UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 10
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140

MAR 2 4 2015

OFFICE OF
ENVIRONMENTAL
CLEANUP

Mr. Bob Wyatt
Chairman, Lower Willamette Group
c/o Northwest Natural
220 Northwest Second Avenue
Portland, Oregon 97209

Re: Dispute Decision Regarding Lower Willamette Group Dispute dated August 26, 2014, Portland Harbor Superfund Site, Administrative Order on Consent for Remedial Investigation/Feasibility Study, U.S. EPA Docket Number CERCLA-10-2001-0240

Dear Mr. Wyatt:

This letter sets forth my determination with respect to the Lower Willamette Group's August 26, 2014, request for dispute resolution regarding EPA's August 12, 2014, decision that certain outlier sample results would be excluded from the dataset used for calculating background sediment concentrations for the Portland Harbor Superfund Site (Site), and the methodology by which EPA excluded such data. In summary, I hereby determine and direct LWG to:

1. incorporate the changes EPA made to Section 7 of the draft RI into the final draft RI report;
2. complete background threshold values for the other 23 contaminants by use of the methodology EPA employed to determine background sediment concentrations for the contaminants of concern; and
3. submit background calculations for the other 23 contaminants to EPA within thirty days of the date of this decision.

Background

This dispute is raised pursuant to Section XVIII of the Administrative Settlement and Order on Consent for the RI/FS ("AOC").[1] The RI/FS AOC requires ten parties to perform a remedial investigation/feasibility study for the Portland Harbor Superfund Site.[2] These 10 parties and four other parties comprise the Lower Willamette Group. The LWG purpose includes performing the Portland Harbor RI/FS on behalf of its members and for the purposes of this decision the LWG will be used as shorthand for the 10 AOC signatories, who are ultimately responsible for performing the RI/FS.

In satisfaction of its obligation to perform the RI/FS, LWG developed and, on or about August 29, 2011, submitted a draft RI to EPA. Section 7.0 (*Determination of Background Concentrations for Indicator Contaminants)* of the draft RI documented LWG's methodology for calculating background contamination for the Portland Harbor Superfund Site.

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[1] I*n the Matter of: Portland Harbor Superfund Site*, Administrative Order on Consent for Remedial Investigation/Feasibility Study, U.S. EPA Docket Number CERCLA-10-2001-0240 (the "AOC").
[2] The signatories to the RI/FS AOC include Atofina Chemical, Inc., Chevron USA, Inc., Gunderson, Inc., Northwest Gas, City of Portland, Port of Portland, Time Oil Co., Conoco Phillips Company (formerly Tosco Corporation), Union Pacific Company, and Oregon Steel Mills, Inc.

The EPA did not approve Section 7 of the submitted draft RI. Instead, and after efforts to resolve disagreements regarding the background analysis, the EPA, by email, provided LWG with a final revised version of Section 7 on August 12, 2014.[3] This email confirmed EPA's final decision to exclude certain data as outliers for calculating background for indicator contaminants, identified the methodology for completing background calculations for 23 other contaminants, and directed LWG to complete background calculations for these contaminants by use of the identified methodology.[4] The LWG disputes EPA's decision to exclude outliers for the purpose of determining background values for indicator contaminants and the methodology used for such determination.[5]

The Issues

In its request for dispute, the LWG contends that EPA erred on many points which were focused on how constituents from upstream sources will be "transported to and deposited within the Site,"[6] and that "EPA removed data that best represent the background sediment contamination concentrations upstream of the Site that are most likely to be transported downstream and deposited into the Site."[7] As such, this dispute addresses a significant component of a CERCLA cleanup – the establishment of background threshold values.

The Portland Harbor Superfund Site primarily involves contaminated water and sediment within the Willamette River. The study area for the Site extends from the Columbia Slough to the Broadway Bridge, roughly a distance of 10 river miles. The contamination resulted from more than a century of industrial use along the Willamette River and within Portland. The reference area selected for the Portland Site is an up-gradient portion of the Willamette River that is unaffected by releases within the Site. The reference area has physical characteristics that are similar to the Site and was selected as an area that was also representative of the larger Willamette River watershed. Because the physical characteristics of the reference area are similar to the Site -- the river within the reference area begins to widen and its currents begin to slow relative to the up-gradient Willamette River – sediment loading within the reference area approximates the upstream sediment loading that occurs within the Site, i.e. the deposition of suspended sediment occurring within the reference area is broadly representative of the suspended sediment deposition occurring within the Site. However, in this regard the reference area is less than perfect since it is located within an urban/suburban area and its location presents the possible presence of contaminated sources within its footprint. The reference area begins approximately four miles up-gradient of the Site and includes approximately 13 river miles. Water flows downstream and sediment can come along for the ride. By consequence, contamination or relatively clean sediment in the reference area may end up in the Site.

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[3] See, August 12, 2014 email from Deb Yamamoto to Margaret Kirkpatrick subject *Response to Background Issue Raised During the EPA/LWG Senior Managers Call* and its attachment.

[4] EPA's Response to LWG August 26, 2014 Request for Dispute Resolution, October 3, 2014, (hereinafter referred to as "EPA's Response") at p. 5.

[5] LWG Request for Dispute Resolution of EPA's Notice of Decisions on Background Regarding Section 7 of the Remedial Investigation; Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240 (hereinafter referred to as the "LWG's Dispute Request").

[6] LWG Dispute Request at p. 3

[7] *Id.* at p. 4

It is important for the purposes of this dispute to understand the role of "background" as it is used in the Superfund remedial process. The EPA has generally attempted to clarify this concept through various guidance documents dating back to the late 1980s. Generally, background provides a point of departure for EPA and others to compare a Superfund site to surrounding areas that otherwise have not been affected by releases of a contaminant/constituent. Through this comparison, one can begin to understand the magnitude of the impacts of a release or releases to the environment. Those effects are presented through the risk assessment process. To establish this baseline of comparison, the Superfund Remedial program endeavors to determine the typical level of a given contaminant that is likely to be encountered assuming there are no other contributing man-made or natural sources. This provides a basis for determining the risks a site may pose and what cleanup options, if any, may be needed.

However, sampling of a given area frequently reveals that the levels of a given contaminant that are generally present may differ from sampling location to sampling location, and in some instances, the variation may be significant. The variance within observations when determining background concentrations may present an issue as to whether all observations represent the population that one intends to measure, or whether some of the measured levels represent something other than what one would typically expect to find in the measured population.

