on January 5, 2006. Arkema will provide any additional briefing on this Directed Change to EPA by February 3, 2006.	EPA does not agree in the use of 20 ppm as the perchlorate boundary. Depending on the presentation of the figures, additional revisions may be required. Arkema shall provide this data in a figure that shows isopleths of wherever perchlorate has been detected, including detections below 20 ppm.		X	Refer to EPA Understanding 2-27-06
D16 (32)	EPA does not agree that the DNAPL is immobile.	12/9/05: Several phases of the upland RI focused on investigation whether DNAPL is present and in a mobile form. There are numerous monitoring wells in the Acid Plant area screened in the DNAPL zone. DNPAPL has only been detected in one well for a short period of time after well installation. DNAPL has not been found in any of the other monitoring wells. No mobile DNAPL was identified. The EE/CA work plan text however states that the residual, immobile DNAPL is still contributing to the dissolved phase MCB plume. (on) What facts and/or data does EPA base their opinion that the DNAPL is mobile? 1/25/06: Arkema accepts this Directed Change.	Arkema shall include evidence in the revised work plan to demonstrate DNAPL is immobile.	Arkema accepts 1/25/06.		Resolved
D17 (47)	Page 4-8: It is stated that Dockside worker ingestion of groundwater is considered negligible. This pathway should be evaluated for future workers given the hexavalent chromium and perchlorate groundwater plumes on the site. Please provide further discussion as to why the ingestion of groundwater pathway is not addressed.	12/13/05: See response to comment 458. 1/25/06: Issues related to this Directed Change are currently part of the dispute filed by Arkema on January 5, 2006. Arkema will provide any additional briefing on this Directed Change to EPA by February 3, 2006.	Response not accepted. Dockside worker ingestion shall be considered and assessed by comparison to MCLs and tap water PRGs. See EPA reply to comment #458.		X	
D18 (144)	Sampling Strategy. Having the perchlorate sampling as part of the sediment cores, but not necessarily as part of ground water may present a potential problem with low detections in the sediments. Should include prechlorate for ground water in the sediments. The sampling should also include chloride sampling for sediments and ground water under the sediments. This may require more sampling points upstream towards the salt dock.	12/2/05: Perchlorate and chloride will be tested in selected sediment samples as described in Section 6. Since bulk sediment samples include porewater and groundwater influences, these compounds should be detected in the chemical analysis as planned. In addition, proposed bioassays (standard tests and purging) will aid in the interpretation of the results to possible causes of toxicity from these more soluble chemicals. 1/25/06: Arkema accepts that perchlorate and chloride sampling in groundwater and TZW is necessary and that the schedule is yet to be determined.	Not responsive. Perchlorate and chloride sampling in groundwater and transition zone water are required. 1/25/06: EPA reserves right to review adequacy of schedule between IRM & RAA.	1-25-06 Arkema accepts that perchlorate and chloride sampling in groundwater and TZW is necessary and that the schedule is yet to be determined.		1/25/06: EPA accepts and reserves right to determine the adequacy of schedule between IRM & RAA.

Attachment C

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

November 1, 2005

Reply To
Attn Of: ECL-110

Larry Patterson
Arkema Group
6400 N.W. Front Avenue
Portland, OR 97210

Subject: Comments on Arkema draft EE/CA Workplan, dated September 26, 2005

Dear Larry:

EPA and its partners have reviewed the draft EE/CA Work Plan. We appreciate Arkema's efforts; however, the Statement of Work required significantly more information on certain topics or issues than contained in the draft. Enclosed is a list of the specific comments on the draft work plan. I have provided general comments in this letter that lists changes and/or additions to the work plan that EPA is requiring be made for the work plan to be approved. To ensure that you understand our required changes or if you wish to discuss them, I would be happy to have a meeting for that purpose. If Arkema disagrees with any of these required changes, Arkema should call to discuss them as soon as possible. I remind you of the dispute resolution process provided in the AOC (Section XVI.). Informal resolution should be our goal. Formal dispute is to be initiated within 14 days unless extended.

DIRECTED CHANGES

EPA is directing Arkema to make the following changes to the EE/CA Work Plan:

- Because of the lack of sufficient data presentation, data evaluation, figures and CSM development in the EE/CA Work Plan (WP), EPA is not able to adequately evaluate the Field Sampling Plan (FSP). Therefore, before the next version of the FSP is submitted, Arkema must resolve Work Plan comments prior to completing a revised FSP.
- EPA considers the Summary of Previous Investigations inadequate. Arkema shall revise the summary of data needs in order to adequately assess: (1) the nature and extent of contamination; (2) the COIs that are known to exist at the site, including all contaminants from boundary to boundary; and (3) the mechanisms that move contaminants through the environment. Additional data for both upland and in-water conditions are needed to develop the CSM at a level that will allow for informed analysis and decision-making for this response action.
- Throughout the removal action data collection and analysis, EPA must be able to determine how the removal furthered remedial work that is part of the Harbor-wide RI/FS since a full risk assessment will not be conducted as part of this early action. Arkema is directed to collect data during the removal action for use in the harbor-wide RI/FS and its analysis of pre and post-removal risks to human and ecological receptors.
- The document does not adequately delineate the areal or vertical extent of contamination identified in the previous investigations. The EE/CA work plan should include a map for

each COI showing extent and estimated thickness of each COI in sediment over the entire river area between thalweg and shoreline and the Arkema south and north property lines.

- Based on information from the Portland Harbor Phase 2A sampling, the data presented in Appendix D of the draft Work Plan and the findings of the upland investigations being performed at the site by ERM and others, additional COIs need to be further investigated. At a minimum, Arkema shall add PCBs, chlorinated dioxins/furans, PAHs, hexachlorocyclohexane, and VOC to the list of COI. Other COI should be added as determined by Arkema through their continued review of background documents and existing data sets.
- The Work Plan does not include sufficient information for EPA to evaluate potential releases from Lots 1 and 2, or what the sediment quality is adjacent to Lots 1 and 2. Existing data shall be assessed and new data collected as necessary to ensure there is no significant contamination beyond the DDT area. Arkema shall include data from Lots 1 and 2 and show the distribution of data from upland and in water environs. Arkema shall also propose methods to complete data gaps identified for Lots 1 and 2.
- Arkema shall provide a more comprehensive presentation of potential ARARs given the known circumstances at the site and likely removal action alternatives.
- Within the Work Plan, Arkema shall present a methodology that will be used or a set of criteria for how the RAA boundary will be delineated. Several criteria that may be used are, but are not be limited to: dredging restrictions generated from material stability, water depth, limiting factors on containment options; dredge methods; recontamination impacts; hydraulic containment alternatives; cost and schedule limitations; institutional controls; and technology limitations.
- Given the source control evaluation schedule proposed by Arkema in the September 28 meeting (no complete source control evaluation until post EECA), Arkema shall evaluate hydraulic control measures in the EECA for the plumes across the site (DDT, MCB, chromium, perchlorate). Please discuss the data gaps for this effort related to engineering analyses and controls.
- Arkema shall perform characterization activities that assess contaminant conditions at the entire site in order to determine the RAA boundaries for the EECA.
- Arkema shall include in the work plan the process to be used and the performance standards to be applied in evaluating upland source control effectiveness. Also the work plan needs to provide a schedule for when EPA will receive the upland source control evaluation effectiveness and recontamination potential.

RECOMMENDED CHANGES

In addition to the directed changes, EPA presents the following summary of comments we see as very important to the successful evaluation of site conditions and possible removal action technologies. These recommended changes are a summary of the comments contained in the attached comment summary.

Contaminants of Concern & Source Control

- The Work plan lacks an adequate summary of upland contamination and the corresponding plans that would ensure upland source controls can meet the SOW RAOs.
- The risks of both DDT and perchlorate are downplayed. Please discuss the specific plans to contain and treat perchlorate. Perchlorate contaminated groundwater plume has not been addressed. Sources of DDT have not been fully characterized in detail for their transport impacts by groundwater.

- Contaminant transport pathways are not sufficiently explained. Data is incomplete and/or misleading. Potential contaminant discharge from transition zone water, intermediate & deep aquifers, sediments, and soil/sediment erosion need to be addressed more thoroughly.
- Toxicity concentration data are misleading. It leads to possible false conclusions about the nature and locations of the contamination and as presented may influence treatment alternative selection.
- Data strongly suggests the presence of groundwater seeps. Data is needed to validate seepage. Seeps will need to be assessed as part of the EE/CA.
- There is no discussion of screening of chemicals found in aquatic biota that are consumed by human receptors.
- Sedimentation rates have not been well characterized. Additional evaluation and discussion is needed.
- Sediment quality characteristics must include not only toxicity but also bioaccumulation from DDT contaminated soil, sediments, & groundwater.
- The proposed sediment testing is likely insufficient to predict contaminants fate & transport during dredging or removal work.
- Additional hydrogeologic characterization & modeling should be performed prior to any long-term containment.
- Additional characterization is necessary to evaluate recontamination from upland source areas.

Removal Action Technologies & Alternatives

- The work plan should include not only technologies but related support technologies for options provided. For example, dredging technology must also include containment methods to avoid spread of contaminants during work. This analysis should be carried forward into the Biological Assessment where these impacts need to be evaluated against USFW and NMFS threatened and endangered species (and likely used in an abbreviated foodweb analysis therein).
- Hydraulic containment shall be evaluated in the EE/CA, as noted above. In addition, there remain data gaps relative to hydraulic dredging.
- Technologies and alternatives should also discuss upland source control technologies that may be necessary to reduce recontamination and contaminant flux concerns from upland to in water areas.

Sampling & Analysis

- More media need to be sampled (e.g., ground water as well as sediment cores) and the depth of borings/samples needs to be expanded.
- Samples need to be analyzed for a more complete suite of COIs
- Chemical analysis for Subtitle C/D disposal must be conducted in the EE/CA, including an evaluation of the leachability of contaminants to determine if dewatering is necessary prior to transportation to the disposal facility. Sediment pretreatment may be required prior to transport to some confined disposal facilities.

Cultural Resources

- The LWG Survey is inadequate. Site specific cultural surveys are needed to complete the cultural resources assessment.

Please contact me at (206) 553-1220 or Sheldrake.sean@epa.gov with questions or concerns.

Sincerely,

Sean Sheldrake, RPM

Enclosure

Cc:
Audie Huber, Umatilla Tribe *via email only*
Brian Cunninghame, Warm Springs Tribe
Erin Madden, Nez Perce Tribe
Paul Ward, Yakama Nation
Jeff Baker, GrandeRonde Tribe
Tom Downey, Siletz Tribe
Jean Lee, EI
Rob Neely, NOAA
Jeremy Buck, USFW
Greg Smith, USFW
Jim Anderson, DEQ
Matt McClincy, DEQ
Mikell O'Mealy, DEQ
Rod Struck, DEQ
Mike Poulsen, DEQ
Jennifer Peterson, DEQ
Rick Kepler, ODFW
Cyril Young, DSL
Lori Cora, EPA
Chip Humphrey, EPA
Eric Blischke, EPA
Kristine Koch, EPA
Rene Fuentes, EPA
Joe Goulet, EPA
Dana Davoli, EPA
Sylvia Kawabata, EPA
Nancy Munn, NOAA-NMFS
Peter Battuello, Parametrix
Preston Sleeger, USDOI

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

January 13, 2006

Reply To
Attn Of: ECL-110

Larry Patterson
Arkema Group
6400 N.W. Front Avenue
Portland, OR 97210

Subject: Comments on Arkema draft EE/CA Workplan Responses

Dear Larry:

EPA is providing the enclosed reply to Arkema's response to comments on the EE/CA work plan. Specifically, EPA and its partners have reviewed Arkema's responses from December 2, 9, and 13, 2005. Enclosed are a number of clarifications that were requested on the comment set, as well as EPA's assessment of various replies. Of the comments not included in the January 5, 2006 dispute letter, a significant number of Arkema responses were found to be inadequate or unresponsive. For inadequate responses, EPA has suggested directions that Arkema could go with the comment response to make it acceptable. For those found to be unresponsive, EPA has directed the revision for the comment. The reply does not include comments related to the QAPP or FSP as these issues are being addressed under directed comment 1 from the November 1, 2005 letter at a later time.

Overall, the majority of comments in the EPA reply are currently subject to the Arkema dispute dated January 5, 2006. This includes a number of references to Arkema's November 30 proposal regarding data screening and data presentation. EPA is reviewing Arkema's dispute document to directed changes 2, 4, 5, 6, 8, and 10. In light of our on-going review, we will defer any further discussion to the dispute process. Should there be comments not under dispute that you would like to discuss, we are available on Tuesday, January 17th at 10am. Should there be any other comments within this reply that Arkema intends to dispute, you have 14 days in which to submit written dispute in accordance with the AOC.

Please contact me at (206) 553-1220 or Sheldrake.sean@epa.gov with questions or concerns.

