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San Diego Coastkeeper and
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San Diego Coastkeeper and Environmental Health Coalition Technical Comments, Legal Argument, and Evidence on the Tentative Cleanup and Abatement Order No. R9-2011-001 and Draft Technical Report for the San Diego Bay Shipyard Sediment Site

Designated Parties San Diego Coastkeeper and Environmental Health Coalition respectfully submit the following comments, legal argument and evidence related to the Tentative Cleanup and Abatement Order No. R9-2011-001 (the "Order") and Draft Technical Report ("DTR"). These comments hereby adopt and incorporate by reference the expert report prepared by Donald MacDonald entitled "Review and Evaluation of Tentative Clean-up and Abatement Order (No. R9-2011-001) for the Shipyard Sediment Site, San Diego Bay, San Diego, California" dated March 11, 2011 ("MacDonald 2011"), attached hereto as Exhibit A. Additional evidence is also attached as exhibits to these comments and legal argument.

The law requires cleanup to background except where evidence in the record demonstrates that alternative cleanup levels greater than background water quality are appropriate. The Order concludes that cleanup to background is not economically feasible, but that conclusion is arbitrary and capricious and not supported by substantial evidence in the record. Furthermore, the Order fails to meet the legal requirements for cleanup to pollutant levels greater than background. Additionally, other flaws in the proposed cleanup mean the cleanup fails to require the best water quality reasonable. For these reasons, San Diego Coastkeeper and Environmental Health Coalition urge the Regional Board to amend the Order and Draft Technical Report to address the problems enumerated in these comments.

I. The Law Requires Cleanup to Background Except Where Evidence in the Record Demonstrates that Alternative Cleanup Levels Greater than Background Water Quality are Appropriate.

The State Water Resources Control Board has empowered the Regional Boards "to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge)." *See* State Water Board Order 92-49. When ordering a cleanup, the Regional Board must "[e]nsure that dischargers are required to clean up and abate the effects of discharges" to "either background water quality, or the best water quality which is reasonable if background levels of water quality cannot be restored, considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." State Water Board Order 92-49. Therefore, cleanup must be set to background pollutant levels unless background water quality "cannot be restored."

A. Cleanup to a Pollutant Level Greater than Background Conditions is Only Allowed if the Regional Board Makes Two Findings.

The law provides that the Regional Board can establish alternative cleanup levels for constituents greater than background pollutant levels only if the Regional Board makes two findings. First, it must find "that it is technologically or economically infeasible to achieve the background value for that constituent." The Post Remedial Monitoring plan should be expanded to provide a more robust basis for evaluating exposure of benthic invertebrates to contaminants at the site and for assessing sediment toxicity, and include testing from appropriate reference sites 2550.4(c). If cleanup to background is technologically or economically infeasible, a pollutant level greater than background conditions can be adopted only if the Regional Board finds "that the constituent will not pose a substantial present or potential hazard to human health or the environment as long as the concentration limit greater than background is not exceeded." CAL. CODE REGS. tit. 23 §2550.4(c). The cleanup levels must be set at background water quality if the Regional Board fails to make these two findings for each pollutant.

B. Alternative Cleanup Levels Must Be a Concentration Limit Set on a Constituent-by-Constituent Basis and Must Meet Requirements in State Water Board Order 92-49.

The law governing alternative cleanup levels makes clear that the alternative cleanup levels must set a concentration limit, or maximum pollutant amount that cannot be exceeded. The Regional Board must find that the constituent will not pose a threat to human health or the environment "as long as the ***concentration limit*** greater than background is not exceeded." CAL. CODE REGS. tit. 23 §2550.4(c) (emphasis added). Therefore, alternative cleanup levels that are not set at a maximum pollutant level are unlawful.

The law also dictates that analyzing whether background levels are achievable and what alternative cleanup levels are appropriate must be done on a constituent-by-constituent basis. *See* CAL. CODE REGS. tit. 23 § 2550.4(c) (The Regional Board must determine technological and economic feasibility "to achieve the background value ***for that constituent***" and find that "***the constituent*** will not pose a threat to human health or the environment as long as the concentration limit greater than background is not exceeded." (emphasis added)).

Finally, State Water Board Order 92-49 requires that any alternative cleanup level:

1) must be consistent with the maximum benefit to the people of the state;
2) must not unreasonably affect present and anticipated beneficial uses of the waterbody; and

> 3) must not result in water quality less than that prescribed in the Water Quality Control Plans and Policies adopted by the State and Regional Water Boards.

C. The Regional Board's Findings Must be Supported By Evidence in the Record.

Decisions of the Regional Board must be made on a reasoned basis and be supported by evidence in the record. A reviewing court will overturn a Regional Board decision "if the court determines that the findings are not supported by the weight of the evidence." CAL. CIV. PROC. CODE §1094.5(c). For an agency finding to be upheld, the agency's findings must be "supported by substantial evidence" in the record. *See JKH Enter. v. Dep't of Industrial Relations*, 48 Cal. Rptr. 3d 563. 574 (Cal. Ct. App. 2006).

Therefore, in order to set a cleanup level at less than background water quality, the Regional Board's finding of technical or economic infeasibility must be supported by substantial evidence in the record. Also, there must be substantial evidence in the record demonstrating ***(1)*** that the remaining pollutant levels "will not pose a substantial present or potential hazard to human health or the environment as long as the concentration limit greater than background is not exceeded," Cal. Code Regs. tit. 23 §2550.4(c), ***(2)*** that the alternative cleanup levels are consistent with the maximum benefit to the people of the state; ***(3)*** that the alternative cleanup levels will not unreasonably affect present and anticipated beneficial uses of San Diego Bay; and ***(4)*** the alternative cleanup levels will not result in water quality less than that prescribed in the State and Regional Boards' Water Quality Control Plans and Policies. *See* State Water Board Order 92-49.

II. The Order's Conclusion that Cleanup to Background Water Quality Levels is Economically Infeasible is Arbitrary and Capricious and Not Supported By Substantial Evidence in the Record.

The first step in determining appropriate cleanup levels—background or some other level—is assessing the technological and economic feasibility of cleaning to background pollutant levels. The Order determined that cleaning to background is technologically feasible. *See* Order Finding 30. This means that the economic feasibility analysis determines whether alternative cleanup levels will be considered, and if so, what that level should be.

Because the economic feasibility analysis drives the entire cleanup, it is imperative that the economic feasibility is a fair analysis, supported with evidence in the record cited to its sources, which is fairly presented. But the economic feasibility analysis in Section 31 of the DTR fails to provide support for its assumptions, fails to provide the source of data used in the analysis, analyzes the cleanup arbitrarily in eleven groups of six polygons, presents the analysis in four arbitrary groups, and then arbitrarily proclaims that $33 million is the cut-off for where the incremental costs exceed the incremental benefits.