Values that differ significantly from the overwhelming majority of the other values must be evaluated to determine whether they are generally representative of the area. They may not be for many reasons, but where possible, those values should receive greater scrutiny to determine whether they fit within the population being measured. In some instances, specific information may explain whether they fit within the population, and in other instances, it may be useful to use statistical tests to evaluate whether a given value is representative of the population. In this instance, the EPA evaluated the background data to determine whether the data represents the Willamette River watershed, as opposed to a specific site within the reference area, and used statistical tests to inform its evaluations and identify outliers. LWG objects to EPA's methodology and conclusions.

Background threshold values, particularly when they exceed risk based cleanup levels, will inform the development of remedial action goals and remedial action levels during the feasibility study. The remedial action goals and remedial action levels will be selected in a record of decision. In general, the EPA will not select cleanup levels at concentrations that are below natural background levels or anthropogenic background concentrations.[8] Artificially low background threshold values may lead to unattainable remedial action levels or remedial action levels that are difficult to attain and prone to re-contamination. On the other hand, background threshold values that are artificially high (e.g., potentially affected by the inclusion of samples contaminated by sources upstream of the Site) may result in remedial action goals and remedial action levels that do not appropriately address the risks to human health and the environment posed by the site conditions and may overestimate the potential for re-contamination. Thus, development of background threshold values is an important step in cleanup.

Recognizing the importance of selecting background threshold values, the LWG challenged the methodology the EPA used and directed the LWG to use to establish background contaminant

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[8] Role of Background in the CERCLA Cleanup Program. OSWER 9285.6-07P, Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (April 2002).

concentrations for upriver bedded sediments. The parties have briefed several issues related to the methodology. The parties have not necessarily responded to the arguments each has made in a direct manner. Nevertheless, sufficient information was provided to identify and resolve the underlying issues of the dispute. In general the issues primarily involve whether EPA followed its guidance and performed an analysis in a scientifically acceptable manner. Before the issues are analyzed, it is appropriate to describe the methodology that EPA employed to determine background threshold values for the contaminants of concern and the dispute resolution process.

EPA Methodology for Establishing Background Sediment Values

The EPA describes the methodology used to establish background for sediment values at pages 6 through 11 of its response. The EPA notes that it relied on the data set developed by LWG.[9] EPA reviewed the figures LWG generated for indicator contaminants. The figures included scatter plots of results by river mile, normal Q-Q plots, and box-whisker plots.[10] EPA's review of the scatter plots revealed that in most instances, the majority of the data fell within a well-defined concentration range, and allowed EPA to observe the spatial separation of the highest values from the majority of the data.[11] The EPA's review of the LWG figures in conjunction with the contaminant-specific data revealed two data issues which resulted in revisions to the data sets.[12] After revising the data, EPA conducted a statistical analysis of the revised background data sets using an approach recommended by ProUCL version 5.0.00 Technical Guide.[13] EPA compared the results of statistical outlier tests performed by ProUCL Version 5.0.00 with the visual observations of outliers and found that the two approaches generally found the same outliers.[14] For example, the statistical approach identified 5 outliers from the PCB Aroclor dataset and the visual approach identified 4. In addition, EPA used SCOUT to conduct a more robust statistical test of the PCB Aroclor data, and this approach identified 8 potential outliers, 4 extreme and 4 intermediate, and after reviewing the results of this analysis, the EPA concluded that only the 4 extreme values were outliers.[15] Thus, EPA selected fewer outliers than were identified in the statistical tests it employed. The EPA also considered the effects of removing successive outliers for PCBs as Aroclors, PCBs as congeners and DDx.[16] Before a decision to exclude datum as outliers, EPA compared statistical endpoints of datasets which included and excluded the suspected outliers.[17]

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[9] EPA Response at p. 6.

[10] *Id.*

[11] *Id.*

[12] *Id* at p.7.

[13] *Id* at pp. 7-9. As noted in its Executive Summary "ProUCL Version 5.0.00 is a statistical software EPA developed in 2013 for environmental applications of data sets with and without non-detect observations. The software, its user guide, and technical guide were peer reviewed prior to publication for use. ProUCL software was initially developed during 1999 and 2000 and it has been upgraded on several instances with EPA funding by EPA's Office of Research and Development. Version 5.0.00 is the most recent of the software. The suggestions made in PROUCL are based upon the extensive experience of its developers in environmental statistical methods, published environmental literature, and procedures described in various EPA guidance documents." *See,* Executive Summary for ProUCL Version 5.0.00 Technical Guide at p. vi.

[14] *Id* at 9.

[15] *Id* at 9-10. EPA used another statistical software, Scout 2008 Version 1.0., to perform this analysis. Similar to ProUCL, Scout 1.0 was peer reviewed before it was published by EPA in 2009.

[16] *Id* at 10-11.

[17] *Id* at 10.

Based on these evaluations, EPA removed four outliers from the Aroclor data set, and then corrected the UPL and UCL for organic carbon content using a methodology that had been developed by LWG and approved by EPA.[18] With the exception of performing the SCOUT analysis, EPA performed the same analysis for all indicator contaminants. The EPA excluded data for background determinations for the following indicator contaminants: arsenic, total chlordane, DDx, Bis (2-ethylhexyl) phthalate, total PAHs, PCBs as Aroclors, PCB as congeners, Total PCDFs/PCDDs, and zinc.[19]

LWG's Objections

1. EPA did not follow its guidance (EPA 2000a) by excluding data based solely on statistical tests and without regard to some scientific or quality assurance basis.
2. EPA calculated upriver sediment concentrations using tests to identify outliers that explicitly assume a normal distribution for all populations from which the data was obtained.
3. EPA arbitrarily set the number of suspected outliers to 10 for all outlier tests it performed, contrary to its guidance which recommends using graphical techniques to determine the number of potential outliers.
4. Contrary to guidance, EPA discarded observations based on an improperly applied statistical test without investigating whether any evidence justified discarding the observations (analytical quality or site-specific environmental conditions).
5. EPA failed to use correct statistical methods to evaluate Q-Q plots or to otherwise formally test for outliers in datasets that contain non-detect values, like use of the Tobit regression.
6. EPA's justification for removal is based on the concept that reference area data may also contain high-biasing outliers that are either not representative of the dominant background population or are representative of specific contaminant sources. Because upstream bedded sediments may be transported downstream to the Site, it is important for the reference data to represent the total reference population, not a post-hoc background population constructed by the removal of valid data.