Sincerely,

Sean Sheldrake, RPM

Enclosure

Cc:

Audie Huber, Umatilla Tribe *via email only*
Brian Cunninghame, Warm Springs Tribe
Erin Madden, Nez Perce Tribe
Paul Ward, Yakama Nation
Rose Longoria, Yakama Nation
Jeff Baker, GrandeRonde Tribe
Tom Downey, Siletz Tribe
Jean Lee, EI
Rob Neely, NOAA
Jeremy Buck, USFW
Greg Smith, USFW
Jim Anderson, DEQ
Matt McClincy, DEQ
Mikell O'Mealy, DEQ
Rod Struck, DEQ
Mike Poulsen, DEQ
Jennifer Peterson, DEQ
Rick Kepler, ODFW
Cyril Young, DSL
Lori Cora, EPA
Chip Humphrey, EPA
Eric Blischke, EPA
Kristine Koch, EPA
Rene Fuentes, EPA
Joe Goulet, EPA
Dana Davoli, EPA
Sylvia Kawabata, EPA
Nancy Munn, NOAA-NMFS
Peter Battuello, Parametrix
Preston Sleeger, USDOI

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

February 27, 2006

Reply To
Attn Of: ECL-110

Larry Patterson
Arkema Group
6400 N.W. Front Avenue
Portland, OR 97210

Subject: EPA Understanding of Arkema Data Screening Proposal.

Dear Larry:

EPA has reviewed information provided by Arkema in support of the dispute regarding directed comments on the draft EE/CA work plan for the in-water removal action at the Arkema facility in Portland Harbor. This includes documentation, correspondence, and comments made during on going discussions regarding the dispute. Because of the complexity of the issues and extent of the current dialogue, EPA wishes to express our current understanding of Arkema's position regarding disputed comments.

DATA SCREENING

EPA understands that Arkema will screen all data sources identified in part 2 of the revised data screening approach (Arkema, February 2, 2006) and in EPA comment summaries to the draft EE/CA work plan against the chronic values contained in the Joint Source Control Strategy prepared by ODEQ and TEC. This includes screening against MCL and Region 9 tap water PRG and the most current ODEQ bioaccumulative sediment SLVs. For sediment and riverbank soil data, EPA expects the "other screening values for toxicity" identified in the Arkema proposal will include Region 9 industrial soil PRGs. EPA understands that MCL and the PRG will be considered at this time for screening purposes only. We further understand the use of MCL and PRG as ARARs may result during later stages of EE/CA.

EPA further understands that any chemical concentration exceeding chronic values or TEC will be carried forward as a contaminant of interest (COI). All COI will be identified on figures as described below (see Figures section).

To delineate priority risks and delineate the removal action area RAA boundary, EPA understands that Arkema is proposing **in part** to use:

- Freshwater Acute Criteria (ODEQ Tables 33A and 33B) for waters, including surface, TZW, and groundwater (intermediate and deep).

- PECs (McDonald et al 2000) for sediments[1]

[1] PELs and UETs may be used in the absence of PECs

- Specific criteria for perchlorate and monochlorobenzene.

- Wildlife and bioaccumulative[2] SLVs and indirect human exposure values. These values will be developed using information available at the time the work plan is submitted. Arkema should understand that EPA is not able to wait for harbor wide information to be published prior to establishing screening levels for the removal action.

EPA considers the most recent SCAT Guidance as applicable to this project. This guidance sets the chronic screening level value for perchlorate at 24.5 ug/L. Arkema shall propose an acute value for perchlorate. The 20 mg/L identified in the screening proposal is not acceptable to EPA for the in-water removal. We suggest you review U.S. EPA (2002), *Perchlorate Environmental Contamination: Toxicological Review and Risk Characterization Based on Emerging Information (External Review Draft).* Office of Research and Development, Washington, D.C. NCEA-1-0503[3] and other literature and propose an acute screening level value for in-water conditions. Regarding monochlorobenzene, EPA understands the Tier II screening acute value developed by Suter and Tsao is 1,100 ug/L.

EPA understands that the delineation of this RAA will be based in part on the COI exceeding acute toxicity, bioaccumulative risk potential and the spatial relationship of acute, chronic, and bioaccumulative criteria and other screening criteria identified through the EE/CA. EPA understands the evaluation process presented in part 5 of the screening approach, but does not necessarily concur with the usability or need for all these analyses. EPA expects that as more information is gathered, the use of acute toxicity may not be the sole or primary criteria to delineate the RAA, as other criteria may support a more effective removal action. Therefore, EPA prefers to recognize the proposed approaches as possible evaluation tools, subject to the findings of the EE/CA process.

CONCEPTUAL SITE MODEL (CSM)

EPA understands that Arkema wishes to develop a conceptual site model that reflects the risks being addressed by the removal action. EPA would propose that Arkema evaluate site conditions and prepare a comprehensive CSM for all potential site exposure scenarios. Then as the RAA delineation factors are applied, it will be possible to more clearly identify and articulate those elements of the CSM that are being addressed by the removal action and those elements that are not being considered during this removal action. We have attached the most recent CSM (ecological and human health) for the Harbor-wide RI/FS as an example of EPA's expectation for a comprehensive CSM. We also suggest you review the T-4 EE/CA to review how the Port of Portland selected pathways to be considered during the EE/CA.

FIGURES

EPA requires figures that demonstrate the current understanding of contaminant distribution relative to chronic and acute screening level values. EPA needs to visually assess the distribution of all contaminant data that exceed screening levels including chronic, bioaccumulative, and other relevant data (e.g., toxicity and biota testing).

The figure examples presented on February 2, 2006 are a good start. The identification by color and symbol for different screening criteria are useful. The example figures should be expanded to show

[2] Oregon DEQ bioaccumulation SLVs are being developed and should be available prior to publishing the revised work plan

[3] http://yosemite.epa.gov/opa/admpress.nsf/8b32b843b17f37d88525701800558fac/1e56c8361918f6f285257102006ce95e!OpenDocument

chronic and acute screening level values as isopleths. The figures also need to show relevant upland conditions that could contribute to recontamination to and groundwater flux across the preliminary RAA. Upland information should be consistent with the upland information presented in the Upland Remedial Investigation, Lots 3 and 4 and Tract A- Revision 1.

The figures showing current conditions shall depict in map view with iso-concentration (chronic and acute and bioaccumulation values) the areal extent of contaminants exceeding chronic screening level values. Vertical extent should be depicted for each of the following intervals, surface (0 to 1 foot below the surface; either mudline or ground surface), transition zone (1.0 – 4.0 feet below the surface, intermediate (4 – 8 feet) and deep sediment (>8 feet) and include sediment, biota, and groundwater data. Cross-sections through areas of the highest concentration may also be needed for some contaminants, including but not limited to DDT, hexavalent chromium, perchlorate and monochlorobenzene.

EPA recognizes that some data sets may not meet the geo-spatial or data quantity requirements to accurately depict areal extent using iso-concentration contours. We do not expect Arkema to plot contours for data sets involving one or very few data points. EPA does expect, however that Arkema will use professional judgment to create figures that provide information suitable to identify data gaps, sampling objectives and primary risk areas for all relevant pathways.

The information should be presented in a manner that shows the relationship between upland source areas (soil, groundwater), migration pathways (surface run-off, stormwater outfalls, groundwater) and chemical distribution in the Willamette River. A rough example (conceptual) of selected information EPA would like to see on drawings is attached.

The number of figures necessary will ultimately depend on the results of data tabulation and screening. Some chemicals may extend throughout the environment and should be shown EPA expects the figure presentation to include at a minimum the chemicals listed in Table 3-10 of the draft EE/CA work plan and other chemicals and biota data identified in EPA comment summaries to the draft work plan.

Preliminary Guide for Figure Development[(a)]

Chemical	Sediment	Transition Zone Water	Groundwater	X-sections
DDT	X[(b)]	X	X	X
DDD	X	X	X	X
DDE	X	X	X	X
Hexavalent Chromium		X	X	X
Perchlorate		X	X	X
Monochlorobenzene	X	X	X	X
Total PAH	X	X	X	
Total PCB	X	X	X	
Dioxin	X	X	X	
Hexachlorocyclohexane	X	X	X	

Preliminary Guide for Figure Development (continued) [(a)]

Chemical	Sediment	Transition Zone Water	Groundwater	X-sections
Lead	X	X	X	
Nickel	X	X	X	
Naphthalene	X	X	X	
Others as defined through data review[(c)]	X	X	X	X
	35 to 50 figures	15+ figures	20 to 30 figures	5-10 figures

(a) Table lists only chemical distribution maps. Other figures may be needed to identify non-chemical site conditions.

(b) DDT, DDE, DDD shall be shown for beach and riverbank soil.

(c) Will include VOC, chloride, and metals (e.g., manganese) data referenced in EPA comment summaries.

RESOLUTION OF DISPUTED COMMENTS

It is EPA's understanding that discussions during January and February, Arkema has accepted directed comments D1, D7, D9, D11, D16, and D18. EPA understands that the revised screening approach and figure presentation as summarized in this letter will resolve disputed comments D2, D4, D5, D6, D8, D10, D14, D15, and D17 and related specific comments.

NEXT STEPS

As we have discussed, it is unlikely that both parties will consider the disputed matters resolved until there is another draft EE/CA work plan. EPA considers that a revised work plan based on the agreements reached and other discussions we have had over the last few months should be submitted as soon as possible. We would appreciate receiving a revised schedule for the EE/CA work plan. Regarding data screening, figures, and RAA delineation, EPA continues to encourage Arkema to provide interim submittals to ensure consistency with EPA's understanding of the agreed approach. Specific submittals EPA would like to see include:

- Data screening tables including data sources
- COI list with screening criteria used to identify
- A refined figure list based on the data screening
- The CSM that shows pathways for the EE/CA

Having interim review and dialogue on these items would greatly expedite the review and acceptance of the EE/CA work plan.

Also, we recognize that additional discussion is needed to resolve the remaining disputed comments (D3, D12, and D13) and several specific comments. We look forward to moving ahead in resolving these outstanding items.

Please contact me at (206) 553-1220 or Sheldrake.sean@epa.gov with questions or concerns.

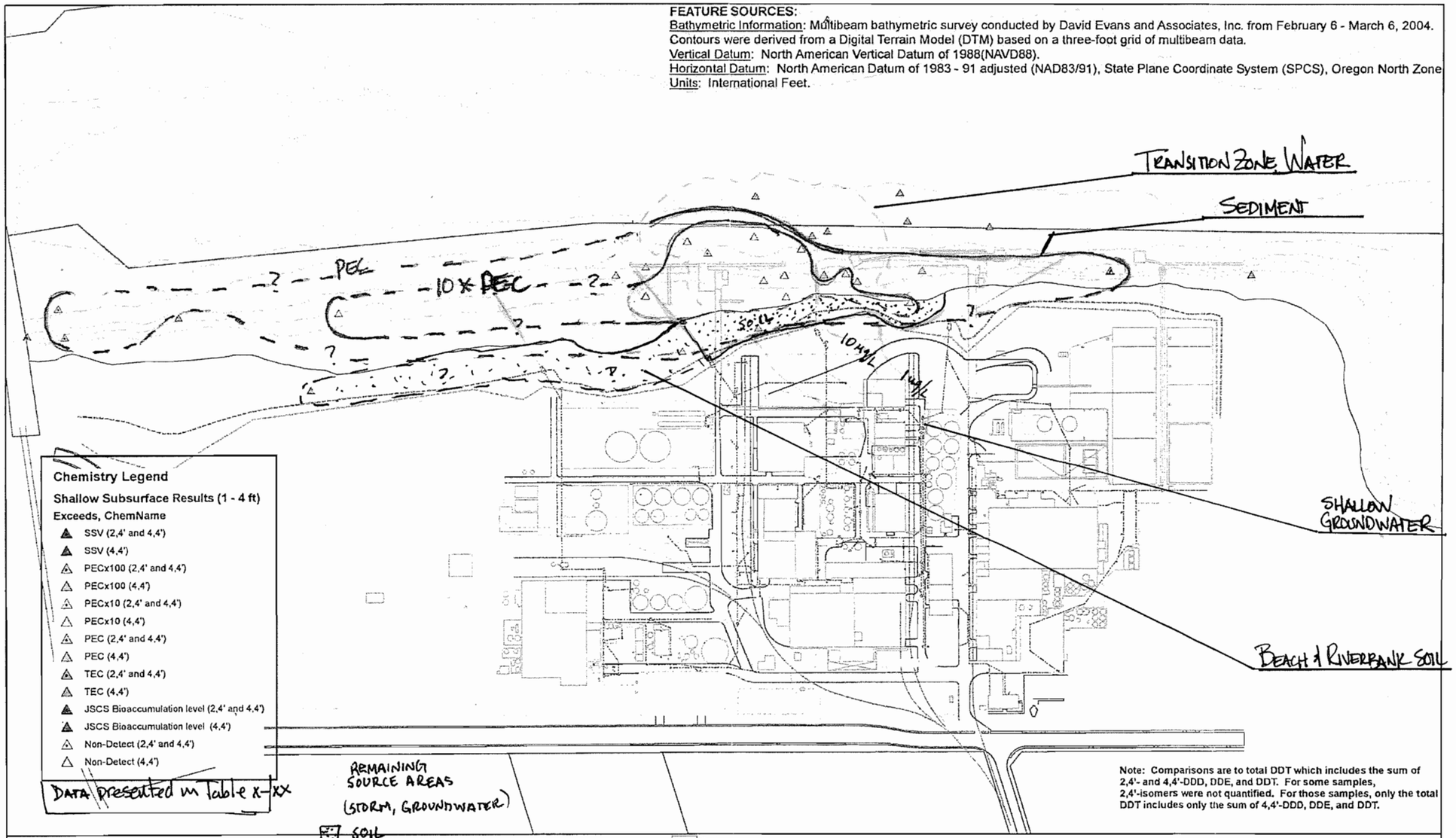
Sincerely,

Sean Sheldrake, RPM

Enclosures

cc:
Audie Huber, Umatilla Tribe *via email only*
Brian Cunninghame, Warm Springs Tribe
Erin Madden, Nez Perce Tribe
Paul Ward, Yakama Nation
Jeff Baker, GrandeRonde Tribe
Tom Downey, Siletz Tribe
Jean Lee, EI
Rob Neely, NOAA
Jeremy Buck, USFW
Greg Smith, USFW
Jim Anderson, DEQ
Matt McClincy, DEQ
Mikell O'Mealy, DEQ
Rod Struck, DEQ
Mike Poulsen, DEQ
Jennifer Peterson, DEQ
Rick Kepler, ODFW
Cyril Young, DSL
Lori Cora, EPA
Chip Humphrey, EPA
Eric Blischke, EPA
Kristine Koch, EPA
Rene Fuentes, EPA
Joe Goulet, EPA
Dana Davoli, EPA
Sylvia Kawabata, EPA
Nancy Munn, NOAA-NMFS
Peter Battuello, Parametrix
Preston Sleeger, USDOI

FEATURE SOURCES:
Bathymetric Information: Multibeam bathymetric survey conducted by David Evans and Associates, Inc. from February 6 - March 6, 2004. Contours were derived from a Digital Terrain Model (DTM) based on a three-foot grid of multibeam data.
Vertical Datum: North American Vertical Datum of 1988(NAVD88).
Horizontal Datum: North American Datum of 1983 - 91 adjusted (NAD83/91), State Plane Coordinate System (SPCS), Oregon North Zone
Units: International Feet.