This arbitrary and unsupported economic feasibility analysis leads to an arbitrary determination that cleanup to background is not economically feasible. More importantly, it has also lead to an arbitrary determination of what level of cleanup is the "best water quality reasonable" given all considerations. *See* State Water Board Order 92-49.

A. The Economic Feasibility Analysis Arbitrarily Assessed Costs in Six-Polygon Groups.

The DTR admits that the economic feasibility of remediating the Shipyard Sediment Site to background levels was assessed using a "series of cumulative cost scenarios" starting with the "six most contaminated stations, then adding the six next most contaminated stations, progressing sequentially down the list until the entire Shipyard Sediment Site was included in the scenario." DTR §31.1 at 31-2.

The DTR provides no explanation or rationale as to why stations were evaluated in groups of six. There is no biological or economic reason for the polygons to be evaluated in groups of six, particularly when the polygons are different sizes and six polygon groups do not necessarily represent one construction season or other grouping in which a consideration of economies of scale could have reduced costs.

Furthermore, by lumping the polygons together in groups of six, the analysis fails to provide the data to allow the Regional Board to determine that the alternative cleanup level should be set at a level that falls in between the groups of six polygons.

B. The DTR and Appendices Fail to Detail the Assumptions in the Economic Feasibility Analysis and Provide Information as to the Source of the Information Used in the Analysis.

The Regional Board's conclusions must be supported by substantial evidence in the record. *See* CAL. CIV. PROC. CODE §1094.5(c). However, the economic feasibility analysis is not supported by substantial evidence in the record. The key information, including cost assumptions, pollution reduction assumptions, and dredging volume assumptions are either not provided or have been provided without a citation as to the source of the information. Failing to provide this information prevents the public from fully vetting the analysis and renders any Regional Board decision based on incomplete information or information not in the record arbitrary and capricious.

1. The economic feasibility analysis fails to identify the source of data for the surface weighted average concentration of the five priority pollutants.

Table A31-1 columns labeled “SWAC.” DTR Appendix 31; Table A31-1. The source of this data has not been provided in the record. It must be provided to allow the public to evaluate the economic analysis and to perform additional analysis.

2. The record fails to identify the source of the cost data in Table A31-1.

Table A31-1 contains cost data. The record fails to identify the source of data or itemize the costs so that the public can analyze the cost assumptions and the elements that underlie the cost conclusions.

Counsel for San Diego Coastkeeper and Environmental Health Coalition were provided an excel spreadsheet labeled “Economic Feasibility Source data” by counsel for the Cleanup Team on March 24, 2011. The document was provided without an administrative record citation and therefore it is assumed that this information is not currently a part of the administrative record. The file fails to indicate the source(s) for this economic feasibility data and this information has not been provided to the public.

This spreadsheet contains cost assumptions that are suspect. For example, the spreadsheet assumes that eelgrass mitigation will be required for five percent of the total dredging area for each six-polygon scenario. There is no showing that this is an appropriate assumption, nor is there any information about the source of the costs assumptions for “Eelgrass Habitat Mitigation” and “Eelgrass Land Lease Costs (in perpetuity).” Without this information, the public cannot evaluate the reliability of that data and assumptions.

3. The record fails to identify the source of the data in Table A31-2.

Table A31-2 contains data regarding polygon area, volume and dredging depths and volumes. The record fails to identify the source of this data so that the public can analyze the data and assumptions.

4. **There is no explanation in the economic feasibility analysis why polygons identified with a "depth to clean" as the undefined term "sur" have differing "dredging depth[s]."**

Table A31-2 includes the undefined term "sur" for several polygons in the "depth to clean" column. Determining what the term "sur" is supposed to mean becomes challenging because the dredging depth varies for polygons with "depth to clean" listed as "sur." For example, "Depth to clean" for SW05 is "sur" while the "Dredging Depth" is 5; "Depth to clean" for SW23 is "sur" while the "Dredging Depth" is 3; and "Depth to clean" for NA15 is "sur" while the "Dredging Depth" is 7. The record provides no explanation as to why these three polygons that all have "Depth to Clean" listed as "sur," have such varied dredging depths or how "Dredging Depth" was determined for rows where "Depth to Clean $(ft)^2$" is listed as "sur." *See* 2010-07-27 Economic feasibility 07-27-10.ng.xls (SAR384569).

If "sur" means that only surficial data is available, the record must explain why additional sampling to determine appropriate dredging depth was not collected. Further, if dredging depth from polygons labeled "sur" was assumed based on dredging depth at an adjacent polygon, the record must explain how such an assumption could be valid and explain the consequences of that assumption to the cost assumptions.

A. The Economic Feasibility Results are Presented in an Arbitrary Manner.

The economic feasibility analysis must be supported by substantial evidence in record and must be presented in a fair manner so that conclusions drawn from the analysis are not arbitrary and capricious. However, the economic feasibility analysis results presented in DTR §31 are presented in an arbitrary manner that prevents the Regional Board from making a reasoned decision based on evidence fairly presented. Any Regional Board decision based solely or heavily on that unfair or biased presentation of evidence is arbitrary and capricious.

1. **DTR Appendix 31 Table A31-2 groups the economic feasibility results together in an arbitrary manner.**

The economic feasibility analysis evaluated the 66 polygons in eleven "cost scenarios," with each scenario representing a group of 6 polygons. *See* DTR Appendix 31. DTR Table A31-2 provided information relative to cost, such as total dredging area, total dredging volume, under pier area, and rock protection area for each polygon.

For each 6-polygon cost scenario, Table A31-1 presented data for: ***(1)*** the resulting surface weighted average concentration of each pollutant following remediation of those polygons and ***(2)*** the cumulative percent exposure reduction for each pollutant.

The economic feasibility analysis ***averaged*** the cumulative exposure reduction for all five pollutants and calculated the percentage "exposure reduction per $10 million spent" based on the average pollutant levels. DTR Table A31-1. The DTR presents the data in a chart labeled Figure 31-1.