The Dispute Resolution Process

The AOC provides terms for initiating and resolving disputes that concern activities or deliverables required under the AOC.[20] The process allows LWG to object to any EPA notice of disapproval or requirement made pursuant to the AOC.[21] The objection must be made within 14 days of LWG's receipt of the disapproval or requirement, and in the form of a written notice to EPA that defines the dispute and states the basis of LWG's objection.[22] The AOC provides LWG and EPA 14 days to resolve the dispute by agreement.[23] If no agreement is reached during the 14 day period, LWG may request that the Director

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[18] *Id* at pp. 9-11 & 6 at fn 5.

[19] See, EPA Response at pp. 6-11; and Section 7 Determination of Background Concentrations for Indicator Contaminants, Portland Harbor RI/FS, Draft Final Remedial Investigation Report, August 29, 2011 (attachment to Deb Yamamoto email to Margaret Kirkpatrick, dated August 12, 2014) at Sections 7.3.2, 7.3.3, 7.3.6, 7.3.8, 7.3.10, 7.3.11, 7.3.12, 7.3.13, 7.3.14, and 7.3.15.

[20] AOC at Section XVIII, Dispute Resolution at Paragraph 1

[21] *Id.*

[22] *Id.*

[23] *Id.*

of the EPA's Office of Environmental Cleanup issue a decision that resolves the dispute.[24] EPA and LWG by the exchange and submittal of information have supplemented the dispute resolution process as described in the AOC, and I note that this approach is consistent with practices of the parties in at least one prior dispute raised pursuant to the terms of the AOC.[25]

The AOC does not expressly provide a standard for resolving a dispute. The EPA asserts that the arbitrary and capricious standard provided by section 113(j) should provide the analytical framework for resolving the dispute. LWG disagrees, emphasizes that section 113(j) is captioned "Civil Proceedings" and relates to judicial of review of EPA cleanup decisions, and as such is not relevant to an administrative review concerning the selection or adequacy of a CERCLA response action. LWG suggests the use of the alternative standard of review of appropriateness and thus requests that I evaluate whether "EPA has appropriately applied its guidance and fundamental statistical concepts in defining the background dataset applicable to the Site."[26]

CERCLA section 113(j) provides a well settled and defined framework for review of response actions.[27] Section 113(j)(1) limits review of any issue concerning the adequacy of any response action taken or ordered by EPA to the administrative record.[28] Section 113(j)(2) requires a court to uphold EPA's decision in selecting a response action unless the objecting party can demonstrate, on the administrative record, that the decision was arbitrary and capricious or otherwise not in accordance of law.[29] Courts interpreting the arbitrary and capricious standard have concluded that the agency must examine the relevant data and articulate a satisfactory explanation for its action, including a rational connection between the facts and the choice made, *Motor Vehicle Manufacturers Association v. State Farm Mutual*, 463 U.S. 29, 43, 103 S. Ct. 2856, 77 L.Ed.2d 443 (1983).

In this instance both LWG and EPA submitted arguments and exhibits. LWG requested and was granted the opportunity to submit a reply to EPA's response.[30] Consistent with the letter granting leave to file a reply I asked EPA to provide a copy of the ProUCL Rosner's Outlier Test for PCBs as congeners.[31] Collectively, the submittal of arguments and exhibits represent the adversarial nature of the formal dispute resolution process and the development of an administrative record that provides the basis for resolving the dispute at issue. In addition, the issues at hand – the methodology used to determine background threshold values – involve the adequacy or selection of a CERCLA response action. As such, I will affirm EPA's decision if it is rationally supported by the information provided by the parties.

I reach this conclusion mindful of LWG's request that I evaluate the issues by determining whether EPA has appropriately applied its guidance and fundamental statistical concepts in defining the background dataset applicable to the Site. However, I note that the decision of which standard to apply may result in

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[24] *Id.*
[25] *See*, Letter from Bob Wyatt to Richard Albright dated September 11, 2014
[26] *LWG Reply* at 8-9.
[27] 42 U.S.C. § 9613(j).
[28] 42 U.S.C. § 9613(j)(1).
[29] 42 U.S.C. § 9613(j)(2)
[30] *See*, Letter from Bob Wyatt to Richard Albright dated September 11, 2014; and letter from Richard Albright to Bob Wyatt dated September 18, 2014.
[31] *See*, letter from Richard Albright to Bob Wyatt dated September 18, 2014 at p. 2.

a distinction of little or no difference. Merriam-Webster defines appropriate, when used as an adjective, as "meeting the requirements of a purpose or situation." A decision that meets the requirement of a purpose, or situation, and is thus, "appropriate" certainly seems similar if not coterminous with a decision that is rationally connected to the facts upon which the decision is based. After all, rational behavior/decisions certainly set the base line for behavior/decisions that meet the requirements of a purpose or situation. Thus, I am comfortable with the conclusion that I would reach the same decision using either of the proposed standards.

Analysis

The development of background threshold values is important, and as this dispute documents, involves complex issues. Resolution of this dispute is important to LWG, EPA, the community of Portland, and the Site's ecosystem.

Did EPA fail to follow its guidance?

A threshold issue is whether EPA followed its guidance when it made the decision to determine that certain sample results were outliers. [32]

LWG's and EPA's arguments share a reliance on several guidance documents: *Role of Background in the CERCLA Cleanup Program*, September 2002; *Contaminated Sediment Remediation Guidance for Hazardous Waste Sites*, December 2005; *Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites*, September 2002; the *Scout Version 1.0 User Guide*, 2008; the *ProUCL Version 5.0.00 User Guide*, 2013; and the *ProUCL Version 5.0.00 Technical Guide*, 2013.[33]

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[32] Although it is not clear that LWG has raised the issue, I will nevertheless address the issue of whether any of the relied upon EPA's guidance is contrary to accepted scientific practices. In a sense, LWG waived this argument when it signed the Portland Harbor AOC. Paragraph 2 of the AOC expressly provides that "the activities conducted under the [AOC] shall be conducted in compliance with the NCP and consistent with all applicable guidance, policies and procedures." There is little argument that the guidances EPA relied on are applicable to the issue at hand. Thus, by the commitment it made when it entered into the AOC, LWG agreed to set aside challenges to the scientific merit of EPA guidance. Moreover, the guidances which LWG presumably challenges – the ProUCL User Guide and Technical Guide – are the result of an EPA peer review process and are based upon the experience of its developers in environmental statistics methods, published environmental literature and procedures described in several EPA guidance documents. *See*, ProUCL Technical Guide at pp. ii & vi. Simply put, this is neither the time nor forum to challenge EPA guidances. In addition, the submittals provided by the parties do not create a record adequate to support or address such a challenge.