Note: Comparisons are to total DDT which includes the sum of 2,4'- and 4,4'-DDD, DDE, and DDT. For some samples, 2,4'-isomers were not quantified. For those samples, only the total DDT includes only the sum of 4,4'-DDD, DDE, and DDT.

integral consulting inc

DRAFT
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Work Product Prepared in Anticipation of Litigation

Figure 1. Arkema Site
Shallow Subsurface Sediment Samples
1.0 - 4.0 ft

FEATURE SOURCES:
Bathymetric Information: Multibeam bathymetric survey conducted by David Evans and Associates, Inc. from February 6 - March 6, 2004. Contours were derived from a Digital Terrain Model (DTM) based on a three-foot grid of multibeam data.
Vertical Datum: North American Vertical Datum of 1988(NAVD88).
Horizontal Datum: North American Datum of 1983 - 91 adjusted (NAD83/91), State Plane Coordinate System (SPCS), Oregon North Zone
Units: International Feet.

TRANSITION ZONE

PEC

10x PEC

Chemistry Legend

Intermediate Subsurface (4 - 8 ft)

Exceeds, ChemName

- SSV (2,4' and 4,4')
- SSV (4,4')
- PECx100 (2,4' and 4,4')
- PECx100 (4,4')
- PECx10 (2,4' and 4,4')
- PECx10 (4,4')
- PEC (2,4' and 4,4')
- PEC (4,4')
- TEC (2,4' and 4,4')
- TEC (4,4')
- JSCS Bioaccumulation level (2,4' and 4,4')
- JSCS Bioaccumulation level (4,4')
- Non-Detect (2,4' and 4,4')
- Non-Detect (4,4')

Note: Comparisons are to total DDT which includes the sum of 2,4'- and 4,4'-DDD, DDE, and DDT. For some samples, 2,4'-isomers were not quantified. For those samples, only the total DDT includes only the sum of 4,4'-DDD, DDE, and DDT.

integral ecology group

200 100 0 200 Feet

- Bridges
- Navigation Channel
- Storm Drain
- River

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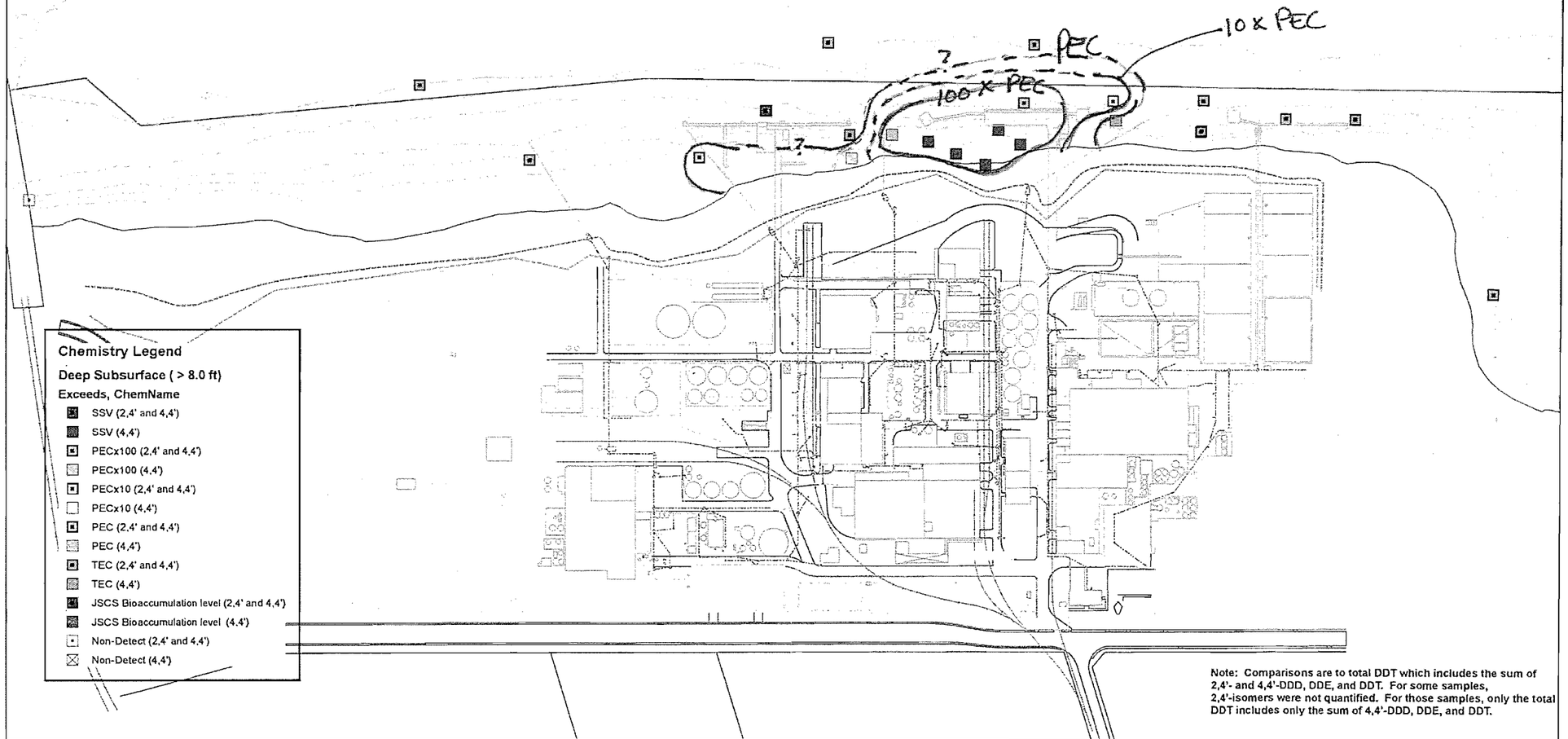
Figure 1. Arkema Site Intermediate Subsurface Sediment Samples 4.0 - 8.0 ft

NO DEEP GROUNDWATER AT ACUTE LEVELS

FEATURE SOURCES:
Bathymetric Information: Multibeam bathymetric survey conducted by David Evans and Associates, Inc. from February 6 - March 6, 2004. Contours were derived from a Digital Terrain Model (DTM) based on a three-foot grid of multibeam data.
Vertical Datum: North American Vertical Datum of 1988(NAVD88).
Horizontal Datum: North American Datum of 1983 - 91 adjusted (NAD83/91), State Plane Coordinate System (SPCS), Oregon North Zone
Units: International Feet.



Chemistry Legend

Deep Subsurface (> 8.0 ft)

Exceeds, ChemName

- SSV (2,4' and 4,4')
- SSV (4,4')
- PECx100 (2,4' and 4,4')
- PECx100 (4,4')
- PECx10 (2,4' and 4,4')
- PECx10 (4,4')
- PEC (2,4' and 4,4')
- PEC (4,4')
- TEC (2,4' and 4,4')
- TEC (4,4')
- JSCS Bioaccumulation level (2,4' and 4,4')
- JSCS Bioaccumulation level (4,4')
- Non-Detect (2,4' and 4,4')
- Non-Detect (4,4')

Note: Comparisons are to total DDT which includes the sum of 2,4'- and 4,4'-DDD, DDE, and DDT. For some samples, 2,4'-isomers were not quantified. For those samples, only the total DDT includes only the sum of 4,4'-DDD, DDE, and DDT.

integral consulting inc.

200 100 0 200 Feet

- Bridges
- Navigation Channel
- Storm Drain
- River

DRAFT
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Figure 1. Arkema Site Deep Subsurface Sediment Samples > 8.0 ft

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

April 11, 2006

Reply To
Attn Of: ECL-110

Todd Slater
Arkema Group
6400 N.W. Front Avenue
Portland, OR 97210

Subject: EPA Comments on Arkema Interim Deliverable for Data Screening and COI identification.

Dear Mr. Slater:

EPA has reviewed the following Arkema interim deliverables received by EPA on March 24th and 30th:

- Summary tables submitted by David Livermore
  - Preliminary screening of surface water samples to JSCS values
  - Preliminary screening of transition-zone water samples to JSCS values
  - Preliminary screening of groundwater samples to JSCS values
  - Preliminary screening of riverbank soil samples
  - Preliminary screening of sediment samples
- Preliminary Constituents of Interest (COI) list
- Preliminary Figure List

Based on our review, we have determined the following. More detailed comments are presented in Attachment A.

- The submitted COI screening process is not consistent with previous discussions and the COI list presented by Arkema is incomplete.
- Several chemicals including monochlorobenzene, individual Aroclors, perchlorate and other VOCs must be added to the COIs and Figures lists.
- The screening for beach sediments must be revised to include the cancer risk of 1×10^{-6} and a non-cancer hazard quotient of 0.1.
- A revised data presentation needs to be included in the revised EE/CA Work Plan. The revised data presentation shall be adequate to allow for complete independent validation of the COI list. This means all data used in identifying COI needs to be submitted to EPA.

Based on this review, EPA has determined the revised EE/CA work plan must address and include the following:

- The summary tables provided by Arkema prevent any independent verification of the process used to select the preliminary COI list. Arkema needs to present their complete data set, not simply summary statistics, in order to provide EPA with sufficient information to fully review the COI screening process.

- The Human Health Screening for Sediment and Beach Samples were not adjusted to reflect cancer risk of 1×10^{-6} and a non-cancer hazard quotient of 0.1, as requested in previous comments. This information is required to adequately complete data screening and COI selection to determine whether the removal action addresses all pathways and receptors.

- The treatment of detection limits for non-detects is not acceptable. Attachment A provides EPA's need for dealing with non-detect analytical results.

- The preliminary COI list is missing several chemicals including monochlorobenzene, hexavalent chromium, individual aroclors, perchlorate and other chemicals discussed in Attachment A.

- Further data and quality control evaluations and analyses are needed to determine whether the refined figure list is yet inclusive. Arkema needs to include this data in their next interim deliverable (Final COI and Figure List), which is due to EPA 2 weeks from the date of this letter.

- Data (table) presentation should be in decimal rather than scientific notation format.

- The figures to be developed need to define the relationships between upland groundwater, transition zone water, and sediments as outlined in EPA's February 27 letter. to include the COI specified in Attachment A.

NEXT STEPS

As we have presented above, it is not possible to independently verify the process used by Arkema to develop the preliminary COIs and figures lists. We are concerned that Arkema has not responded adequately to specific comments to the draft EE/CA work plan and discussions and agreements reached during dispute negotiations. Because these interim deliverables were meant to help ensure that EPA and Arkema were in agreement on the screening approach and figure development while the revised EE/CA work plan is being developed, it is very important that the next scheduled interim deliverable address these concerns. Per the agreed schedule, we look forward to Arkema's next submittal which is due on 14 days from the date of this letter. From our review, we are concerned that EPA and Arkema are still not in agreement with key elements of the work plan. Arkema must incorporate EPA's requests into the revised EE/CA work plan which, per the interim delivery schedule, is due June 30, 2006.

I request that upon receipt of this letter, Arkema contact me to discuss your ability to address our comments. At this point, the EE/CA process is well behind schedule and it is essential that we move forward to complete a revised work plan in a timely manner. An absence of clear progress against our agreed to schedule or an incomplete or inadequate revised EE/CA work plan is not to anyone's advantage.

Please contact me at (206) 553-1220 or Sheldrake.sean@epa.gov with questions or concerns.