The graphic representation of the economic feasibility presented in DTR Figure 31-1 is arbitrary. Instead of graphing each of the eleven cost scenarios separately, the DTR grouped some of the scenarios together, presenting the data in the following way:

Coastkeeper/EHC Table 1. Description of DTR Figure 31-1 by Cost Scenarios and Polygons[1]

"Remediation Dollars Spent" in Table 31-1	Cost Scenarios	Additional Polygons	Total Polygons
$0 - $24	**1, 2**	**12**	**12**
$24 - $33	**3**	**6**	**18**
$33 -$45	**4**	**6**	**24**
$45 - $185	**5, 6, 7, 8, 9**	**30**	**54**
$185- $288	**10, 11**	**12**	**66**

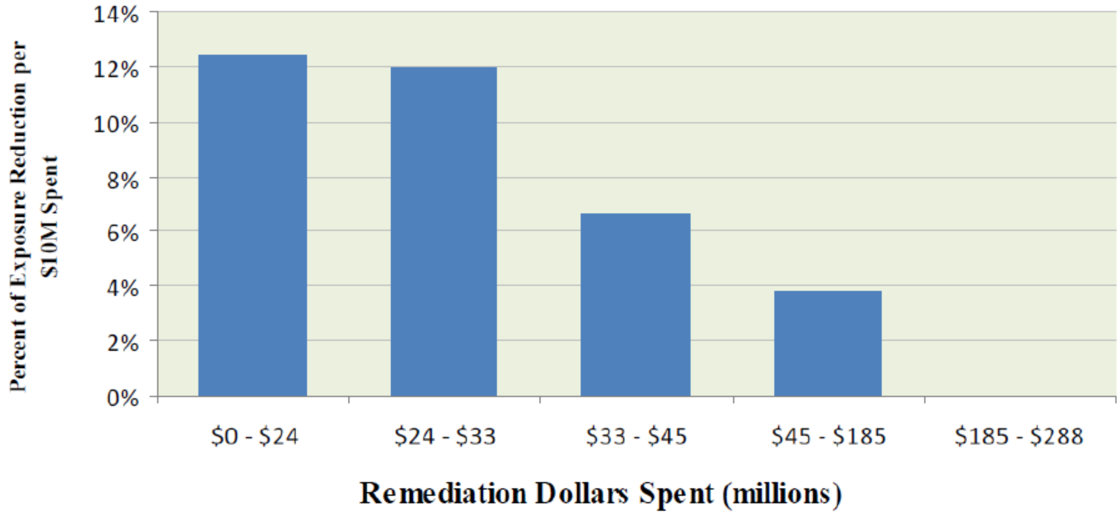
By grouping multiple groups of six polygons scenarios together in an inconsistent and arbitrary way, the economic feasibility analysis fails to present a fair representation of the data, making the analysis arbitrary.

[1] See Exhibit B.

2. **DTR Figure 31-1 would have looked different if results had been presented for each of the eleven cost scenarios.**

When the cost scenarios are arbitrarily grouped, they look like this:

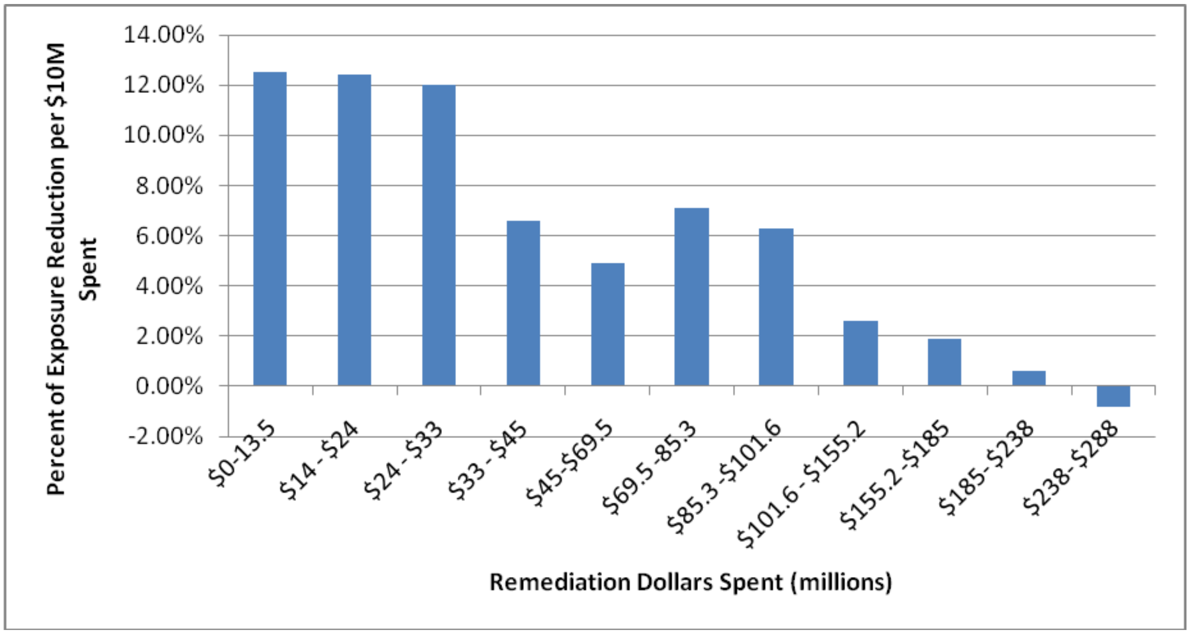
Figure 31-1 Percent Exposure Reduction versus Remediation Dollars Spent



Note: See Appendix for Section 31 for supporting calculations

Each of the eleven cost scenarios graphed individually looks like this:

Coastkeeper/EHC Figure 1. Average Percent of Exposure Reduction Per $10 Million, for Each Cost Scenario



3. The DTR incorrectly summarizes cumulative exposure reduction percentages per $10 million spent.

The DTR states "exposure reduction drops below 7 percent per $10 million after $33 million, below 4 percent after $45 million, and drops to zero at $185 million." DTR § 32.7.1 at 32-40. This response is consistent with supporting calculations in "2010-07-27 Economic feasibility 07-27-10.ng.xls" (SAR384569).

But the Cleanup Team's own discovery response indicates that those numbers are incorrect and shows that the average exposure reduction per $10 million is 10.8% after $33 million, 8.7% after $45 million, and at 5.5% at $185 million. *See* Response to San Diego Coastkeeper and Environmental Health Coalition Economic Feasibility Question, attached as Exhibit D.

Cleanup Team Response at Page 6:

Scenario	Number of Ranked Polygons	Incremental Probable Likely Cost per million	Cumulative Probable Likely Cost per million	Incremental Exposure Reduction per $10 million*	Cumulative Exposure Reduction per $10 million**
1	6	$13.5	$ 13.5	12.5%	12.5%
2	12	$10.8	$ 24.3	12.3%	12.4%
3	18	$08.6	$ 32.9	12.0%	12.3%
4	24	$12.0	$ 44.9	6.6%	10.8%
5	30	$24.5	$ 69.4	4.9%	8.7%
6	36	$15.8	$ 85.2	7.1%	8.4%
7	42	$16.3	$ 101.5	6.3%	8.1%
8	48	$53.6	$ 155.1	2.6%	6.2%
9	54	$29.7	$ 184.8	1.9%	5.5%
10	60	$53.1	$ 237.9	0.6%	4.4%
11	66	$50.3	$ 288.2	-0.8%	3.5%

*** Based on the incorrect assumption that each scenario consists of only 6 polygons.**

****Based on the correct assumption that each scenario includes all previous polygons.[2]**

[2] These explanations are included in discovery response.