[33] LWG additionally relies on three guidance documents -- *Data Quality Assessment: A Reviewer's Guide*, February

values (but provide valuable suggestions related to developing
ing documents provide specific recommendations. Collectively, these
cord of information from which both sides may construct cogent
ment of background values to support CERCLA remedial decisions,
anuals most directly discuss the issue of identifying and addressing
cent, comprehensive discussion of this issue.[34] Thus, I am inclined to
ide and Technical Manual, as informed by the related guidances,
e for this analysis.

s consistent with the recommendations of the ProUCL Version 5.0.00
For example, both the ProUCL Version 5.0.00 User Manual[35] and

statistics in developing backgroun
background values) and the remain
documents present a voluminous r
arguments. In regard to the develo
the ProUCL User and Technical M
outliers and provide EPA's most r
conclude that the ProUCL User Gu
provides the most relevant guidan

Here, EPA used an approach that i
User Guide and Technical Manual.

ary 2006; and *Statistical Analysis of*

2006; *Data Quality Assessment: Statistical Methods for Practitioners*, Febru

separated from the majority of data). However, before making a decision to exclude datum as outliers, EPA compared statistical endpoints of datasets which included and excluded the suspected outliers. After making this comparison, EPA reached its decision to exclude the four data points from the background threshold value calculation.

The above described approach is consistent with the approach described by EPA's guidance. Thus, I find that the approach used by EPA to identify and address outliers is consistent with its guidance.

Did EPA Apply its Guidance Rationally (Appropriately)

LWG contends that EPA abused its discretion in several respects by its application of its guidance as it identified outliers and established background threshold values.

LWG contends that EPA contradicted its guidance by removing valid data from background datasets based solely upon a statistical analysis of the data which assumed that the background dataset should reflect a normal distribution, and without considering other evidence (QA/QC issues or knowledge of site or reference area conditions).[41] EPA contends that it did not assume a normal distribution of data but instead, and consistent with its guidance, removed outliers after it appropriately analyzed the data.[42]

In 2002, EPA published a policy entitled *Role of Background in the CERCLA Cleanup* Program which documents EPA's preferred approach for considering background constituent concentrations at Superfund sites.[43] At page 5 of this policy, EPA defined background as follows:

> "Background" refers to constituents or locations that are not influenced by the releases from a site, and is usually described as naturally occurring or anthropogenic (USEPA 2002a, p.1-2; USEPA 2002b, page 5):
>
> 1) Anthropogenic – natural and human-made substances present in the environment as a result of human activities (not specifically related to the CERCLA release(s) in question); and,
> 2) Naturally occurring – substances present in the environment in forms that have not been influenced by human activity.

This policy continues to be of primary importance for the consideration of background contamination at Superfund Sites. However, it does not address the complexity of the issues related to the Portland

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[41] See, LWG Request at pp. 6-7, 8-9, 15-16, & LWG Reply at 6. LWG in making this argument in part relies on guidances that I have determined are less relevant to the analysis than the ProUCL User Guide and Technical Guide, see, *supra* at fn 31.

[42] See, EPA Response at 4, & 13-14.

[43] *Role of Background in the CERCLA Cleanup Program*, OSWER 9285.6-07P, Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (April 2002) at p. 3.

Harbor Site.[44] Here EPA and LWG endeavored to locate a reference site and select sampling sites within the reference area in a manner that addressed this complexity.[45]

As noted by the LWG's and EPA's respective references to EPA guidance, EPA's approach for evaluating background constituents has matured and been refined since 2002. The changes reflect the experience EPA has gained in assessing background as well as the improvements to the analytical tools used for this purpose. EPA, in its response at p. 4, quotes a portion of the ProUCL Technical Guide's discussion of background data sets. The quotes are compelling and bear repeating.

> A defensible background data set represents a "single" population possibly without any outliers. In a background data set, in addition to reporting and/or laboratory errors, statistical outliers may also be present. A few elevated statistical outliers present in a background data set may actually represent potentially contaminated locations belonging to impacted site areas and/or possibly from other polluted site(s); those elevated outliers may not be coming from the main dominant background population under evaluation. Since the presence of outliers in a data set tends to yield distorted (incorrect and misleading) values of the decision making statistics (e.g., UCLs, UPLs and UTLs), elevated outliers should not be included in background data sets and estimation of BTVs. The objective here is to compute background statistics based upon the majority of the data set representing the main dominant background population, and not to accommodate a few low probability high outliers (e.g., coming from extreme tails of the data distribution) that may also be present in the background data set. The occurrence of elevated outliers is common when background samples are collected from various onsite areas (e.g., large Federal Facilities). The proper disposition of outliers, to include or not include them in statistical computations, should be decided by the project team. The project team may want to compute decision statistics with and without the outliers to evaluate the influence of outliers on the decision making statistics.[46]

The quoted language supports the conclusion that a background dataset should be representative of a single population (the background area) and be free of data representing other populations (sources of contamination other than background as well as a conclusion that an EPA project team may determine to exclude data as outliers after performing the appropriate statistical analysis).

The ProUCL Technical and User Guides provide additional recommendations in support of EPA's position. For example, the ProUCL Technical Guide cautions that in practice "the boundaries of an environmental population (background) of interest may not be well-defined and the selected population actually may consist of areas (concentrations) not belonging to the main dominant population of interest (reference area)."[47] The guidance then recommends that extreme background values should be excluded from statistical evaluations that determine background threshold values since they potentially represent

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[44] See, *Id* discussion of hypothetical cases at pp. 9-12.

[45] See, Exhibit 1 to EPA Response at October 21, 2004 email (discusses exclusion of sampling locations within River Miles 19-22 due to potential sources and lack of river sediment); and Exhibit A to LWG Reply(showing lack of sampling locations between River Mile 19 and approximately River Mile 21.5).