Sincerely,

Sean Sheldrake, RPM

Attachment

cc: David Livermore
Doug Loutzenhiser
Todd Slater
Mark Herrenkohl

Attachment A
Detailed Review Comments to March 30 Summary Tables

EPA reviewed the following summary tables submitted by Arkema:

- Preliminary screening of surface water samples to JSCS values
- Preliminary screening of transition-zone water samples to JSCS values
- Preliminary screening of groundwater samples to JSCS values
- Preliminary screening of riverbank soil samples
- Preliminary screening of sediment samples

As part of this review, approximately 10 percent of the SLV entries in the Arkema table were checked against the JSCS
Table 3-1, EPA Region 9 PRGs, Table C-2 of the draft Arkema EE/CA, and Table 1 Summary of the Consensus-based Sediment Effect Concentrations for the Chemicals of Concern in Indiana Harbor Canal Superfund Site from MacDonald et al. 2000.

REVIEW COMMENTS

1. Arkema should review the following Portland Harbor RI/FS human health risk related documents to better understand EPA guidance and to ensure consistency with the Portland Harbor RI/FS:

    - Portland Harbor RI/FS Programmatic Workplan, Appendix C: Human Health Risk Assessment Approach (April 23, 2004);

    - Interim Deliverable for Human Health Risk Assessment: Round 1 Tissue Exposure Point Concentrations (October 8, 2004), and;

    - Interim Deliverable for Human Health Risk Assessment: Human Health Toxicity Values (October 8, 2004)

2. Review of the data sources identified as being included in the Arkema Database / C167.0101 indicated that only data collected by the Lower Willamette Group, consultants working for Arkema, and consultants working for EPA had been entered as of March 24, 2006. EPA undertook a search of electronic databases available through the University of Washington or online to determine whether other data sources were applicable to this project.

    Our review indicates that Arkema has covered all the formal Port of Portland and DEQ data sources, but have not included historical fish tissue data available in USGS reports and some recent literature citation, such as Wentz et al. 1998, Hink et al. 2006, Sethajintanin et al. 2004, and measurements of low-level concentrations using semi-permeable membrane devices (McCarthy and Gale 2001). While these data are not specific to the Arkema site, and are therefore not directly applicable to the selection of the COI list, we consider them as comparable information for bioaccumulation studies at the Arkema site, and would prefer Arkema include them in the COI data set.

3. Only the summary data (minimums, maximums, averages, and medians) were submitted by Arkema in each table. As result, EPA is unable to provide a comprehensive review of data quality. Without inclusion of the actual analytical results it is impossible to track the source and quality of data used to develop the summary results. In many instances throughout the tables, there are more samples identified

than there are sampling stations. Our assumption is that this is probably the result of the averaging of all samples (vertically and horizontally) and inclusion of duplicates. Please clarify this data presentation.

4. Although the data presentation is usable for developing the COI lists, it is not well-formatted for subsequent data presentations. The February 27th letter states that figures should be depicted for intervals of 0 to 1 foot, 1.0 – 4.0 feet, 4 to 8 feet, and greater than 8 feet as measured from top of soil or soil/water interface. The purpose of this is to facilitate future decision-making for the Removal Action Area (RAA) delineation. Data averaging over the entire depth of the sampling station is not an appropriate data presentation to satisfy the RAA delineation phase of this EE/CA.

    - To validate assumptions and to complete a review of data quality, Arkema needs to provide A tabular presentation of all potential COI samples arranged by sample locations and depth intervals as identified above, QA/QC data for each of the above (preferably the QA/QC reports prepared for the various analyses and not individual laboratory QA/QC efforts) and a summary presentation tables arranged by depth intervals as identified above.

5. Our review found that human health screening values were not used to screen in-water sediments or riverbank soils. Arkema also did not adjust the sediment screening values for child recreational beach user from Table C-2 of the draft EE/CA to a cancer risk of 1×10^{-6} and a non-cancer hazard quotient of 0.1. This directly conflicts with work plan comments #43, 413, 302, and 460, each of which specify that Arkema should us a cancer risk of 1×10^{-6} and a non-cancer hazard quotient of 0.1 for these media.

    The screening table for the in-water sediments needs to identify screening values for human health. Also, the sediment screening levels for DDD/DDE/DDT developed by ODEQ should be present.

6. All of the screening was done against detected analytical results, while the non-detected results are listed but ignored. This might be marginally acceptable provided the appropriate clean-up and analytical methods are used for all of the analyses and the non-detects values are in the ballpark of the detected concentrations. However, this does not seem to be the case for some media/analytes where several of the non-detected values are orders of magnitude above the detected values. In many cases, the detected value does not exceed the SLV, but the non-detected value does. For example, for groundwater, several chemicals (phthalates, chlorinated solvents, benzene) are not selected as COIs although the non-detect values are above the screening levels.

    To address this problem, we suggest the approach used in the human health risk assessment for the Lower Duwamish Superfund Site (page 25 of LDW RI Appendix B: HHRA, July 3, 2005 at LDWG.org). For those chemicals that do not have detected concentrations above an SLV, this process selects as COIs those chemicals where detection limits in >10% of the samples are greater than an SLV. This is a conservative way to make sure nothing has been missed and can be done efficiently by adding a few columns (additional queries) to the spreadsheets.

7. The note at the bottom of the Preliminary COI table states that the list is based only on chemicals that are above PEC and other SQV in sediment samples. Arkema had agreed to use TEC for sediment toxicity and industrial soil PRGs for human exposure to in-water sediment (as stated in previous comments, EPA requires a 1×10^{-6} cancer risk and 0.1 non-cancer hazard for beach sediment screening). This will address potential human health exposure under a child recreational user, which EPA considers a likely future use scenario.

8. While it is not possible to independently verify the chemicals included or excluded from the preliminary COI list submitted by Arkema, EPA recognizes the following omissions:

    - Hexavalent Chromium
    - Total PCBs (calculated using both the Aroclor and congener data (where available)
    - Dioxin-furan TEQ
    - Dioxin-like PCB TEQ and the sum of the latter two TEQ values
    - Pesticide isomers (such as those of chlordane) that are summed
    - Total carcinogenic PAHs
    - Manganese
    - Perchlorate
    - Monochlorobenzene
    - Other chemicals that will screen through based on revised approach to dealing with non-detect values (see comment 5).

    Rationale and justification must be provided for any proposal that does not include these COIs on the list.

9. Contaminant concentrations should be presented in decimal format rather than scientific notation and to follow the standard convention of using ppb, ug/kg or equivalent for organics and ppm, mg/kg or equivalent for metals.

10. Biota was not discussed. Because there are not screening levels for biota except for Hg (EPA's WCQ has a biota value for Hg but not a water value) and for DDT/DDE/DDD (from the ODEQ document), we would like to see screening of the biota off of Arkema for Hg and for the DDD/DDT/DDE.

11. Transition-zone water samples and peeper data should be included in the screening. Also, please list which six surface water stations from the LWG surface water sampling program Arkema considers relevant to the Arkema Early Action.

12. According to EPA's ERA Guidance for Superfund, one of the first steps in a screening-level risk assessment is "the establishment of contaminant exposure levels that represent conservative thresholds for adverse ecological effects." These levels "should represent a no-observed-adverse effect-level (NOAEL) for long-term (chronic) exposures to a contaminant." In lieu of NOAELs for screening sediment evaluation, the more conservative of any of the various sediment quality guidelines can be used; hence, sediment screening should be based on the ERL, TEL, TEC or equivalent values rather than on ERM, PEL, or PEC values. Arkema's proposed approach does not appear to be consistent with the ERA guidance for screening level risk assessments. While both TEC and PEC values are included in Table 2 (Sediment Samples Summary), the highlighting of contaminants for inclusion in future evaluations is apparently based solely on a comparison to the PEC or equivalent value. This is not consistent with agreements reached during the dispute discussions or EPA's February 27th letter of understanding.

13. Screening Tables – The new screening tables should include:
    - A column to show which sample number was selected as the maximum value for purposes of screening.

- A column that shows which SLV(s) were exceeded and used to define a chemical as a COI. If frequency is used as the selection criteria (see next comment), it should also be shown in this column.
- Columns that show the (a) maximum non-detected result, (b) percent of non-detected results, and (c) percent of non-detected results that are above an SLV. If a chemical is not selected as a COI because there is no detected value above an SLV, it should still be selected if 10% or greater of the non-detect values are above an SLV.

14. Recent LWG sediment data should be considered in the data screening, including the relevant archived sediment cores, the PCB congener samples and Round 2B sediment cores.

15. Recent LWG groundwater data should be considered in the data screening.
16. The table notes indicate that a dashed line means there are no SLVs. We assume that a dashed line in a column such as "# Detected Results Exceed SLV (PEC or other SQV Toxicity)" is supposed to mean "0." Please revise accordingly and clarify in the next submittal.

17. To avoid confusion with different analyte names, isomers, combinations of fractions, etc., add a column for CAS numbers in the tables. If a CAS number is inadequate, use the same name as the source document or provide a footnote to describe.

18. There seems to be inconsistent reporting of Aroclor SLV, which need clarification. Examples include:
    - For individual Aroclor Fish SLVs, total PCB value was used.
    - For individual Aroclors PRG SLV values, Total PCB SLV values were used, except for Aroclor 1016 and Aroclor 1254 where the individual drinking water PRG SLV was used.
    - No individual values were entered for the drinking water MCL SLV.
    - The total PCB value was entered for the Ecological Receptor SLV even though individual values were available for most of the Aroclors.

    Please respond by providing consistent reporting of Arochlor SLV or written clarification on the reporting approach.

19. For most (but not all) metals and most (but not all) pesticides "dissolved" values were reported as well as values that are not marked as "dissolved". It is unclear what form the compounds not labeled with "dissolved" are (i.e. total, total recoverable, etc.). Clarification as to why the same SLVs values are used for the "dissolved" compounds and the ones not marked "dissolved" needs to be provided.

20. In JSCS Table 3-1, perchlorate is categorized as Metal/Inorganic, whereas the Arkema table has it categorized as Conventional. Please clarify the reporting of perchlorate.

21. Hardness dependent metals values in the JSCS Table 3-1 were calculated based on 25 mg/l CaCO3. In the Arkema table hardness of 28.8 mg/l (of an unspecified compound) was used in the calculations of acute and chronic guidance values. The Arkema table further indicates the hardness equivalent CaCO3 = 2.5(mg/l Ca) + 4.1(mg/l Mg); "Hardness was based on Ca and Mg concentrations (7.4 and 2.5 mg/l, respectively) detected and pH field measurements in water samples from the Willamette River." Please clarification why the hardness calculation used in the Arkema table does not seem to equate to the one used in Table 3-1 needs to be provided.

22. For alpha-, beta-, delta-, and gamma-Hexachlorocyclohexane, the Arkema table has drinking water PRG SLV and Eco SLV values, but these chemicals do not appear in the JSCS Table 3-1. This is also true for trans-Chlordane and 4-Chloro-3-methylphenol. Providing CAS numbers in the tables may provide the needed clarification.

23. An Ecological Receptor SLV is entered in the Arkema table for "Tributyltin ion" of $6.3x10^{-5}$ mg/l, but no value for "Tributyltin". Table 3-1 contains a value of 0.072 ug/l for Tributyltin, and no listing for "Tributyltin ion". Please clarify.

24. The Eco SLV value for 2,3,7,8-Tetrochlorodibenzo-p-dioxin is incorrect and should be $3.8x10^{-7}$.

25. Manganese is inconsistently reported. It is not reported at all in the surface water section, it is reported as "dissolved" in the groundwater section, and is reported as both Manganese and Manganese (dissolved) in the transition zone water section. Please clarify.

26. There are no SLV values for Total of 4-4'-DDD, -DDE, -DDT in JSCS Table 3-1, yet a drinking water PRG of 2.0x10-4 and Eco SLV of 1.1x10-3 are reported. This needs clarification.

27. For the individual analytes m,p-Xylene and o-Xylene in the groundwater sample summary the MCL for Xylenes (total) is reported. Please explain the rationale for this, especially since the MCL is not reported in the line for Total xylenes.

28. Please clarify why there are no mercury data for groundwater.

FIGURE LIST

Our review focused on the Preliminary Figure List submitted on March 24, 2006 and the February 27, 2006 letter. The February 27th letter states that, at a minimum, figure presentation is to include the chemicals listed in Table 3-10 of the draft EE/CA work plan and other chemicals and biota data identified in EPA comment summaries to the draft work plan. Our review indicates that all of the Table 3-10 chemicals are identified. However, the following chemical classes were not dealt with correctly:

- For PCBs, screening against each Aroclor is not sufficient. The Aroclors should be summed to provide an estimate of total PCBs. The PCB congener data should also be added to obtain an estimate of total PCBs. In addition, the TEQ from dioxin-like PCBs as well as those from the dioxins and furan should be calculated and compared the 2,3,7,8- TCDD SLVs for human health. The sum of the PCB TEQ and the dioxin/furan TEQ should also be calculated and compared to 2,3,7,8- TCDD SLVs for human health. The maps should include total PCBs, as well as TEQs for dioxins/furans, for dioxin-like PCBs, and for the sum of the two.

- For PAHs, the sum of carcinogenic PAHs should be calculated, screened, and included on the figures.

- For pesticides (e.g., chlordane), isomers of a given pesticide should be summed and compared to the appropriate screening values, and included on the figures.

The Arkema evaluation has listed several additional chemicals on the Preliminary Figure List that are above PEC or other SQV values. However, based on our review comments and concerns with data quality and understanding

(as detailed above), it is premature to say whether this list is yet inclusive. Further data and quality control evaluations and analyses may result in revision to this list.