Likewise, the DTR states that "the total cost of the cleanup is estimated to be $58 million" and asserts that "cleaning up additional areas beyond the proposed remedial footprint would yield about 4 percent additional exposure reduction per $10 million spent." DTR § 32.7.1 at 32-40. The Cleanup Team's own discovery response proves these statements to be incorrect, as the chart above illustrates that the cumulative exposure reduction per $10 million for a $69.4 million cleanup is actually 8.7%.

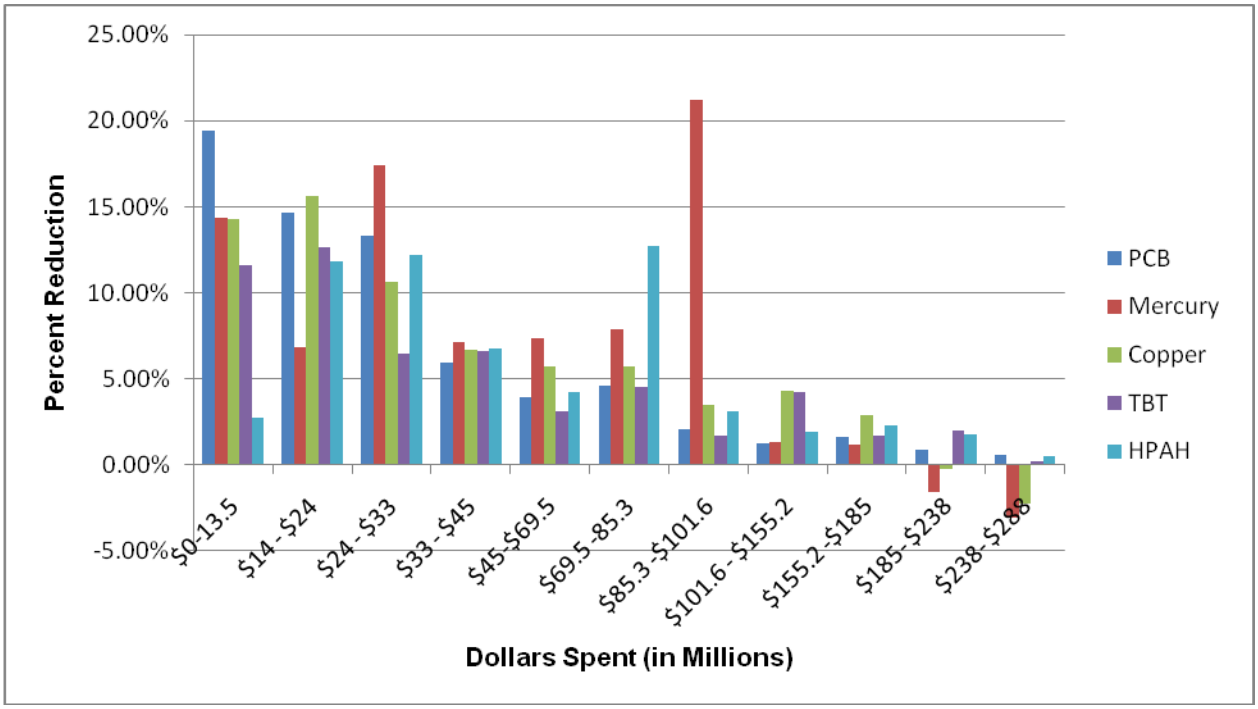
4. The Economic Feasibility Was Not Determined on a Constituent-by-Constituent Basis.

The economic feasibility analysis fails to calculate or present the data on a pollutant-by-pollutant basis. But the law requires that economic feasibility be determined on a pollutant-by-pollutant basis. *See* CAL. CODE REGS. tit. 23 § 2550.4(c) (The Regional Board must determine technological and economic feasibility "to achieve the background value ***for that constituent***" and find that "***the constituent*** will not pose a threat to human health or the environment as long as the concentration limit greater than background is not exceeded." (emphasis added)).

By averaging the pollutant reduction concentration for all five primary constituents of concern, the Cleanup Team and DTR have masked variability in pollutant exposure reduction for each of the pollutants. For example, when percent pollution exposure reduction is calculated for each pollutant individually, it becomes clear that cost scenario 7 ($85.3 - $101.6 million) results in more than 20% exposure reduction in mercury, a persistent bioaccumulating pollutant with significant health impacts.

Calculating and graphing the percent pollution exposure reduction per $10 million spent ***for each pollutant***, using the same methodology the Cleanup Team used in the DTR, the result looks like this:

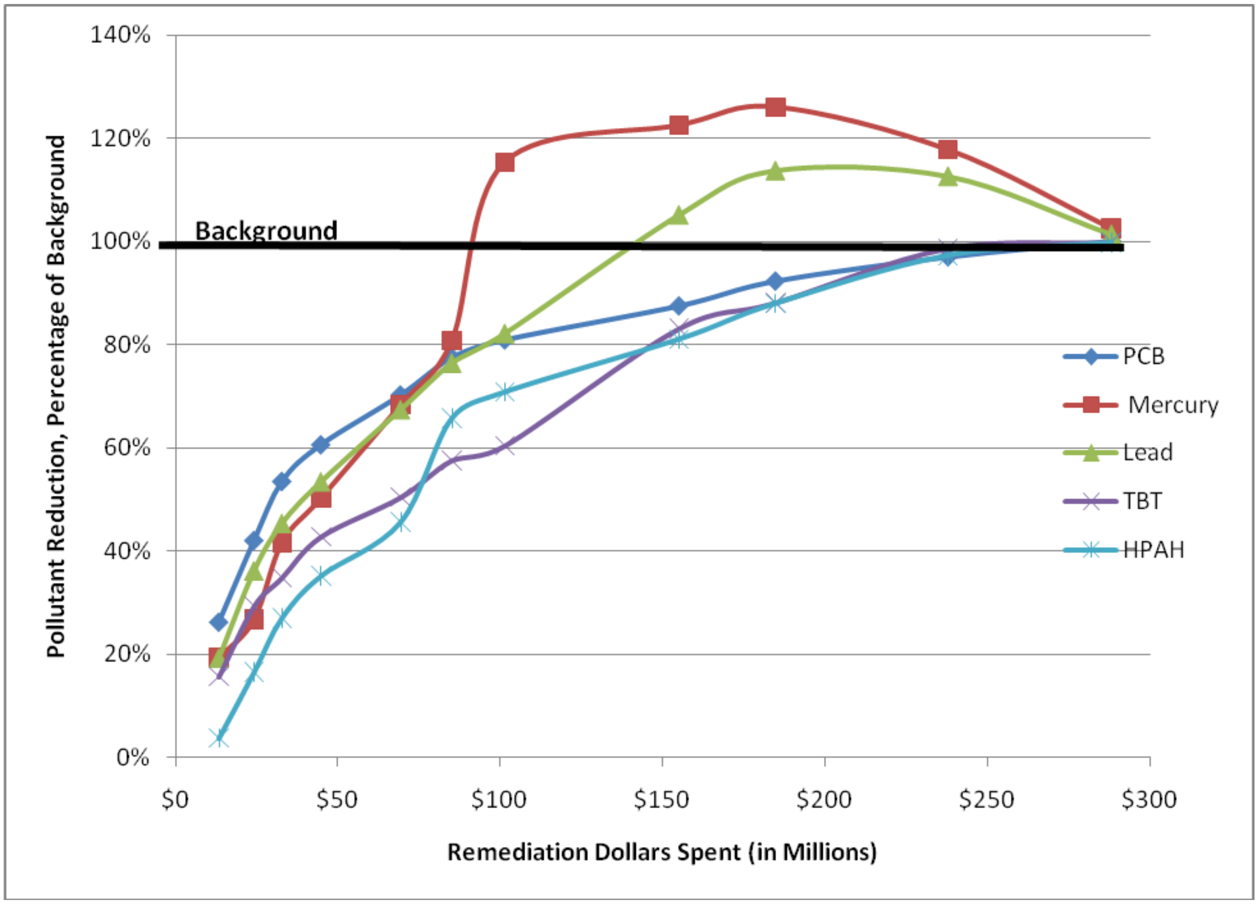
Coastkeeper/EHC Figure 2. Percent Pollution Exposure Reduction Per $10 million, by Pollutant