[46] ProUCL Technical Guide at pp. 16-17

[47] *ProUCL Version 5.0.00 Technical Guide* at 187.

impacted locations.[48] The Technical Guide also cautions that "inclusion of outliers in background data sets tends to yield distorted (inflated) estimates in BTVs. Outlying observations which are significantly higher than the majority of the background data may not be used in establishing background data sets and in the computation of BTVs."[49] The Technical Guide does suggest that historical and current site and regional information as well as graphical displays and outlier test results, should be considered by the project team and the decision makers when deciding how to address the disposition of outliers.[50] However, the overall thrust of the Technical Guide recommends the removal of extreme values based solely on their significant difference from the remainder of the data set.

Here, the reference area was selected as representative of the larger Willamette River Basin. As noted in the background section, the reference area was selected as a surrogate for the Site because its physical characteristics were fairly representative of the Site conditions and it is not impacted by releases from the Site. By consequence, sediment loading that occurs within the reference area approximates the upstream sediment loading that occurs within the Site. However, because there may be localized sources of contamination within the reference area, the approximation is less than perfect. The data used to evaluate background constituent levels should be analyzed to determine whether the data reflects upstream sediment loading or sources of contamination within the reference area.

The EPA presented information from which one could rationally conclude that the suspected outliers are not part of the dominant background population.[51] The exclusion of the suspected outlier data points – to exercise caution with handling of extreme data results -- makes sense. For example, there are relatively few, 33, data points for PCBs as congeners within the 13 mile reference area. The low number of data points can, as demonstrated by tables 2 and 4 and Figures 1, 2 &3 of EPA's response, exacerbate the influence that extreme values may have on decision influencing statistics, including UPLs and UCLs. This, in turn, tends to confirm the Technical Guide's warning that in this instance the inclusion of outliers yield inflated background threshold values.

In addition to faulting EPA for assuming a normal distribution of data, LWG contends that guidance required EPA to base its decision regarding outlier data on some evidence other than the statistical analysis it performed. LWG's assertion and reliance on a weight-of-the-evidence approach assumes a high level of knowledge about the background conditions and particularly the potential sources of contamination within or impacting the reference area.[52] The assumption is likely unfounded.

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[48] *Id.* at 188.

[49] *Id* at 89.

[50] *Id* at 188.

[51] See, figures 1, 2, 3, 4, 5 & 7 of EPA Response (the first 3 show how the removal of high samples may influence the UPLs and UCLs for PCB as Aroclors, PCBs congeners, and DDx; and the last 3 are Q-Q Plots for PCB as Aroclors with non-detects, without non-detects, and with assumed values for non-detects, in each of these plots 4 sample points appear to be well separated from the majority of the data.

[52] LWG discounts the possibility that samples collected near the Portland Shipbuilding Company reflect contamination from its shipbuilding operations and faults EPA for concluding that the sample was a potential outlier without developing a comprehensive history of Portland Shipbuilding Company's operations. LWG's assertion suggests that to identify an outlier, the Agency must not only identify a specific source but must also comprehensively investigate it. As documented by the source control effort being undertaken by the Oregon Department of Environmental Quality, this is a resource intensive effort.

The difficulty of identifying sources associated with the extreme values is illustrated by the PCB data. PCBs are a mixture of synthetic organic chemicals. Until banned, PCBs were used in a variety of industrial and manufacturing processes, including as heat transformer fluids, plasticizers, hydraulic fluids, and lubricants. In addition, PCBs were added to pesticides, caulking compounds and paints, used as a fire retardant and as a dust suppressant. Because of their widespread use, atmospheric transport, and extreme stability, PCBs have been found in highly urbanized areas and in rural and wilderness areas. Because of their widespread presence in the environment, PCBs can be expected to be in a background/reference area as a result of atmospheric transport or as a result of an ongoing release from a location that could be controlled through a CERCLA response action or other regulatory action. For example, PCB contamination can be transported to sediment sites and sediment background sites by storm drains, sewage treatment plants, and surface water run-off. Releases from these sources suggest the possibility of continuing sources of PCB releases which may be controlled by a variety of regulatory programs.

In this instance, EPA identified 4 PCB congener outliers. The record contains possible evidence connecting at least 3 of these samples to sources of contamination that are not part of the background population. LWG submitted graphical representations of PCB congeners data during the development of section 7 of the Site remedial investigation, and in the graphical representations, LWG identifies the sample collected near River Mile 26.9 "as primary outlier due to proximity to probable point source."[53] Thus, there appears to be an acknowledgement by LWG that the result from this sample likely represents a particular contaminant source other than the background population. This finding not only provides an acknowledgement that there may be a localized source of contamination, but also reinforces EPA's position that a statistically-derived approach may be adequate to determine an outlier. In addition, LWG submitted a map documenting the location from which background samples were collected.[54] This map locates one of the outlier samples in a mouth of a tributary to the Willamette River near River Mile 28.3.[55] The three samples collected immediately downstream of this sample contain much lower levels of PCB contamination, possibly suggesting the flow of the Willamette River overwhelms the flow of the tributary and that sources within the tributary, and an extreme data point collected at its mouth may not be reflective of the tributary's influence on background within the larger Willamette watershed. Thus, the results from this sample may not be a reliable indicator of the dominant background population nor a reliable indicator of its downstream impacts. Third, LWG concedes in its Request that EPA provided evidence that the outlier sample collected at River Mile 16 may represent contamination related to the Portland Shipbuilding Company.[56] Thus, a weight-of-the-evidence analysis if performed on information contained in the dispute record supports a conclusion that at least 3 of these samples should be removed. Uncertainty associated with the regional conditions and their influence on PCB contamination could support removal of the fourth sample located near River Mile 24.4, an area that is downstream of another tributary to the Willamette River and located near urban/suburban features that may include

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[53] See Exhibit 3 to EPA Response at p. 2.

[54] Figure 7.3-19 attached to LWG's Reply.

[55] *Id.* The map locates the other 3 outlier samples near railroad lines, freeways, and urbanized areas from which storm water is collected and released into the river.