Additionally and importantly, as addressed in the February 27th letter, the figures need to be defined to show the relationships between upland groundwater, transition zone water, and sediments. Further, these figures need to be organized to demonstrate these connections in context of the physical site constraints (soil and sediment layers) and prevailing groundwater movements. Individual figure development in context of each individual COI chemical for each specified depth interval, as previously defined, is critical to full site understanding and development of the remedial actions. These figures should include iso-concentration contours showing the extents of chemical concentrations relative to acute or other appropriate screening criteria.

REFERENCES

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Sethajintanin, D., E.R. Johnson, B. R. Loper,K.A. Anderson. 2004 Bioaccumulation Profiles of Chemical Contaminants in Fish from the Lower Willamette River, Portland Harbor, Oregon. Arch. Environ. Contam. Toxicol. 46, 114–123 (2004).

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

May 15, 2006

Reply To
Attn Of: ECL-110

Todd Slater
486 Thomas Jones Way
Exton Pennsylvania 19341

Subject: EPA Comments on Arkema Interim Deliverable for Data Screening and Chemical of Interest (COI) identification.

Dear Todd:

EPA has reviewed the following Arkema interim deliverables received between April 23 and 25:

- Response to April 11 Letter Regarding EPA comments on Interim Deliverables Administrative Order on Consent (AOC) for Removal Action U.S. EPA Region 10 Docket No. CERCLA 10-2005-0191 including:
- Arkema's responses to the April 11th Detailed Review Comments
- Revised data screening tables
- Revised preliminary COI and Figure List
- Draft CSM and revised EE/CA Work Plan – submitted April 24, 2006

This letter presents the finding of this review. EPA is requesting that Arkema address these comments as part of your on-going work to develop a revised work plan by June 30, 2006. The comments presented in this letter or the attachment do not extend our agreed delivery date for the revised work plan. As part of your on-going work, I encourage you and your team to contact EPA technical and contractor staff to discuss clarifications you may need.

Arkema Responses to Detailed Review Comments

The Arkema comments to the April 11th letter were generally responsive. Differences and detailed comments are provided in Attachment A.

Revised Data Screening Tables

The data quality and submittals are vastly improved over previous submittals. Generally the data is understandable. However, there are several areas where table intent, nomenclature, definitions, etc need review and improvement.

Our review of the data screening tables was undertaken without benefit of review of the data sources (including data quality of these sources), used to populate the screening tables. Therefore, EPA requests that each study used in the report be listed and the data quality reported (see PH RI/FS Programmatic Work plan, specifically Attachment F1) using the PH RI/FS criteria. Since most of the data sources being used are from the PH RI studies, much of this evaluation should have already been completed. This evaluation will be useful in determining additional data needs.

Revised Preliminary COI and Figure List

- The revised COI list does not include all chemicals that exceed chronic SLVs. Arkema needs to present COI as any chemical exceeding a chronic SLV, then complete further analysis to identify criteria for evaluating the limits of Removal Action Area boundary. As previously discussed, these criteria may include acute SLVs, engineering limitations, and institutional control requirements for the selected remedy.
- The human receptor screening analysis is incomplete regarding human health impacts for "beach sediments" or "riverbank sediments" and needs upgrading, as noted in Attachment A, to be considered acceptable.
- The EPA April 11th letter stated "The screening for beach sediments must be revised to include the cancer risk of 1 x 10-6 and a non-cancer hazard quotient of 0.1." Comments #460, 463, and 302 of the original EPA comments on the draft work plan clearly demonstrate EPA's consistent position on this issue. Arkema is to implement this directive.
- Arkema in the CSM for Human Health indicated that the exposure pathway for Native American and Non-tribal fishers is incomplete. These must be revised to show complete exposure pathways.
- The preliminary figures list is highlighted in yellow on the revised preliminary COI list. However, the list is incomplete and needs upgrading, as noted in Attachment A, to be considered acceptable. It is critical that these figures be developed in manner that provides clear and detailed understanding of the relationships between upland groundwater, transition zone water and sediments for each individual COI.

CSMs (Ecological Receptors and Human Health Risk Assessment)

- The CSM for Ecological Receptors and Human Receptors is not responsive to the EPA request that Arkema use the harbor wide CSM (provided with the February 27 understanding letter) and identify those elements that will be addressed by the EE/CA. The current Arkema submittal includes numerous omissions and modifications of potential sources, release mechanisms, and ecological and human receptors from the Portland Harbor CSMs. EPA has provided an example (refer to CSM from the T-4 EE/CA) for Arkema to use as a template. Arkema needs to revise the CSM as requested or EPA will prepare the CSM and direct its use.
- The definition of riverbank sediment is not acceptable. EPA expects human health and ecological risk screening values will be applied to all sediment from the top of bank waterward to the limits of the data. Therefore, the Region 9 industrial soil PRGs will apply to all sediment (riverbank and in-water) for human health exposures and the ecological risk characterization should extend landward to the **ordinary high water mark** or the top of bank.

Revised EE/CA Work Plan Outline

- The revised EE/CA outline is inadequate. Arkema continues to avoid EPA's request to develop a CSM based on known site conditions and identify COI based on chronic screening criteria. EPA expects that the EE/CA work plan will:
  - Identify contaminant site conditions
  - Develop conceptual site models for ecological Receptors and Human Health Risk Assessment that reflect the baseline contaminant site conditions
  - Perform data screening relying on the defined Portland Harbor Joint Source Control Strategy (JSCS) (December 2005) and other specifically directed chronic criteria to determine COIs
  - Present criteria to define the Remedial Action Area (RAA) boundary for the purpose of the characterization activities.
  - Identify the removal action technologies that the EE/CA will consider.
  - Identify data gaps as defined by all the above activities and propose a sampling and analysis program.

The EE/CA outline should be revised and resubmitted to ensure Arkema understands the EPA expectation for the form and organization of the revised EE/CA work plan.

Please contact me at (206) 553-1220 or Sheldrake.sean@epa.gov with questions or concerns. I encourage Arkema to directly contact me or my technical team with specific points of clarification or specific questions regarding these comments or any element of the EE/CA process. Our goal is to move forward with the work plan process. Further delay or non-responsive submittals provides no opportunity to achieve the project goals and is not in the best interest of either EPA or Arkema.

Sincerely,

Sean Sheldrake, RPM

Attachment
References

cc: David Livermore
Doug Loutzenhiser
Larry Patterson

Attachment A
Detailed Review Comments of Letter Response,
and Final COI and Figures List

Arkema Responses to Detailed Review

Following are comments to the Arkema responses, as presented by the EPA April 11th Attachment A comments to Arkema. Contained below are the April 11 letter comments, the Arkema responses to each comment, and a proposed reply or position to the Arkema response.

1. Arkema should review the following Portland Harbor RI/FS human health risk related documents to better understand EPA guidance and to ensure consistency with the Portland Harbor RI/FS:

- Portland Harbor RI/FS Programmatic Work plan, Appendix C: Human risk Assessment Approach (April 23, 2004);
- Interim Deliverable for Human Health Risk Assessment: Round 1 tissue Exposure Point Concentrations (October 8,2004), and;
- Interim Deliverable for Human Health Risk Assessment: Human Health Toxicity Values (October 8, 2004).

Arkema/LSS Response: Arkema/Logistics Site Services (LSS) will review the above referenced documents as requested.

*EPA expects that this review will occur prior to publishing the revised EE/CA work plan and that the revised EE/CA work plan will be consistent with the methods applied to the Portland Harbor RI/FS**,** including, but not limited to those dealing with chemical mixtures and surrogate chemicals. In addition, the methods used to sum PCB congeners and to calculate TEQ values for both dioxins and furans and for dioxin-like PCBs should be clearly discussed and presented. The EE/CA should also show which TEF values were used and how non-detected chemicals were handled.*

2. Review of the data sources identified as being included in the Arkema Database / C167.0101 indicated the only data collected by the Lower Willamette Group, consultants working for Arkema, and consultants working for EPA had been entered as of March 24, 2006. EPA undertook a search of electronic databases available through the University of Washington or online to determine whether other data sources were applicable to this project.
Our review indicates that Arkema has covered all the formal Port of Portland and DEQ data sources, but have not included historical fish tissue data available in USGS reports and some recent literature citation, such as Wentz et al. 1998, Hink et al. 2006, Sethajintanin et al. 2004, and measurements of low-level concentrations using semi-permeable membrane devices (McCarthy and Gale 2001). While these data are not specific to the Arkema site, and are therefore not directly applicable to the selection of the COI list, we consider them as comparable information for bioaccumulation studies at the Arkema site, and would prefer Arkema include them in the CO I data set.

Arkema/LSS Response: As pointed out in the comment, these data are not directly applicable to the site and are therefore not directly applicable to the selection of COIs for the site. However, Arkema/LSS will review the articles in question to assess the additional information they may offer on bioaccumulation of chemicals not already identified from site-specific sources and whether these chemicals should be included as COIs at the Arkema site. Consequently, Arkema would appreciate a pre-print of the article by Hink et al. (in press).

Arkema is responsive. An electronic link to the Hinck et al. abstract is being sent under separate cover. EPA understands that the quality of some of the data in the Hinck document may be unknown or be of unacceptable quality. This should be included in the list of studies and their data quality summary discussed in the third bullet under Revised Data Screen Tables (see above). In discussing all of the biota data, the approach taken by the LWG should be used. Biota results should be shown on figures and discussed in relation to other samples of the same species/body type at the PH site. Much of this work has already been done for the PH samples (see Figures 4-10 b and c in the PH RI/FS Round 1 Site Characterization Summary Report). A similar format should be used for the EE/CA.

3. Only the summary data (minimums, maximums, averages, and medians) were submitted by Arkema in each table. As result, EPA is unable to provide a comprehensive review of data quality. Without inclusion of the actual analytical results it is impossible to track the source and quality of data used to develop the summary results. In many instances throughout the tables, there arc more samples identified than there are sampling stations. Our assumption is that this is probably the result of the averaging of ail samples (vertically and horizontally) and inclusion of duplicates. Please clarify this data presentation.

   Arkema/LSS Response: A table presenting the results of each individual sample screen for each medium is provided as backup to the summary screen table with this interim deliverable. No averaging of samples was performed; rather each sample and each replicate sample was screened individually. Please see the revised presentation (electronic file) attached to this letter.

   Arkema is responsive. See our detailed review comments of the revised data submittals.

4. Although the data presentation is usable for developing the COI lists, it is not well-formatted for subsequent data presentations. The February 27th letter states that figures should be depicted for intervals of 0 to 1 foot, 1.0 – 4.0 feet, 4 to 8 feet, and greater than 8 feet as measured from top of soil or soil/water interface. The purpose of this is to facilitate future decision-making for the Removal Action Area (RAA) delineation. Data averaging over the entire depth of the sampling station is not an appropriate data presentation to satisfy the RAA delineation phase of this EE/CA.

   Arkema/LSS Response: If more than one sample with chemistry results occurs between these intervals, the maximum concentration is displayed on the associated map. The tabular summary includes all the chemistry results for all intervals.

   Arkema is responsive. Also, see our detailed review comments regarding the figures list in Attachment A below.

   To validate assumptions and to complete a review of data quality, Arkema needs to provide a Tabular presentation of all potential COI samples arranged by sample locations and depth intervals as identified above, QA/QC data for each of the above (preferably the QA/QC reports prepared for the various analyses and not individual laboratory QA/QC efforts) and a summary presentation table arranged by depth intervals identified above.

   Arkema/LSS Response: A tabular summary by sample location and depth of all COI samples is provided as back-up for the COI lists. Arkema needs clarification on the request for also including QA/QC data in this summary table because the request is not clear. QA/QC data is not typically tabulated on a sample-by-sample and analyte-by-analyte basis. Arkema can provide a discussion and summary of the data quality evaluation and assessment performed for each study. However, most of these studies are included in the Portland Harbor RI/FS Work plan (LWG 2004) (Appendix F and subsequent updates), which includes a summary of data quality for each study. Please provide clarification for the request of QA/QC reports for each sample and depth interval.

   Our review of the data screening tables was undertaken without benefit of the data sources used to populate the screening tables. At this time, EPA accepts the data sources. However, further QA/QC review may be necessary to validate data derived from other reports. As

discussed above the EE/CA should include a list of studies and their data quality summary (see discussion the third bullet under Revised Data Screen Tables).

5. Our review found that human health screening values were not used to screen in-water sediment or riverbank soils. Arkema also did not adjust the sediment screening values for child recreational beach user from Table C-2 of the draft EE/CA to a cancer risk of 1 x 10^{-6} and a non-cancer hazard quotient of 0.1. This directly conflicts with work plan comments #43, 413, 302, and 460, each of which specify that Arkema should us a cancer risk of 1 x 10^{-6} and a non-cancer hazard quotient of 0.1.

   Arkema/LSS Response: See Arkema/LSS's April 6 email regarding the use of child recreational user scenario. Arkema has not screened to values for a recreational user because it is not appropriate for the site. That was made clear to EPA during the March 3 conference call in which we agreed to continue with the February 27 letter understanding. Arkema's calculated site-specific human health sediment screening values that were based on a principal threats analysis and therefore a cancer risk of 10^{-5} and a non-cancer hazard quotient of 1 was used to identify these principal threat areas. Other screening values that EPA has requested that Arkema use (e.g., Region 9 Industrial Soil PRGs) incorporate a cancer risk of 1 x 10^{-6} or HQ of 0.1.