5. The economic feasibility data was not presented in a scaled manner.

DTR Figure 31-1 presents the economic feasibility analysis in a bar graph with percentage pollutant reduction per $10 million spent on the Y-axis, and remediation dollars spent on the X-axis. But by using a bar graph, readers cannot tell the true relationship of the data points to one another over a continuous basis (dollars spent). To fairly represent the data and to observe the trends of where significant pollution reduction occurs per dollar spent and where the pollution reduction per dollar spent decreases, the results must be graphed on a continuous X-axis. Once the data is plotted as a scatter graph on a continuous x-axis, we can truly see the percent reduction compared the remediation dollars spent.

Coastkeeper/EHC Figure 3. Percent Pollution Exposure Reduction Per $10 million, by Pollutant and in Continuous Dollars, with Background Marked.



B. The DTR's economic feasibility conclusions based on DTR Figure 31-1 are arbitrary and capricious.

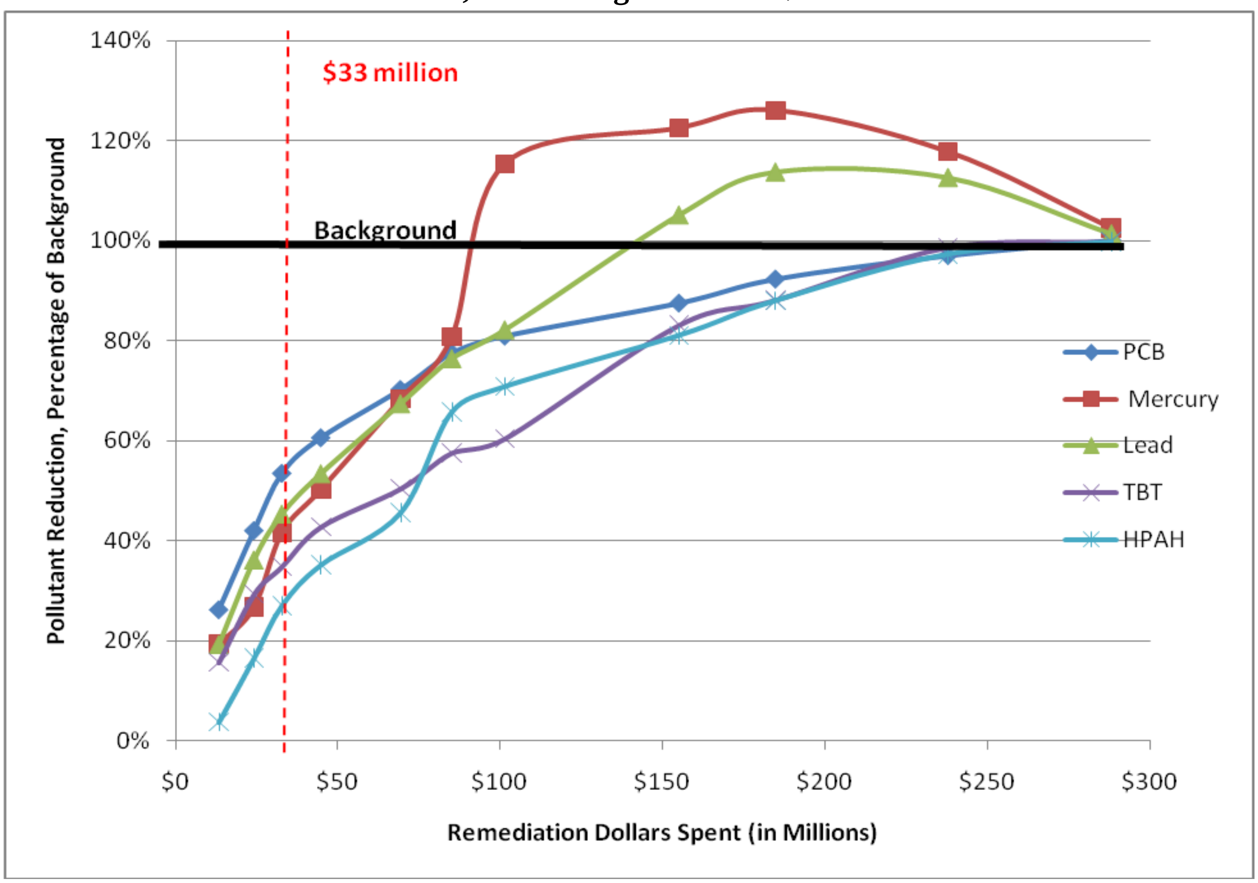
DTR §32.7.1 concludes, based on DTR Figure 31-1:

The highest net benefit per remedial dollar spent occurs for the first $33 million (18 polygons), based on the fact that initial exposure reduction is above 12 percent per $10 million spent. Beyond $33 million, however, exposure reduction drops consistently as the cost of remediation increases. Exposure reduction drops below 7 percent per $10 million spent after $33 million and below 4 percent after $45 million. Based on these incremental costs versus incremental benefit comparisons, cleanup to background sediment quality levels is not economically feasible.

These conclusions are not supported by evidence in the record once the exposure reduction per $10 million is analyzed and presented on a constituent-by-constituent basis. It is crucial that the exposure reduction data for each pollutant be graphed individually because the alternative cleanup levels must be set on a pollutant-by-pollutant basis, not as an average pollution reduction amount. *See* State Water Board Order 92-49. The alternative cleanup levels address each pollutant separately because each pollutant represents a different major class of pollutants that poses a specific type of harm or risk of harm to human health or the environment. *See* DTR at 20-1, 20-2.