[56] *LWG Request* at p. 12. LWG questions this evidence because EPA failed to locate a comprehensive history of Portland Shipbuilding Company's activities and by consequence questions whether it could be a source of contamination. Thus, even where site specific information is available, LWG is unwilling to accept its value.

sources of contamination. Thus, I conclude that the record before me rationally supports removal of each of the identified outliers under a weight-of-the-evidence approach.[57]

LWG also argues that PCB congener data in the background dataset controls the weight-of-the-evidence analysis and asserts that environmental conditions at the 4 potential outlier sample locations more closely resemble environmental conditions within the Site than the remainder of the background sample locations for PCB congeners.[58] LWG bases this argument on a comparison of the organic carbon content of the samples, and in making this argument LWG compares the organic carbon content of the four outlier samples and the organic carbon content of the remainder of the background dataset to the organic carbon content of sediment samples within the Site. LWG notes that the 4 outliers have a higher average organic carbon content than do the other background samples and that the higher organic carbon content is more similar to the Site samples for PCB congeners than are the remaining background dataset. However, a closer examination of the organic carbon content of the four outlier samples shows that two of the samples have a higher organic carbon content (2.97 and 2.42 TOC) than the other two outlier samples (1.18 and 0.169 TOC), such that the organic carbon content of the latter two samples could not sufficiently explain the elevated PCB concentrations at those stations. Thus, the averaging approach employed by LWG likely masks the differences within the outlier samples and creates the appearance that as a group they are more similar to the Site dataset (1.79 TOC) than the remainder of the background dataset.[59] In addition, EPA acknowledges that organic carbon content could be a factor in the PCB congener concentrations and notes that EPA applied a correction factor for organic carbon content that was developed by LWG,[60] and nowhere, in its dispute filing, does LWG suggest that the correction factor was in error. Thus, LWG's reliance on its analysis of organic carbon content of sediment samples fails to support its position that a weight-of-the-evidence analysis supports the inclusion of the suspected outliers in the data set used to compute background threshold values.

As noted above and related to the previous discussion, LWG contends that EPA failed to follow its guidance and abused its discretion by assuming a normal distribution without properly deciding what distribution to use, and specifically faults EPA for failing to use graphical techniques, goodness-of-fit tests, and tests for outliers to determine the appropriate distribution to use or whether to use a nonparametric method.[61] As noted, EPA responds to this contention by asserting that EPA did not assume a normal distribution of the data but instead used the most appropriate methods available in the guidance to perform outlier analyses, goodness-of-fit tests, and compute upper confidence levels and

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[57] While I understand that conditions of the reference area are uncertain, I note that LWG could have addressed this uncertainty by either investigating potential sources of outlier contamination, or collected additional samples near or at the location of the potential outlier sample. Based on the record before me, it appears that LWG failed to propose or perform either.

[58] *LWG Reply* at pp. 7-8.

[59] LWG makes a similar argument at p. 15 of its *Request*. This argument appears to suffer that same problem – there are not many outlier values and averages of outlier values may be dominated by sediment samples with high TOC concentrations.

[60] *Supra,* at fn. 15.

[61] *LWG Request* at pp. 7 & 8-9.

background threshold values.[62] In support of its position EPA identifies relevant portions of the guidances and applicable literature which stress performing outlier tests on raw data.[63]

There are several assumptions that underlie LWG arguments. For example, contrary to the ProUCL Technical Guide, EPA ran its outlier tests (Rosner and Dixon) on raw data. Second, EPA, as contrary to the recommendations of the Technical Guide, only used a normal distribution for statistical methods it used to compute hypothesis tests, confidence levels, prediction limits, or tolerance limits. Third, EPA failed to use modeling and graphical techniques to determine distribution and applying statistical methods appropriate for that distribution.

The first assumption is, in part, correct, EPA used raw data to run outlier tests, and, in part, incorrect, as contrary to LWG's assumption, the ProUCL Technical Guide recommends running outlier tests in raw data.[64] Thus, EPA appropriately followed its guidance by running the outlier tests on raw data and LWG's contention that EPA erred is mistaken.

The second assumption is incorrect. It is incorrect in two respects. First, it's incorrect to the extent that it suggests the use of a lognormal distribution for the purpose of computing hypothesis tests, confidence levels, prediction limits, or tolerance limits for data that is more than mildly skewed. As noted by EPA's response at p. 15, EPA guidance recommends against using a lognormal distribution for these purposes unless the data is only mildly skewed. In cases where the data is more than mildly skewed, and EPA correctly points out that use of lognormal distributions tend to accommodate outliers and yield inflated or distorted values for UCLs, UTLs, and UPLs.[65] The statement is also incorrect in its suggestion that EPA failed to use distributions other than a normal distribution to perform these computations. Consistent with the recommendations of ProUCL User and Technical Guides, EPA input the data in raw form and initiated the ProUCL analysis without transforming the data. ProUCL Version 5.0.00 allows the user to, and in this instance EPA did, let ProUCL compute statistics and identify how well the data fit various distributions. Thus, EPA not only evaluated representations of data that were normally distributed but also evaluated distributions identified by ProUCL.[66]

LWG's third assumption fails for reasons similar to the second. EPA guidance generally cautions against using a lognormal distribution for the reasons discussed in the preceding sentence,[67] and ProUCL is programmed to automatically model and graphically display the data to determine the appropriate distribution data and statistical methods for the selected distribution(s). Thus, LWG's third assumption is mistaken.

By consequence, LWG errs when it contends that EPA failed to follow its guidance and abused its discretion by assuming a normal distribution without properly deciding what distribution to use and for

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[62] *EPA Response* at pp. 15-17.

[63] I note that EPA's discussion at pp 15-16 of its response is consistent with the cited guidance. See, e.g., ProUCL Technical Guide at pp. vii, 1, 3, 9, 19, 34, 35, 72, 136, & 189. These citations are supportive of the quoted EPA discussion and include numerous recommendations against the use of lognormal distributions.

[64] ProUCL Technical Guide at pp. 34, 110, 189 & 190.

[65] See, ProUCL Technical Guide at pp. 54 - 61.

[66] See EPA response at pp. 7-8 and ProUCL User Guide in general.

[67] See, ProUCL Technical Guide at pp. 54- 61.

failing to use graphical techniques, goodness-of-fit tests, and tests for outliers to determine the appropriate distribution to use or whether to use a nonparametric method.

Additionally, EPA adds in its Response at p. 15 the following discussion:

> In practice, it is the presence of outliers in a data set that destroys the normality of the data set; in other words, a data set consisting of outliers seldom (perhaps when only outliers are mild near the tail) can be modeled by a normal distribution. Therefore, data sets consisting of outliers often do not satisfy the normality assumption needed to use classical outlier tests (Rosner, Grubbs, and Dixon tests). The normality assumption comes into play while computing the critical values of the test statistics associated with these classical tests. It is likely that a data set without outliers can be modeled by a normal distribution. Therefore, to identify outliers based upon the Rosner test, one can use a critical value associated with the number of observations left in the data set without the number of specified/suspected outliers.
>
> For both the Rosner and Dixon tests, it is the data set (also called the main body of the data set) obtained after removing the outliers (and not the data set with outliers) that needs to follow a normal distribution. Barnett and Lewis 1994 and Chapter 12 of EPA 2009a also state that the Rosner and Dixon outlier tests assume that the rest of the data except for the suspect outlier observation(s), are normally distributed.
>
> USEPA 2013b recommends avoiding the use of a lognormal model, as its use tends to accommodate outliers. Even the use of graphical methods (e.g., Q-Q plot) fails to identify outliers in the log-scale. USEPA (2009a) also states that the data set without the outliers should follow a normal distribution.