   Arkema is not responsive to EPA direction to use the hazard quotient of 0.1 for calculating human health screening values. The Region 9 PRGs that were used are calculated with a hazard quotient of 1. Therefore, Arkema shall recalculate non-cancer risk screening values using a hazard quotient of 0.1. Also, the sediment screening levels for DDD/DDE/DDT developed by ODEQ should be included.

   Arkema/LSS Response: See Arkema/LSS's April 6 email regarding the use of human health Region 9 PRGs. Arkema/LSS has agreed to include Region 9 PRGs in the sediment screening. ODEQ's bioaccumulation wildlife screening values will be included along with EPA/DEQ's bioaccumulation values for all PBTs once they are received by Arkema.

   There are no additional PBTs for which screening levels are being developed other than the ones for DDT/DDE/DDD that EPA provided.

6. All of the screening was done against detected analytical results, while the non-detected results are listed but ignored. This might be marginally acceptable provided the appropriate clean-up and analytical methods are used for all of the analyses and the non-detects values are in the ballpark of the detected concentrations. However, this does not seem to be the ease for some media/analytes where several of the non-detected values are orders of magnitude above the detected values. In many cases, the detected value does not exceed the SLV, but the non-detected value does. For example, for groundwater, several chemicals (phthalates, chlorinated solvents, benzene) are not selected as COIs although the non-detect values are above the screening levels.

   Arkema LSS Response: The data screen has been revised to include non-detects.

   To address this problem, we suggest the approach used in the human health risk assessment for the Lower Duwamish Superfund Site (page 25 of LDW RI Appendix B: HHRA, July 3, 2005 at LDWG.org). For those chemicals that do not have detected concentrations above an SLV, this process selects as COIs those chemicals where detection limits in >10% of the samples are greater than an SLV. This is a conservative way to make sure nothing has been missed and can be done efficiently by adding a few columns (additional queries) to the spreadsheets.

   Arkema/LSS Response: The frequency of non-detects that exceeds a corresponding SLV has been added to the summary screen table. Chemicals where detection limits in >10% of the samples exceed an SLV arc highlighted, however, the inclusion of these chemicals as

COIs will be evaluated in the context of the other data (detections and non-detections) for those chemical analytes.

Arkema is responsive. See our detailed review comments of the revised data submittals. The COI list should include all those chemicals where the DL in >10% of the samples exceeded the chronic SLVs. Future FSPs/QAPPs for data collection for the EE/CA should evaluate this list and discuss how detection limits will be improved to achieve the chronic screening levels.

7. The note at the bottom of the Preliminary COI table states that the list is based only on chemicals that are above PEC and other SQV values in sediment samples. Arkema had agreed to use TEC for sediment toxicity and industrial soil PRGs for human exposure to in-water sediment (as stated in previous comments, EPA requires a 1×10^{-6} cancer risk and 0.1 non-cancer hazard for beach sediment screening). This will address potential human health exposure under a child recreational user, which EPA considers a likely future use scenario.

Arkema/LSS Response: See response to comment 5. A child recreational user is neither a realistic current or future use scenario.

EPA has reviewed the Figure 1b of the "Portland Harbor RI/FS Programmatic Work Plan; Appendix C: Human Health Risk Assessment Approach." Based on this review, EPA identified that transient and dockside worker risk scenarios should be applied to calculate screening level values for the EE/CA. However, Arkema needs to propose institutional controls to address future industrial land use scenarios, including fencing and signage, as well as deeds and covenants that would trigger in case alternative land use is proposed in the future.

8. While it is not possible to independently verify the chemicals included or excluded from the preliminary COI list submitted by Arkema, EPA recognizes the following omissions:

- Hexavalent Chromium
- Total PCBs (calculated using both the Aroclor and congener data (where available)
- Dioxin-furan TEQ
- Dioxin-Iike PCB TEQ and the sum of the latter two TEQ values
- Pesticide isomers (such as those of chlordane) that are summed
- Total carcinogenic PAHs
- Manganese
- Perchlorate
- Monochlorobenzene
- Other chemicals that will screen through based on revised approach to dealing with non-detect values (see comment 5).

Rationale and justification must be provided for any proposal that docs not include these COIs on the list.

Arkema/LSS Response: Arkema will submit rationale and justification with the final COI list. Most or the chemicals presented in this list are on the revised COI list presented with this letter.

a. Arkema is partially responsive. The specifically identified chemicals are now included in the COI list, except 1) Dioxin-furan TEQ, 2)Dioxin-like PCB TEQ and the sum of the latter two TEQ values, and 3) Pesticide isomers (such as those of chlordane) that are summed. Arkema stated that it will submit rationale and justification with the final COI list for those not included. (Note: Arkema did not include Dioxin/Furans and Dioxin-Like PCBs on the COI list (only TCDD). In addition to TCDD which is listed as a preliminary COI, dioxin/furans TEQ and

dioxin-like PCB TEQ should also be screened in the tables and included on the COI list. The above referenced Interim Deliverable for Human Health Risk Assessment: Human Health Toxicity Values (October 8, 2004) provides specific information on the methods for calculating the TEQ, as well as methods for dealing with mixtures and surrogate chemicals. Lastly, as previously mentioned the COI list should be modified to include all chemicals that failed the chronic screening values.

9. Contaminant concentrations should be presented in decimal format rather than scientific notation and to follow the standard convention of using ppb, ug/kg or equivalent for organics and ppm, mg/kg or equivalent for metals.

   Arkema/LSS Response: For the revised presentation of the data screens, chemical concentrations are presented in decimal format. The standard units in the Arkema database for ail chemicals are mg/kg or equivalent. To convert and present the data in ug/kg or equivalent units for both metals and organics is extremely time consuming and requires considerable QA/QC. The conversion could not be completed in time to perform the rescreens; however, the revised work plan submittal can include the data in ug/kg or equivalent format if deemed necessary by EPA.

   Arkema is mostly responsive. Presentation of all data in mg/kg format is adequate. However, our review noted that several of the data are still presented in scientific notation. This should be addressed in the next presentation of COI screening.

10. Biota was not discussed. Because there are not screening levels for biota except for Hg (EPA's WCQ has a biota value for Hg but not a water value) and for DDT/DDE/DDD (from the ODEQ document), we would like to see screening of the biota off of Arkema for Hg and for the DDD/DDT/DDE.

    Arkema/LSS Response: As outlined in Arkema's February 2 revised screening approach and EPA's February 27 understanding letter, only abiotic media (sediments and water) are being screened to identify COIs for the site. Although there are a few samples of biota (e.g., sculpins) in the vicinity of the site, screening methods for tissues are not well developed and the data are too sparse to make meaningful judgments. Consequently, biota screening is not included as part of the evaluation. Nevertheless, Arkema will be presenting available, relevant biota data in tables and figures as discussed in the February 2 revised screening approach.

    The absence of biota suggests a significant data gap to be filled as part of the EE/CA process. The revised EE/CA work plan should, therefore, contain a specific analysis of this data gap and present sampling and analysis methods to address this data gap. Arkema needs to consider and compare biota data using methods consistent with the presentation contained in the Portland Harbor RI/FS Round 1 Site Characterization Summary (LWG October 2004)[1]. EPA expects that Arkema will provide some level of comparison of available biota to available sediment data.

11. Transition-zone water samples, peeper data should be included in the screening. Also, please list which six surface water stations from the LWG surface water sampling program Arkema considers relevant to the Arkema Early Action.

    Arkema/LSS Response: Transition-zone water (TZW) sample data were already included in the data screen. The seven surface water stations selected for purposes of screening included W015 (LWG), W016-1 (LWG), W016-2 (LWG), SW01, SW02, SDC, and WL-RIVER.

    Specific TZW data that were excluded from the screening due to data quality or other reasons should be listed by sample number and discussed and any contaminants that are

[1] *http://yosemite.epa.gov/R10/CLEANUP.NSF/6d62f9a16e249d7888256db4005fa293/31ae45c9c90a674988256e470062ced9/$FILE/2004-10-12_-_R1_SITE_CHARACTERIZATION_SECTION_4_FIGURES_2_OF_3.pdf*

above the chronic screening levels should be added to the list of COIs. EPA has reviewed the surface water sample locations and has determined additional surface water data will be necessary to establish baseline conditions for in-water work. Arkema will need to identify surface water quality as a data gap to fill during the EE/CA process.

12. According to EPA's ERA Guidance for Superfund, one of the first steps in a screening-level risk assessment is "the establishment of contaminant exposure levels that represent conservative thresholds for adverse ecological effects." These levels "should represent a no-observed-adverse effect-level (NOAEL) for long-term (chronic) exposures to a contaminant," In lieu of NOAELs for screening sediment evaluation, the more conservative of any of the various sediment quality guidelines can be used; hence, sediment screening should be based on the ERL, TEL, TEC or equivalent values rather than on ERM, PEL, or PEC values. Arkema's proposed approach does not appear to be consistent with the ERA guidance for screening level risk assessments. While both TEC and PEC values are included in Table 2 (Sediment Samples Summary), the highlighting of contaminants for inclusion in future evaluations is apparently based solely on a comparison to the PEC or equivalent value. This is not consistent with the agreements reached during the dispute discussions or EPA's February 27th letter of understanding.

    Arkema/LSS Response: The process described in this comment does not accurately describe what Arkema completed, Arkema screened all data using the SLVs as described in the summary tables. Any chemical that was greater than an SLV for the appropriate media was highlighted and flagged for inclusion for the EE/CA screening that is still being completed.

    While EPA recognizes that Arkema did screen against chronic SLVs, EPA requires that all contaminants exceeding a chronic SLV be identified as a COI. Additionally, EPA requests information on Arkema's proposed criteria for delineating the Removal Action Area prior to completing the revised draft EE/CA work plan.

13. Screening Tables - The new screening tables should include:

- A column to show which sample number was selected as the maximum value for purposes of screening.
- A column that shows which SLV(s) were exceeded and used to define a chemical as a COI. If frequency is used as the selection criteria (see next comment), it should also be shown in this column.
- Columns that show the (a) maximum non-detected result, (b) percent of non-detected results, and (c) percent of non-detected results that are above an SLV. If a chemical is not selected as a COI because there is no detected value above an SLV, it should still be selected if 10% or greater of the non-detect values are above an SLV.

    Arkema/LSS Response; Additional columns as described above have been incorporated in the revised summary screen tables. The second bullet has also been addressed by providing a back-up individual sample screen table for each dataset (sediment, riverbank, TZW, ground water, and surface water). Each SLV exceedance is highlighted in the individual sample screen tables using a color keyed to the corresponding SLV (see attached electronic file).

    Arkema is responsive. See our detailed review comments of the revised data submittals.

14. Recent LWG sediment data should be considered in the data screening, including the relevant archived sediment cores, the PCB congener samples and Round 2B sediment cores.

    Arkema/LSS Response: The original data screen included the LWG's relevant PCB congener sample data; however, relevant archived and Round 2B sediment core data have not yet been uploaded to the Arkema database. Uploading new data could not be

completed in time to perform the rescreens; however, the revised work plan submittal can include these LWG data.

EPA requires this information to be presented before the final COI list can be completed. EPA will consider any future COI lists that do not contain this information as non-responsive.

15. Recent LWG groundwater data should be considered in the data screening.

Arkema/LSS Response; All relevant LWG groundwater data collected by acceptable methods arc already included in the Arkema/LSS database, data summary tables, and data screen.

Arkema is responsive.

16. The table notes indicate that a dashed line means there are no SLVs. We assume that a dashed line in a column such as "# Detected Results Exceed SLV (PEC or other SQV Toxicity)" is supposed to mean "0." Please revise accordingly and clarify in the next submittal.

Arkema/LSS Response: The summary screen table has been revised accordingly.

Arkema is responsive. See our detailed review comments of the revised data submittals.

17. To avoid confusion with different analyte names, isomers, combinations of fractions, etc., add a column for CAS numbers in the tables. If a CAS number is inadequate, use the same name as the source document or provide a footnote to describe.

Arkema/LSS Response: The summary screen table has been revised to include CAS numbers accordingly.

Arkema is responsive. The summary tables include CAS numbers, but they are missing from the individual tables. Please include CAS in the individual tables.

18. There seems to be inconsistent reporting of Aroclor SLV values which need clarification. Examples include:

- For individual Aroclor Fish SLVs, total PCB value was used,
- For individual Aroclors PRO SLV values, Total PCB SLV values were used, except for Aroclor 1016 and Aroclor 1254 where the individual drinking water PRG SLV was used,
- No individual values were entered for the drinking water MCL SLV.
- The total PCB value was entered for the Ecological Receptor SLV even though individual values were available for most of the Aroclors.

Please respond by providing consistent reporting of Arochlor [sic] SLV or written clarification on the reporting approach.
Arkema/LSS Response: Aroclor SLVs have been checked to match the JSCS Table 3-1. Individual Aroclor SLVs are available for Tap Water PRGs, Oak Ridge National Laboratory (Tier II SLV), PECs and other SQVs, and DEQ's Bioaccumulative Sediment SLVs. Total Aroclor SLVs are available for all except DEQ's Bioaccumulative Sediment SLVs.