If the economic feasibility results are examined on a continuous dollar basis and on a constituent-by-constituent basis, it becomes clear that selection of $33 million as the point below which exposure reduction "drops consistently" as the remediation cost increases and conclusion that cleanup to background is economically infeasible is arbitrary and capricious.

Coastkeeper/EHC Figure 4. Percent Pollution Exposure Reduction Per $10 million, by Pollutant and in Constant Dollars, with background and $33 million marked.



C. The Conclusion that The Alternative Cleanup Levels Are the Lowest Levels Economically Achievable is Arbitrary and Capricious and Not Supported by the Evidence.

The Order concludes that "the alternative cleanup levels established for the Shipyard Sediment Site are the lowest levels that are technologically and economically achievable." Order Finding 32 at 16. But this conclusion is based on the DTR's faulty analysis in § 32.7.1 regarding the four percent additional exposure reduction per additional $10 million spent above $58 million, which the Cleanup team's own discovery response has proven untrue. *See* above, Section II.C.3.

Further, the DTR's conclusion that 4 percent additional average pollutant exposure reduction per $10 million spent is not "economically achievable" is arbitrary. *See* DTR §32.7.1 at 32-40. Neither the Order nor the DTR explains why a 12% average exposure reduction per $10 million is economically achievable, but 4% average exposure reduction per $10 million is not. Nor has the Order or DTR explained why it is appropriate to look at average exposure reduction for all pollutants instead of analyzing economic feasibility on a pollutant-by-pollutant basis. If economic feasibility is analyzed for each pollutant, a cleanup of $85 million provides an exposure reduction for HPAHs of approximately 12% per $10 million, and a cleanup of $101 million provides an exposure reduction for mercury over 20% per $10 million spent. Determining that a $58 million cleanup will bring pollutant levels to the "lowest levels economically achievable" based on a faulty claim that further cleanup will only reduce pollution by 4% per $10 million spent is arbitrary and capricious when the evidence shows that additional cleanup will reduce HPAHs by 12% per $10 million spent and reduce mercury by 20% per $10 million spent.

D. The Economic Feasibility Analysis Fails to Demonstrate that the Chosen Alternative Cleanup Levels Represent the "Best Water Quality" Based on All Demands.

The DTR states: "An assessment of risk to wildlife receptors under projected post-remedial conditions was conducted to confirm **the alternative cleanup levels established by economic analysis (Section 31*)*** are adequately protective of aquatic-dependent wildlife beneficial uses." DTR §32.2 at 32-12(emphasis added). In this statement, the DTR admits that the economic feasibility analysis in Section 31 determined the alternative cleanup levels. But there is no evidence in the record justifying the decision to limit the Proposed Remedial Footprint to 23 polygons.

State Water Board Order 92-49 requires the economic feasibility analysis to consider all the values involved, but the economic feasibility analysis only includes cleanup cost for the dischargers and measures that against average pollutant concentration removal per $10 million spent. The analysis fails to quantify and consider additional benefits to human health, wildlife, aquatic dependent wildlife, and other beneficial uses from removing pollutants and providing a cleaner San Diego Bay for the wildlife and communities that use this resource. The analysis vaguely asserts that it "considered" a broad range of values, but none of these are listed or quantified, and there is no explanation of the role these other, external costs played in the determination of the economic feasibility of cleaning to background.

For example, the DTR claims that the "San Diego Water Board evaluated a number of criteria to determine risks, costs and benefits." DTR § 31 at 31-1. It suggests that these criteria included factors such as "total cost, volume of sediment dredged, exposure pathways of receptors to contaminants, short- and long-term effects on beneficial uses…, effects on shipyards and associated economic activities, effects on local businesses and neighborhood quality of life, and effects on recreational, commercial or industrial uses of aquatic resources." DTR § 31 at 31-1. But other than alleging that these factors were "evaluated," the DTR makes no attempt to quantify or rank these criteria or explain how they were balanced against one another.

II. The Order Fails to Meet Legal Requirements for Cleanup to Pollutant Levels Greater Than Background.

In order to adopt alternative cleanup levels, the Regional Board must make a finding that the pollutants will not threaten human health or the environment as long as the alternative cleanup levels are "not exceeded." CAL. CODE REGS. tit. 23 §2550.4(c). But the monitoring plans—both during and post-remediation—do not actually require that the alternative cleanup levels be met. *See* Order Directive A.2.a. and Directive D; DTR § 34.

A. The Site-Wide Alternative Cleanup Levels Were Calculated Based on Remediating to Background Pollutant Levels.

The DTR admits that "Post-remedial SWAC calculations were completed with the assumption that the SWAC inside the [Proposed Remedial] footprint would be remediated to background concentrations…." DTR §32.2.3 at 32-12; *see also* Table A32-3. By the DTR's own admission, in order to achieve the post-remedial pollutant concentrations site-wide, the remediated areas need to be cleaned to background if the other areas remain untouched. For this approach to be valid, the cleanup must ensure that remediated areas are cleaned to background conditions or cleaner.

B. The Remediation Monitoring Fails to Require Remedial Areas to Achieve Background Levels.

The Order and the DTR indicate that the Dischargers must conduct "Remedial Monitoring" to confirm that the dredging and other remedial activities have achieved target clean-up goals within the remedial footprint. *See* Order Section B.l.1; DTR Section 34.1. As explained above, the "target cleanup levels within the remedial footprint" is background pollutant levels. But the Order and DTR set out a process by that allows the remediated areas to be **20% more polluted** than background pollutant levels.

1. The "120% of background" could lead to site-wide pollutant concentrations above the Alternative Clean-up Levels.

The Order requires a second dredging pass: "If concentrations of primary COCs in subsurface sediments (deeper than 5 cm) are above 120 percent of post-remedial dredge area (background) concentrations." Order Directive A.2.a. at 20; *see also* DTR § 34.1.2. at 34-3. Because the DTR's approach to achieve site-wide contamination levels below existing contamination levels (but above background) is to clean-up a portion of the Site to background levels and to leave other portions of the site as-is, it is key that those portions of the Site that will be dredged actually achieve background contamination levels. *See* MacDonald 2011 at 25. But the Order and DTR has set the trigger for second pass of dredging at 120% of background, meaning that the remediation areas will not necessarily achieve background contamination levels and are likely to have higher-than-background concentrations of pollutants. *See* MacDonald 2011 at 25.

When the "Predicted Post-Remedial SWAC Calculations" in DTR Table A32-3 are re-calculated using numbers in each remediated polygon at the "120% of background" level at which additional dredging is not required, it becomes clear that the site-wide alternative cleanup levels will not be achieved. By substituting the background concentrations of each pollutant for the 120% of background, the resulting Site-wide surface weighted average concentration for each pollutant would be ***greater*** than the Alternative Cleanup Levels.