I note that EPA's discussion accurately reflects the referenced guidances, and that EPA evaluated graphical representations of the data which also supported EPA's approach and conclusions. As a result, I agree that EPA considered the data in the appropriate distribution.

LWG also asserts several arguments which appear to be based upon on misunderstanding of how the software for ProUCL Version 5.0.00 works and/or how EPA conducted its outlier analysis. I will address several of these.

First, LWG asserts that "EPA arbitrarily set the number of suspected outliers to 10 for all outlier tests and then removed all statistical outliers identified."[68] As EPA points out, Rosner's Test was performed to identify no more than 10 outliers, and the test will not identify 10 outliers if the dataset contains fewer than 10 outliers.[69] In addition, EPA did not rely solely on the results of Rosner's Test, it also reviewed graphical displays of the data and "evaluated the overall effect potential outliers exhibited on description statistics before making a decision to include or exclude suspected outliers."[70] Thus, this criticism misconstrues how the software runs the test and how EPA used the results to identify outliers.

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[68] *LWG Request* at p. 7; and at pp. 2 & 10.
[69] *EPA Response* at 17.
[70] *Id* at pp. 17-18.

LWG also represents that EPA failed to consider graphical representations of the data before it made decisions regarding outliers.[71] This contention is clearly in error.[72]

LWG asserts that EPA failed to use the correct procedures for datasets that contain non-detect values, and more specifically, EPA improperly set the concentration of non-detect samples at half the detection limit.[73] In response, EPA clarifies that ProUCL Version 5.0.00 did not make substitution assumptions for non-detect values when performing goodness-of-fit tests, instead it clearly recommends against such substitution, and instead employed ROS methods which assume the entire dataset follows a certain distribution and non-detects are imputed using the assumed distribution, or used Kaplan-Meier techniques.[74] EPA acknowledges that it used substitution methods for exploratory purposes and points out that it, similar to LWG, did not use the substituted values in graphical displays of the data.[75] Thus, this criticism is misplaced.

As a final matter I would like to address the flooding scenario described by LWG at p. 2 of its Request for Dispute. I understand that LWG included the scenario to represent the import of establishing accurate background threshold values which include all background sample results. In addressing this scenario I will not address the merits or substance of the scenario except to the extent that I reiterate that the purpose of the background analysis was to assess the likely sediment that comes from the larger Willamette watershed and that the analysis was not confined to assessing potential loading from the reference area only. Actual loading to the site is influenced by a number of factors, such as areas of scour and deposition in both the reference and Site areas, sediment deposition within the Site versus sediment which passes through the Site altogether, how different flow events affect transport and deposition, and other loading (contaminated or relatively clean) from sources located adjacent (upland) to the Site. And while there may be local sources of contamination in the reference area that are excluded from the calculation of BTVs, those sources could both contribute in some fashion to downstream loading and be subject to future regulatory controls. As a result, I find the scenario unpersuasive as a basis to set aside EPA's decisions regarding background values and I believe EPA appropriately responded to the scenario in its Response at page 23-24. Instead, I would like to emphasize that as noted by EPA's Response at p. 24, there are sources of contamination outside of the Site – both upriver of the Site and within the downtown reach – that may affect the ability of cleanup efforts within the Site to equilibrate to the selected cleanup levels regardless of whether the cleanup level is based on risk, regulatory standard or background. In this regard, the Site is similar to other urban sediment sites which CERCLA addresses like the Lower Duwamish Site in Seattle.

Overall the conclusion of this analysis is consistent with EPA's determination that the purpose of the background analysis was to determine background for the Willamette River watershed and not merely the reference area from which samples were collected. Given the many uses - industrial, agricultural,

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[71] *LWG Request* at pp. 9-10.
[72] *See, EPA Response* at pp. 17-20; and *EPA Response* at Exhibits 2, 3; and 5.
[73] *LWG Request* at pp. 8 & 13-14.
[74] *EPA Response* at pp. 21-23.
[75] *Id* at p. 21

commercial, residential, and rural – above River Mile 28.4, and the differences these represent when compared to the reference area, it is not unreasonable to conclude that sediments from the entire Willamette watershed will be in line with the lower values observed in the reference area. The LWG did not sufficiently articulate a basis to include the significantly higher reviewed values as representative of the larger Willamette watershed. The analysis performed by EPA, coupled with the specific facts suggesting sources within the reference area as well as potential differences between the larger watershed and the reference area, support the EPA's exclusion of the outlier values and reliance on the predominant observed values in making background determinations.

Decision

For the foregoing reasons, I uphold EPA's decisions regarding the statistical methodology for determining background sediment concentrations for the contaminants of concern. Accordingly, LWG is directed to:

1. incorporate the changes EPA made to Section 7 of the draft RI into the final draft RI report;
2. complete background threshold values for the other 23 contaminants by use of the methodology EPA employed to determine background sediment concentrations for the contaminants of; and
3. submit background calculations for the other 23 contaminants to EPA within thirty days of the date of this decision.

Administrative Record

The administrative record that includes the documents that provide the basis for this decision. The administrative record includes documents that were submitted to the dispute decision official when and after LWG submitted its request for dispute resolution. LWG submitted written materials. The EPA submitted written materials and electronic files. I have also asked EPA staff to provide output results from the PCB as congeners ProUCL Rosner's Test for Outliers. The administrative record supporting this decision includes:

Letter from Bob Wyatt To Richard Albright, Re: Request for Dispute Resolution of EPA's Notice of Decisions on Background Regarding Section 7 of the Remedial Investigation; Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240 (August 26, 2014).

Table1. Goodness-of-fit Results for Indicator Chemicals.

LWG, Figure 1. Distribution of Number of Outliers According to Rosner's Test for Various Probability Distributions.

Figure 2: Normal Q-QPlots (Figure 2.1 thru Figure 2.33).