Refer to response to Comment 9 and reference data screening rules contained in the Interim Deliverable for Human Health Risk Assessment: Human Health Toxicity Values (October 8, 2004). The EE/CA, including the screening and evaluation of COI, must be consistent with both the JSCS and the PH RI/FS methods used for human health risk assessment, including dealing with mixtures, surrogates and calculating TEFs.

19. For most (but not all) metals and most (but not all) pesticides "dissolved" values were reported as well as values that are not marked as "dissolved". It is unclear what form the compounds not

labeled with "dissolved" are (i.e. total, total recoverable, etc.). Clarification as to why the same SLVs values are used for the "dissolved" compounds and the ones not marked "dissolved" needs to be provided.

Arkema/LSS Response: Compounds that are not labeled with "dissolved" are "total". The screening tables have been revised to clarify this nomenclature.

Arkema is responsive.

20. In JSCS Table 3-1, perchlorate is categorized as Metal/Inorganic, whereas the Arkema table has it categorized as Conventional. Please clarify the reporting of perchlorate.

Arkema/LSS Response: Perchlorate has been categorized as Metal/Inorganic in the revised screening tables.

Arkema is responsive. However, it would help for individual data presentation of screening tables if the group headings could also be provided.

21. Hardness dependent metals values in the JSCS Table 3-1 were calculated based on 25 mg/l CaCO3. In the Arkema table hardness of 28.8 mg/l (of an unspecified compound) was used in the calculations of acute and chronic guidance values. The Arkema table further indicates the hardness equivalent CaCO3 = 2.5(mg/l Ca) + 4.1(mg/l Mg); "Hardness was based on Ca and Mg concentrations (7.4 and 2.5 mg/l, respectively) detected and pH field measurements in water samples from the Willamette River. Clarification of why the hardness calculation used in the Arkema table does not seem to equate to the one used in Table 3-1 needs to be provided.

Arkema/LSS Response: As stated above, Arkema adjusted the metals acute WQC for hardness using actual CaCO3 measurements collected from the Willamette River. The acute WQC SLVs in the current revision reflect hardness values from the seven surface water samples listed in the response to comment 11. The adjustment was made to comply with guidance provided in DEQ's Table 33B (OAR 340-041-0033).

Arkema is responsive.

22. For alpha-, beta-, delta-, and gamma-Hexachlorocyclohexane [sic], the Arkema table has drinking water PRG SLV and Eco SLV values, but these chemicals do not appear in the JSCS Table 3-1. This is also true for trans-Chlordane and 4-Chlor-3-methylphenol. Providing CAS numbers in the tables may provide the needed clarification.

Arkema/LSS Response: The compounds listed above have been checked to match JSCS Table 3-1 (December 2005). Please note that hexachlorocyclohexane (HCH) is synonymous with benzene hexachloride (BHC), which is provided in Table 3-1,

Arkema is responsive. However, please note Table 1 in Toxicity Values in PH/FS Interim Deliverable of Human Health Risk Assessment: Human Health Toxicity Values which lists the HCHs and their toxicity values as well as surrogates for some of these chemicals.

23. An Ecological Receptor SLV is entered in the Arkema table for 'Tributyltin ion" of $6.3x10^{-5}$ mg/l but no value for 'Tributyltin". Table 3-1 contains a value of 0.072 ug/l for Tributyltin and no listing for "Tributyltin ion'. Please clarify.

Arkema/LSS Response: Because tributyltin is not defined in the JSCS Table 3-1, an assumption was made that tributyltin is reported as ion. Based on our experience with this compound over the past ten years, analytical laboratories have generally reported tributyltin as ion, so it was assumed to be the same intention of Table 3-1.

Arkema is responsive.

24. The Eco SLV value for 2,3,7,8-Tetrochlorodibenzo-p-dioxin [sic] is incorrect and should be $3.8x10^{-7}$.

    Arkema/LSS Response: The Eco SLV for 2,3,7,8-TCDD remains $3.8x10^{-8}$ mg/L, JSCS Table 3-1 is incorrect. Please see the referenced source document for the correct value, DEQ's Table 33C (OAR 340-41).

    Arkema is responsive.

25. Manganese is inconsistently reported. It is not reported at all in the surface water section, it is reported as "dissolved" in the groundwater section, and is reported an both Manganese and Manganese (dissolved) in the transition zone water section. Please clarify,

    Arkema/LSS Response: Manganese is reported correctly in the screening tables. Manganese (and metals in general) were from several different studies and were not analyzed consistently across water sample types. If the value is not dissolved, then it is a total value, if it is not reported in a table then there are no data for that sample.

    Arkema is responsive.

26. There are no SLV values for Total of 4-4'-DDD, -DDE, -DDT in JSCS Table 3-1, yet a drinking water PRG of 2.0x10-4 and Eco SLV of 1.1x10-3 are reported. This needs clarification.

    Arkema/LSS Response: The SLVs as stated above appear to be correct. No revisions were made. A total DDT SLV is available for the Tap Water PRG in JSCS Table 3-1 (0.2 ug/L). Using 4,4' isomers of the metabolites is consistent with the Region 9 PRG source document that has values for only 4,4' isomers.
    The source document for the Eco SLV of $1.1x10^{-3}$ was also consulted prior to screening. Footnote "T" of DEQ's Table 33A indicates "the criterion applies to DDT and its metabolites". Again, only the 4,4' isomers are shown in the source document

    Arkema is responsive. However, for the COI screening the sum of the 2,4' and 4, 4' isomers should be calculated for DDD, for DDT, and for DDE and used in the screening as per the PH human health toxicity data guidelines.

27. For the individual analytes m,p-Xylene and o-Xylene in the groundwater sample summary the MCL for Xylenes (total) is reported. Please explain the rationale for this, especially since the MCL is not reported in the line for Total xylenes.

    Arkema/LSS Response: Xylene SLVs have been checked and revised to match the JSCS Table 3-1.

    Arkema is responsive.

28. Please clarify why there are no mercury data for groundwater.

    Arkema/LSS Response: There are no nearshore groundwater samples with mercury data. It should also be noted that Arkema's Portland plant never operated mercury based chlorine cells.

    Arkema is responsive.

Revised Data Screening Tables

General Comments

Quality control checks were conducted on tables provided by Arkema. However, these tables did not include the raw data from laboratory reports. Therefore, the accuracy of the data utilized in the data

and summary tables could not be verified. EPA expects that Arkema will address the specific comments as they continue to develop the revised draft EE/CA work plan.

Data Tables & Summary Tables

- Data qualifiers (U, J, T) need to be defined in table footnotes.
- Footnotes for data tables are incomplete and, in some cases, inaccurate. There are numerous abbreviations (e.g., "FR", "D") that are not defined in the footnotes. For example, the note "Only detected results have been screened" contradicts Arkema's response 6 in their letter dated April 25, 2006. Please standardize and correct the footnotes.
- Depth intervals are often missing or defined as "0". Please accurately define the depth intervals for groundwater and sediment data tables.
- Some sample values appear to be identical to screening values. It is not clear (based on significant figures) if the sample values are truly identical to SLVs or are above/below the SLVs.
- Some values in the data tables are still in scientific notation.
- Color coding between tables is inconsistent, please provide accurate and detailed footnotes for coloring schemes.
- There are numerous blank cells throughout the data and summary tables. Please add an identifier (e.g., "none" or "--") to define missing data. Add definition of identifier to the footnotes.
- Add CAS numbers to Data Tables. They are in the summary tables but not the data tables.
- Please separate chemical groupings in the data tables with a header (e.g., Metals/Inorganics, PCBs, PAHs, Volatiles, etc.).
- Please add lines between chemicals in the data tables to accelerate QA/QC activities.
- Summary Tables. Column: "SLVs Exceeded to Define Chemical as COI", please add commas between the noted SLVs.
- Summary Tables. Column: "Median value", please add the median values or delete the column. It is currently blank.
- Summary Tables. Column: "Number of DLs that exceed SLVs". It would be more appropriate to define this column as "Number of samples with DLs exceeding SLVs."
- It would be helpful for Arkema to take a two-tiered approach to explaining whether an analyte should be on the COI list. Tier one: Reported value exceedance of SLV triggers thereby automatically adding the analyte to COI list. Tier two: Undetected reported value exceedance of one or more SLV triggers thereby adding the analyte to the COI list. Information to this effect needs to be included in the summary tables. This would clarify the direct relationship of the summary tables to the preliminary COI list.
- Regarding comment 8 in Arkema's letter dated April 25, 2006: Arkema does not include Dioxin/Furan TEQs and Dioxin-Like PCB TEQs on the COI list (only TCDD). Dioxin/furan TEQ and dioxin-like PCB TEQ should also be included on the COI list. The method used to calculate TEQs, including how detection limits were handled and what TEFs were used, should be included in the EE/CA.

Surface Water JSCS Screening Highlights table

- Purple highlights related to tap water PRGs are not highlighted in screening level column. This should be added for consistency and to avoid confusion where results are highlighted in orange indicating 2 or more SLVs exceeded. Without purple highlight, only one SLV shows an exceedance (for orange highlights).
- Surface water depths are either zero or null (no value), and only one shows at 0.5 feet. This seems to be a mistake since the water depth is probably not actually 0. Also, why are there 0 and null values?

- There are no footnotes for this table. For example, no explanation for highlighting values different colors and what they mean, and no explanation for sample types.

Surface Water Summary Table

- In, the column heading "# DL Exceeds SLV" is misleading. The heading should state "# of Nondetected Results that Exceed SLV" or similar. Current heading could be interpreted as the # of detection limits that exceed the SLV, and not the number of sample results.

Riverbank JSCS Highlights table QA comments

- Sample SD1006A includes data for only one analyte, with a result of zero. Please clarify how this sample relates to other samples at this location.
- The table footnotes need to be checked for accuracy and applicability to this table. For example:
- The note "Chlordane TEC has been applied to Chlordane (cis & trans), cis-Chlordane, trans-Chlordane, and Total Chlordanes" is incorrect because the TEC has not been applied to cis-Chlordane or trans-Chlordane, and Total Chlordanes are not included in this table.
- The note "Only detected results have been screened" contradicts Arkema's response 6 in their letter dated April 25, 2006.
- These are only two examples. All footnotes need to be checked for accuracy.
- The following SLVs are incorrect, possibly due to rounding errors, correct SLVs are provided:

Analyte	SLV	Correct Value (mg/kg)
Phenol	Toxicity	0.05
Bis(2-ethylhexyl)phthalate	Toxicity	0.800
Dibutyl phthalate	Toxicity	0.1
Diethyl phthalate	Toxicity	0.6
1,2-Dichlorobenzene	Toxicity	1.7
1,3-Dichlorobenzene	Toxicity	0.3
1,4-Dichlorobenzene	Toxicity	0.3
Carbazole	Toxicity	1.6
Hexachlorobutadiene	Toxicity	0.6
Hexachlorocyclopentadiene	Toxicity	0.4
Tetrachloroethene	Toxicity	0.5

Riverbank Soil Samples Summary table

- This table should be modified to include all relevant samples, including those up to the river bank and the 2 PH RI beach samples that are missing (07B024 and 07B022).
- The results in the column "SLVs exceeded to define chemical as COI" does not have correct data in all cases. For example: Benzo(a)pyrene should have Toxicity as well as Reg 9 and TEC. 3,3'-Dichlorobenzidine should have Reg 9 Ind. Fluorene should have TEC.

Transition Zone Water JSCS Screening Highlights

- According the Arkema JSCS Screening Approach table, Perchlorate was screened to the SCAT SLV. That being the case, Perchlorate should have no orange highlights. Also samples LWP1-T-CP06Cfilt and LWP1-T-CP06Cunfilt should not be highlighted. These are just two examples identified by QA checks. There may be others.
- Perchlorate should also be screened against the Region 9 PRG values using an HQ of 0.1.
- The table needs to identify specifically which samples are peeper data.
- The text of the EE/CA should identify all TZW samples (by number) that were eliminated from the chronic screening because of data issues. These samples need to be reviewed to ensure that any COIs that would have been included by a chronic screening will be added to the COI List.

TZW Samples Summary Table

- The list of included samples in the Arkema JSCS Screening Approach table is incorrect. Station CP08D-2 is not included in the data and summary tables. Also several stations are duplicated in the list.
- The results in the column "SLVs exceeded to define chemical as COI" does not have correct data in all cases. For example: Ethylbenzene should have Eco, and Perchlorate should not have PRG.