Coastkeeper/EHC Table 2. Comparison of Post-Remedial Pollutant Concentration When Remediated to Background and Second-Pass Dredging Trigger Set at 120% of Background.[3]

Priority COC	Post-Remedial Concentrations in Remediated Polygons (Background)	Alternative Cleanup Levels (Site-wide Post-remedial SWAC assuming remediation to background)	120% of Background Trigger for Second-pass Dredging	Site Wide Post-remedial SWAC Levels Assuming Remediation to 120% of background
Copper	**121 mg/kg**	**159 mg/kg**	**145.2 mg/kg**	**161 mg/kg**
Mercury	**0.57 mg/kg**	**0.68 mg/kg**	**0.68 mg/kg**	**0.69 mg/kg**
HPAHs	**663 µg/kg**	**2451 µg/kg**	**796 µg/kg**	**2,466 µg/kg**
PCBs	**84 µg/kg**	**194 µg/kg**	**101 µg/kg**	**196 µg/kg**
TBT	**22 µg/kg**	**110 µg/kg**	**26.4 µg/kg**	**111 µg/kg**

The DTR and record present no evidence demonstrating that site-wide remediation goals will be met if the concentrations of pollutants in all of the remediated areas are at 120% of background levels. *See* MacDonald 2011 at 25. Therefore, the "120% of background" second-dredging pass rule is arbitrary and capricious and fails to ensure that alternative cleanup levels are achieved.

2. The Regional Board cannot approve the Order and DTR with the 120% of background second-pass rule because it fails to ensure that Alternative Cleanup Levels will not be exceeded.

To allow an alternative cleanup level greater than background concentration of a pollutant, the Regional Board must find that the constituent will not pose a threat to human health or the environment "as long as the ***concentration limit*** greater than background is not exceeded." CAL. CODE REGS. tit. 23 §2550.4(c) (emphasis added). But the Order's own allowance for remediated polygons to have pollutant concentrations greater than background renders the Alternative Cleanup Levels "predicted resulting pollutant concentrations" and not actual pollutant ***concentration limits***. To make the alternative cleanup levels concentration limits, the Order must ensure that remediated areas are remediated to background pollutant concentrations.

[3] See Exhibit H for Detailed Calculations using DTR Table A32-3.

3. The "120% of background" decision rule violates the Order's corrective action directive.

Order Section A.2.c. states "the Shipyard Sediment Site as shown in Attachment 2 ***shall be remediated to attain*** the following post remedial surface-weighted average concentrations ("SWACs"):

Primary COCs	Predicted Post-Remedial SWACs
Copper	159 mg/kg
Mercury	0.68 mg/kg
HPAHs	2,451 µg/kg
PCBs	194 µg/kg
Tributylin	110 µg/kg

Because the Order mandates—through the use of the word "shall"—attainment of the above-listed post-remedial SWACs, and because those levels can only be guaranteed if the remedial areas achieve background pollutant levels, the 120% background Redredging trigger violates the Order's remediation directive.

4. The "120% of background" decision rule for a second dredging pass is ambiguous.

In addition to violating the requirement that the alternative cleanup levels must be concentration limits, the language in the Order setting the 120% background level allowance leaves open the possibility that every Contaminant of Concern had to exceed 120% of background in order to warrant a second dredging pass. *See* Order Directive A.2.a This would allow for a situation when one or more of the pollutants were significantly above background concentrations, but if one pollutant was at or below 120% of background, that no additional dredging would be required. This would lead to even more egregious violations of the alternative cleanup levels. *See* MacDonald 2011 at 25.

C. The Post Remedial Monitoring Fails to Evaluate Whether Alternative Cleanup Levels are Achieved.

The Order requires the Dischargers to submit a Post Remedial Monitoring plan[4] to the San Diego Water Board within 90 days of the Order's adoption. *See* Order Section D; DTR § 34.2. The Post Remedial Monitoring plan must be designed to verify that the remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. Post Remedial Monitoring is a key component of any sediment remediation because it provides the data and information needed to confirm that the remedial work has been successfully completed and to confirm that the clean-up goals have been met. *See* MacDonald 2011 at 28. Unfortunately, the Post Remedial Monitoring requirements set out in the Order and explained in the DTR do not provide data needed to evaluate the remedial measures' effectiveness and to identify whether additional remediation is needed to achieve the clean-up goals. The Post Remedial Monitoring also considers the remedy "successful" at pollutant concentrations greater than the alternative cleanup levels.

1. The Order sets the "Remedial Goals" as compliance with "Trigger Concentrations" above the Alternative Cleanup Levels—and in some cases ABOVE existing pollutant levels.

The Order sets the "Remedial Goals" as "composite site-wide [pollutant concentrations] below the Trigger Concentrations." Order Directive D at 29. A quick glance at the Trigger Concentrations reveals that they are well above the "alternative cleanup levels" and in many cases are not much below existing pollutant levels. For mercury, the Trigger Concentration is actually **greater** than existing mercury levels. This means that the Order is setting a cleanup goal for mercury that the cleanup **not add any additional mercury contamination**. *See* MacDonald 2011 at 31.

[4] While the Order refers to "Post Remedial Monitoring," (pages 25-31, Attachment 6), the DTR refers to "Post-Remediation Monitoring" (see Section 34.2). These comments use the term "Post Remedial Monitoring" to refer to requirements in both the Order and DTR.

Coastkeeper/EHC Table 3. Summary of Pollutant Concentrations.

Priority COC	Background[5]	Site-wide Existing Concentration[6]	Site-wide Alternative Cleanup Levels[7]	Post-Remediation Trigger Concentration for Additional Study[8]
Copper	121 mg/kg	187 mg/kg	159 mg/kg	185 mg/kg
Mercury	0.57 mg/kg	0.75 mg/kg	0.68 mg/kg	0.78 mg/kg
HPAHs	663 µg/kg	3,509 µg/kg	2451 µg/kg	3208 µg/kg
PCBs	84 µg/kg	308 µg/kg	194 µg/kg	253 µg/kg
TBT	22 µg/kg	162 µg/kg	110 µg/kg	156 µg/kg

Because the Order sets the remediation goals as compliance with the "Trigger Concentration" instead of the alternative cleanup levels, the Order is actually setting the "Trigger Concentration" as the concentration limit for each pollutant.

In order for these "Trigger Concentrations" to be acceptable as alternative cleanup levels greater than background, the Regional Board must find that "the constituent will not pose a threat to human health or the environment as long as the concentration limit greater than background is not exceeded." CAL. CODE REGS. tit. 23 §2550.4(c).