Distributions of Number of Outliers According to Rosner's Test for Various Distributions and Levels of Censoring (Table 3.1 thru 3.3).

Email from Deb Yamamoto to Margaret Kirkpatrick, Subject: Response to the Background Issue Raised During the EPA/LWG Senior Managers Call (August 12, 2014).

Section 7 Determination of Background Concentrations for Indicator Contaminants, Portland Harbor RI/FS, Draft Final Remedial Investigation Report, August 29, 2011 (attachment to Deb Yamamoto email to Margaret Kirkpatrick, dated August 12, 2014).

2001 Administrative Order on Consent as twice amended and entitled: I*n the Matter of: Portland Harbor Superfund Site*, Administrative Order on Consent for Remedial Investigation/Feasibility Study, U.S. EPA Docket Number CERCLA-10-2001-0240.

Letter from Bob Wyatt to Richard Albright, Re: Request for Dispute Resolution of EPA's Notice of Decisions on Background Regarding Section 7 of the Remedial Investigation, Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240 (September 11, 2014).

Letter from Richard Albright to Bob Wyatt, Re: Request for Dispute Resolution *in the Matter of: Portland Harbor Superfund Site*, Administrative Order on Consent for Remedial Investigation/Feasibility Study, U.S. EPA Docket Number CERCLA-10-2001-0240 (September 18, 2014).

Letter from Bob Wyatt to Richard Albright, Re: Request for Dispute Resolution of EPA's Notice of Decisions on Background Regarding Section 7 of the Remedial Investigation, Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240 (September 29, 2014).

PSI Profile, Steven P. Millard, Ph.D.

Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA Sites, EPA 540-R-01-003, OSWER 9285.7-41, September 2002

Role of Background in the CERCLA Cleanup Program, OSWER 9285.6-07P, Office of Solid Waste and Emergency Response, Office of Emergency and Remedial Response, U.S. Environmental Protection Agency, Washington, D.C. (April 2002).

Contaminated Sediment Remediation Guidance for Hazardous Waste Sites, USEPA, OSWER, EPA-540-R-05-012, OSWER 9355.0-85, December 2005.

Data Quality Assessment: A Reviewer's Guide, EPA QA/G-9R, USEPA, OEI, EPA/240/B-06/002, February 2006.

Data Quality Assessment: A Reviewer's Guide, EPA QA/G-9S, USEPA, OEI, EPA/240/B-06/003, February 2006.

Scout 2008 Version 1.0 User Guide Part I, EPA/600/R-08/038, February 2009.

Scout 2008 Version 1.0 User Guide Part II, EPA/600/R-08/038, February 2009.

Scout 2008 Version 1.0 User Guide Part III, EPA/600/R-08/038, February 2009.

Scout 2008 Version 1.0 User Guide Part IV, EPA/600/R-08/038, February 2009.

Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance, EPA 530/R-09-007, March 2009.

USEPA. 2013a. ProUCL Version 5.0.00 Users Guide. EPA/600/R-07/041, September 2013. Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C.

USEPA. 2013b. ProUCL Version 5.0.00 Technical Guide. EPA/600/R-07/041, September 2013. Office of Research and Development, U.S. Environmental Protection Agency, Washington, D.C.

A New Method for Interval Estimation of the Mean of the Gamma Distribution, H.V. Kulkarni and S.K. Power, Lifetime Data Anal (2010) 16:431-447.

Memorandum, Subject: EPA Response to the Lower Willamette Group's (LWG) August 26, 2014 Request for Dispute Resolution of EPA's Notice of Decisions on Background Regarding Section 7 of the Remedial Investigation, Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240, From Deb Yamamoto, Unit Manager To: Richard Albright, Director Office of Environmental Cleanup (October 3, 2014).

EPA's Response to LWG August 26, 2014 Request for Dispute Resolution (October 3, 2014).

EPA's Response Exhibit 1 – Compendium of comments, technical memoranda, and discussions on background.

EPA's Response Exhibit 2 – EPA's final edits to Section 7 of the RI.

EPA's Response Exhibit 3 – LWG's figures from 2011 draft RI with EPA's visual and observational markings.

EPA's Response Exhibit 4 – EPA's working files (Excel Spreadsheet) for evaluation of the background data set.

EPA's Response Exhibit 5 – Classical and Robust Outlier Tests on Total PCB values-R10.

EPA's Response Exhibit 6 – Figure 7.2-2 Scatter plot of paired Aroclor-congener results for the upstream reach for samples that were analyzed by both EPA Methods 8082 and 1668a.

Determination of Background concentrations of Inorganics in Soils and Sediments at Hazardous Waste Sites, R.P. Breckenridge and A.B. Crockett, EPA Engineering Forum Issue, ORD, OSWER, EPA/540/S-96/500, December 1995.

Letter from Bob Wyatt to Richard Albright, Re: Request for Dispute Resolution of EPA's Notice of Decisions on Background Regarding Section 7 of the Remedial Investigation, Lower Willamette River, Portland Harbor Superfund Site, USEPA Docket No: CERCLA-10-2001-0240 (October 14, 2014).

Exhibit A, Portland Harbor RI/FS, Draft Remedial Investigation Report, PCB Congeners in Upstream Sources.

January 22, 2015 email from Elizabeth Allen to Rick Albright, Subject *Outlier Test for OCB congeners.*

ProUCL Rosner's Outlier Test output results for PCBs as congeners, 7/30/2012.

If you have any questions regarding this letter, please contact me at (206) 553-1847, or by email at albright.rick@epa.gov.

Sincerely,

Richard Albright, Director
Office of Environmental Cleanup

cc:
Confederated Tribes and Bands of the Yakama Nation
Confederated Tribes of the Grand Ronde Community of Oregon
Confederated Tribes of Siletz Indians of Oregon
Confederated Tribes of the Umatilla Indian Reservation
Confederated Tribes of the Warm Springs Reservation of Oregon
Nez Perce Tribe
Oregon Department of Fish & Wildlife
United States Fish & Wildlife
Oregon Department of Environmental Quality
Lori Cohen, EPA Region 10 Associate Director, Office of Environmental Cleanup
Deborah Yamamoto, EPA Region 10 Office of Environmental Cleanup
Kristine Koch, EPA Region 10 Office of Environmental Cleanup
Lori Cora, EPA Region 10 Assistant Regional Counsel
Jim Woolford, EPA Headquarters
Barry Nussbaum, EPA Headquarters