Sediments JSCS Screening Highlights tables

- Verified that the samples listed in the JSCS Screening Approach Section 2.2 Sediment were all included in the data tables.
- The following are discrepancies found in the table footnotes:
  - Footnote: cis-1,2-Dichloroethene Region 9 Industrial PRG has been applied to 1,2-Dichloroethene. - - 1,2-Dichloroethene is not on the Analyte list.
  - Footnote: Chlordane (technical) Region 9 Industrial PRG has been applied [sic] to Chlordane (cis & trans) - - Chlordane (technical) is not on the Analyte list The concentrations for the chlordane isomers (alpha-chlordane, trans-chlordane, cis-nonachlor, trans-nonachlor and oxychlordane) should be summed and compared to the Region 9 PRGs for technical Chlordane. Footnote: 4,4'-DDD Region 9 Industrial PRG has been applied [sic] to Total of 4,4'-DDD, -DDE, -DDT. - - The isomers 2,4' and 4, 4' DDT should be added and compared to the Region 9 PRGs for DDT. This should also be done for DDE and DDD. Footnote: 2,3,7,8-TCDD Region 9 Industrial PRG has been applied [sic] to 2,3,7,8-TCDD TEQ - - There are no SLVs listed for 2,3,7,8-TCDD TEQ.
  - Footnote: Only detected results have been screened [sic] - - Clarify what is meant by screened.
  - Footnote: Chlordane TEC has been applied [sic] to Chlordane (cis & trans), cis-Chlordane, trans-Chlordane, and Total Chlordanes. - - Chlordane (cis & trans) is the only Analyte for which SLVs have been provided. See bullet 2 above.
  - Footnote: Total DDT TEC has been applied [sic] to Total of 4,4'-DDD, -DDE, -DDT. - - There is no TEC SLV provided on the table for Total of 4,4'-DDD, -DDE, -DDT. See bullet 3 above.
  - Footnote: Total PAH TEC has been applied [sic] to High Molecular Weight PAH, and Low Molecular Weight PAH. - - There is no TEC SLV provided on the table for High Molecular Weight PAH and Low Molecular Weight PAH.

Sediment Summary table

- The results in the column “SLVs exceeded to define chemical as COI” does not have correct data in all cases. For example: Dieldrin is missing Region 9 Industrial PRGs.

Groundwater JSCS Screening Highlights

- No problems except that values that were equal to the MCL SLV were not highlighted, checks were changed to approximately 1 in 20 lines. Check your methodology to determine whether equal values should be highlighted or not.
- The list of groundwater stations in the JSCS Screening Approach table 2.5 Groundwater, was verified as reported in this table.
- There is only 1 date of sampling for B-117 and there are only 6 chemical values for that sample. Check that this is the case.
- All but 26 of the groundwater samples checked have depths of either 0 or null associated with them. Accurate sample depths should be provided.
- The Ecological Receptors DEQ’s AWQC(acute) SLV is highlighted instead of the DEQ’s 2004 AWQC(chronic) for 2-Chlorophenol on page 2. According to the Arkema JSCS Screening Approach, the DEQ’s AWQC(acute) should be the final tier and not used first.
- The upper depth on GW06100201 is deeper than the lower depth but 2 of the groundwater samples have depths of either 0 or null associated with them. Please check and provide accurate sample depths.

Groundwater Summary table

- All Chrysene values were checked and no discrepancies were found.
- All Hexachloroethane values were checked and the only discrepancy found was the mean was calculated to be 0.004292593. This value should be recalculated.
- The column “SLVs exceeded to define chemical as COI” was checked approximately one in every 20 for the summary to verify the correct SLVs were listed. No discrepancies were found.

Revised Preliminary COI and Figure List

The Revised COI List is not responsive:

- The COI list should include all chemicals that failed the screening against the chronic screening levels.
- Until data are collected for hexavalent chromium, the total chromium results will be considered to be equivalent to hexavalent chrome; therefore, hexavalent chrome should be added to the COI list for the solid phase media
- Sum of 2,4’ and 4,4’ DDD; sum of 2, 4’ and 4,4’ DDE, and sum of 2,4’ and 4,4,’ DDT should be added.

Based upon the availability of data and the results of the chronic screening, the following may also need to be added:

- total PCBs calculated as the sum of PCB congeners
- dioxin/furan TEQS
- dioxin-like PCB TEQS
- the sum of the later two TEQ values.

The Figures list submitted by is partially responsive. However, the following are needed:

- The COIs of 1) Mercury, 2) Dieldrin, 3) Endrin, 4)Dioxin-furan TEQ, 5)Dioxin-like PCB TEQS and the sum of the latter two TEQ values, 6) Pesticide isomers (such as those of chlordane) that are summed, and 7) Sum of 2,4' and 4,4' DDD; 2, 4' and 4,4' DDE, and 2,4' and 4,4,' DDT need to be included in the Figures list unless justification and rationale is provided to demonstrate why it is not appropriate for their inclusion.
- The volatile organic carbon (VOC) COIs need to be addressed comprehensively and mapped to provide understanding of this class of chemicals. Figures adequate to demonstrate the distribution for these chemicals as a group or separately (using designated VOC indicators) need to be developed. The VOCs to address in developing these figures include:
    - 1,1,2,2-Tetrachloroethane
    - 1,1,2-Trichloroethane
    - 1,1-Dichloroethane
    - 1,2-Dichloroethane
    - 1,2-Dichloropropane
    - 2-Chlorophenol
    - Benzene
    - Carbon disulfide
    - Carbon tetrachloride
    - Chloroform
    - Methylene chloride
    - Tetrachloroethene
    - Toluene
    - Trichloroethene
    - Vinyl chloride
    - m, p-Xylene
    - Isopropylbenzene
    - Ethylbenzene
    - 1,4-dichlorobenzene
    - Bromochloromethane
    - O-Xylene

CSMs (Ecological Receptors and Human Health Risk Assessment)

- Arkema was non-responsive to EPA's previous request for CSM development. As discussed during our telecon on May 11, EPA requires (and Arkema has agreed) that the CSMs will be redone to reflect EPA's request for using the Portland Harbor-wide CSMs and identifying the pathways and receptors that will be addressed as part of the EE/CA and the remaining elements that will be addressed either as part of the upland source control or the on-going Portland Harbor RI/FS. EPA encourages Arkema to inquire to the EPA technical team to ensure completeness of the CSMs and assumptions regarding pathways and receptor populations.

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

June 12, 2006

Reply To
Attn Of: ECL-110

Todd Slater
486 Thomas Jones Way
Exton Pennsylvania 19341

Subject: Comments on Interim Deliverables; Figures for Aqueous Phase Contaminants of Interest

Dear Mr. Slater:

EPA and its partners have reviewed the interim submittal of figures displaying the distribution of aqueous phase contaminants of interest (COI) at the Arkema Portland Harbor facility. Generally, we found the figures lacking in sufficient detail to a) assess contaminant distribution, b) evaluate potential sources and pathways that could contribute to contaminant flux and recontamination potential, and c) allow the government team to adequately understand the conditions at the site which will represent the baseline for measuring short term impacts and long term effectiveness of early actions.

In reviewing this submittal, it is apparent that Arkema is presenting in the figures solely the results of the EE/CA screening. On several occasions (most recently our May 18 telecon), Arkema has agreed that figures would display all data (both chronic and acute) for those COI for which figures were developed. This is not the case for the figures submitted with this interim deliverable. Based on the absence of complete data presentation, EPA is unable to provide meaningful specific comments on each figure and is only providing the following comments which apply to all figures.

1. The source of screening level values (SLVs) is not clear. The Joint Source Control Strategy (JSCS) document table 3-1 provides chronic SLVs for human health (MCL and PRG) for most COI, which apparently were not used in developing figures. The sole use of ecological SLVs is not acceptable and EPA has continually communicated that the data presentation must include human health SLVs[1]. Arkema shall provide figures in the revised EE/CA work plan that compare surface water, groundwater, and transition zone water to the most conservative chronic SLV listed in the JSCS for each COI., Arkema shall consider all the human health and ecological receptor values for water as shown on Table 3-1 of the JSCS and shall cite the source of SLVs selected for each COI on the figure.
2. The figures do not utilize isopleths or iso-concentration contours to depict the limit of chronic and acute COI concentrations. The figures also fail to display the limits of COI at differing depths. EPA has continually and clearly expressed the requirements for figure presentation[2]. Arkema shall provide figures in the revised EE/CA work plan that use isopleths to depict the extent of COI exceeding acute and chronic SLVs. This may include multiple isopleths to depict multiple chronic or acute values. Arkema shall also provide figures that show the extent of COI exceeding acute and chronic SLVs at varying depths. This may involve multiple figures for a single COI.
3. The figures misrepresent the available information. For example, DDE concentrations are present in the data that exceed chronic SLV for human health as presented in the JSCS and other

[1] Work Plan comments 458 and 462, Data screening section of EPA's February 27 letter.
[2] Work Plan comments 300, 301, 451, 455; Figure section of EPA's February 27 letter.

screening tables. The figure does not present the human health chronic SLVs, thereby misleading the reader as to the extent of COI at the site. As directed in comment 1 above, Arkema shall use the most conservative JSCS or screening table SLV for depicting the extent of COI at the site.

4. The figures, as presented, do not consider detection limit values. In numerous instances, non-detect values greatly exceed chronic SLVs. Arkema shall provide detection limit information on the figures in a manner that allows EPA to assess potential data gaps. Arkema shall use non-detect data which is substantially over the relevant SLV. The focus should be to provide information on the distribution of data outside of the basic boundary of an RAA that may be established by the extent of other chemicals (e.g. DDT). Essentially, EPA considers that non-detects inside the RAA are not as relevant to the EE/CA evaluation as non-detects outside RAA, which will add uncertainty to setting RAA limits.

5. In the EE/CA, Arkema will need to develop water (and sediment) figures that comply with our comments for mixtures and other chemicals. For example,

    a. Figure for 2,3,7,8, TCDD – dioxin/furan TEQs also need to be computed and mapped
    b. Figure for Aroclors – if available, TEQs based upon PCB congeners should be computed and mapped as should total PCBs based upon the sum of Aroclors.. Total TEQ from the sum of dioxins and furans and dioxin-like PCBs should be mapped.
    c. 4,4' DDD, DDE, and DDT - the sum of the 4,4' and 2,4' species should be computed and mapped.
    d. hexavalent chrome – if hexavalent data is not available, the assumption is that all chrome is hexavalent.
    e. Sum of PAHs – the sum of the carcinogenic PAHs should be computed as B(a)P equivalents and presented on the figures using the screening value for B(a)P. This would help deal with the lack of data presentation for many of the PAHs (other than B(a)P and benzo(a)anthracene) that do not exceed acute values.
    f. The sums of chlordanes and endosulfans (as per the human health PH RI human health guidance) should be presented on the maps.

6. The Although chronic or acute water quality criteria and MCLx10 may have been the useful criteria in selecting which chemicals would have figures, these are not necessarily the criteria that are useful for presenting the distribution of chemical concentrations in sediment and water. Having colors represent a range of chemical concentrations is helpful, but when these coincide with screening criteria that are not available, then data are not presented. At least 19 chemicals do not have MCL values, and it is useless to have MCLx10 as a method to present data because by using this criterion, data are then not presented. For example for the DDT figure, there is no way to determine how much certain data exceed the acute water values when the higher criterion, (MCLx10) is not available. For the COI that have no chronic screening criteria, Arkema shall present detected values and detection limits for each sample location. For COI with no acute criteria, Arkema shall use 100X the chronic SLV as a default acute value. The chronic and acute values shall be shown on the figures using isopleths as directed in comment 2 above.

7. The figures do not show sufficient upland remedial investigation data. Many of our previous conversations and communication have cited the requirement to show COI distribution from the upland source area to the waterward limits of the data[3]. In most all instances, the depiction of upland data is not adequate for assessing potential upland source areas as identified in the RI

[3] Work plan comment 161; EPA letter of February 27.

report of parcels 3 and 4 and Lot 1 and 2 data from previous investigations. There is a substantial data set (some that was shown in the draft EECA) of COI concentrations in the uplands that need to be shown to assess RAOs involving recontamination and contaminant flux across the RAA. Therefore, Arkema shall expand the presentation of data to include upland RI data on EE/CA figures.

8. EPA needs cross-sections to be prepared for some of the key compounds (DDT, perchlorate, chlorobenzene, chromium, chlorides, and others that may be relevant based on data review). A key issue in presenting COI data in cross sections is that the cross-sections must be done along the axis of each plume from the source areas to the edge of the data in the river sediments. Cross sections will, therefore, have different alignments for different COI. Cross section alignments should be shown on COI specific plan view maps. Arkema shall use isopleths to show the boundary of acute and chronic values on the cross sections.

9. EPA needs to see the specific data that represent the distribution of chronic and acute conditions for each COI. This is necessary to allow for quality review and validation of the figures and COI distribution. Several methods are available to depict the data on the figures. Adding data labels to sample locations, providing inset data tables; or having data tables on the adjacent page are all acceptable options for presenting the data. To address this need, Arkema shall present data, including, but not necessarily limited to location identifier, concentration, detection limit, and depth on the figures for all solid phase and aqueous phase data

10. EPA has yet to receive solid phase figures. The absence of solid phase data may result in additional comments to the aqueous phase figures. As discussed in our February 27 letter, EPA requires a comparative presentation of sources, pathways, and exposure points, which requires a visual comparison of aqueous and solid phase data.

EPA encourages Arkema to continue to prepare the revised EE/CA work plan to meet our agreed to date of July 14. Incorporating these comments will be essential to meeting EPA's expectations for the revised work plan. To support this effort, we are available to answer questions and provide clarification on this or other correspondence. We are particularly interested in any further questions you may have or any further discussions you would like to have regarding the conceptual site model or outstanding data screening concerns.

Please contact me at (206) 553-1220 or Sheldrake.sean@epa.gov with questions or concerns.

Sincerely,

Sean Sheldrake, RPM

Enclosure

cc: Dana Davoli
Carl Kassebaum
Larry Patterson
David Livermore
Lori Cora

Sylvia Kawabata