The Regional Board cannot make this finding for two reasons. First, mercury has been identified as a toxic pollutant that poses a threat to human health and the environment when in its bioaccumulating methylmercury form. DTR § 1.5.2.5 at 1-16, 1-17. People from the local community who eat fish from San Diego Bay are at risk from existing mercury levels. *See* DTR § 1.5.3; *see generally* Environmental Health Coalition "Survey of Fishers on Piers in San Diego Bay," March 2005. The Regional Board cannot find that allowing more mercury in the sediment in San Diego Bay does not pose a threat to human health and the environment. Second, the analysis in the DTR regarding the risk to beneficial uses is based on the "alternative cleanup levels" listed in Table 2 of the Order, not the "Trigger Concentrations" as the remedial goal. There is no analysis in the record that compliance with the "Trigger Concentrations" will not pose a threat to human health or the environment.

[5] See Order Table 1 at 13.
[6] See DTR Table 32-5 at 32-14.
[7] See Order Table 2 at 15.
[8] See Order D.6. at 27.

2. The Post Remedial Monitoring program will mask ongoing pollutant problems.

The Post Remedial Monitoring program requires Discharges to collect a paltry amount of samples and then mix them together—a process called "compositing"—which will mask the true extent of the remaining pollution and to guarantee that no additional action will be required. *See* MacDonald 2011 at 30. In order to fairly assess the success of the remediation and determine if additional remediation is necessary, the Post Remedial Monitoring program must collect a robust amount of samples and analyze those samples in a meaningful way. Given the current design of the program, the Regional Board will not be able to assess whether the alternative cleanup levels were achieved and the remediation was successful.

a. The Post Remedial Monitoring program fails to require samples from each polygon at the site.

The sediment sampling requirements described in the Order will provide data on the average levels of five pollutants in the top 2 cm of sediment contained within only six polygon groups. *See* Order, Section D.1.c. This means that the Order fails to require the Dischargers to collect data needed to evaluate whether the clean-up goals have been met for the whole site. *See* MacDonald 2011 at 29. Determining pollutant concentrations within each polygon at the Site is important because certain ecological receptors—including benthic invertebrates and certain benthic fish species, such as gobies—have small home ranges and are therefore exposed to contaminants that occur within small geographic areas. *See* MacDonald 2011 at 29.

Further, this method is not consistent with the way the site-wide post-remedial concentrations were determined. Those site-wide concentrations were determined by measuring existing pollutant concentrations in each unremediated polygon, assuming that each remediated polygon would be cleaned to background, and then calculating the average. To determine the actual post-remedial pollutant concentrations, the pollutant concentrations in each polygon should be measured and the concentrations should then be averaged. This way, if the site-wide alternative cleanup levels are not met and additional action is needed, the data will be available to determine where the pollutant "hot-spots" are or which remediated polygons were not remediated to background. This will also indicate if the dredging resuspended contaminated sediments and potentially contaminated areas outside the remedial footprint.

b. Compositing surface sediment into six polygon groups will mask the true extent of contamination remaining at the Shipyard Sediment Site.

The DTR divides the Shipyard Sediment Site into six sampling areas and then directs the Dischargers to use a compositing scheme to evaluate the efficacy of the remediation. This process is flawed for several reasons:

(1) <u>The "success" of the clean-up will rely heavily on data from polygons that were not dredged.</u> Only two of the six groups sampled to determine the remediation's success represent areas where remedial actions will be taking place, and these areas represent a relatively small proportion of the site as a whole. Therefore, the assessment of how successful the cleanup has been will largely rest on composite data from sites that were not remediated—an inappropriate basis for evaluating the efficacy of remedial actions. *See* MacDonald 2011 at 30.

(2) <u>The six sampling areas are arbitrary</u>. Neither the Order nor the DTR provide any explanation of how the six sampling areas were selected, nor do the documents describe how this is a scientifically-defensible method to assess remediation success. Composite sediment sampling to determine a remediation program's success is unorthodox. *See* MacDonald 2011 at 30. Without a detailed, scientifically-based explanation of how the sites were selected and how it would accurately gauge remediation success, this sampling method is not scientifically justified and is arbitrary. *See* MacDonald 2011 at 30.

(3) <u>Testing replicate sub-samples of composited sediment samples tests how good the lab is, not the variability of pollutants remaining at the Site.</u> The Post Remedial Monitoring plan will not provide the data to verify whether the remediation has been effective in protecting human health and aquatic-dependent wildlife. *See* DTR § 34.2.1; MacDonald 2011 at 30. The plan's reliance on sub-sampling sediments that have been composited from multiple polygons will only provide information on the consistency of the homogenization process that is applied to the composite sediment samples. *See* MacDonald 2011 at 30. The sub-sampling approach will not provide Regional Board staff with the information necessary to determine whether remediation has been effective at protecting human health or aquatic-dependent wildlife. *See* MacDonald 2011 at 30.

3. Failure to assure that the Alternative Cleanup Levels are met through the remediation process renders the cleanup illegal.

The Post Remedial Monitoring requirements reveal the major shortcomings of the cleanup.

(1) There is no requirement in the Order that the alternative cleanup levels must be met. Instead, the Order allows the cleanup to achieve a less-stringent "Trigger Concentration" level of pollutant that effectively sets the cleanup levels significantly higher than background pollutant levels. *See* Order at D.6 at 27. But there is no evidence in the record that this remaining pollutant level will not "pose significant risk to human health or the environment" or will not "unreasonably affect present and anticipated beneficial uses of the waterbody." *See* State Water Board Order 92-49.

(2) By considering the remediation successful if it achieves "Trigger Concentration" levels, the cleanup is not "consistent with the maximum benefit to the people of the state." The people of the state have paid for Regional Board staff to spend years' worth of time developing a cleanup plan. To settle for a plan that allows an even greater level of pollution than already exists and calling it "successful" is an insult to the people of California.

(3) By designing the Post Remedial Monitoring to disguise the true extent of pollution remaining at the Site and to gauge the success of the remediation overwhelmingly on pollutant levels in areas that were not actually remediated makes the cleanup look like a sham. To demonstrate that the Dischargers and the people of the California that the cleanup achieved the alternative cleanup levels, the Post Remedial Monitoring must be designed in a way to fairly assess the cleanup's success and identify areas where cleanup was not successful.

(4) Exceeding the "Trigger Concentrations" does not actually trigger any additional remediation. *See* MacDonald 2011 at 34. Instead, Dischargers need only attempt to identify the specific sub-areas that are causing the exceedance(s), and write a report of investigation that includes recommendation action—if any—to address the problem. This means that even where pollutant concentrations exceed the alternative clean-up levels and the trigger concentrations, there is still no mandate to take additional remedial action to achieve the alternative clean-up levels.

IV. The Proposed Cleanup Fails to Require the Best Water Quality Reasonable.

The law requires every cleanup to result in the "best water quality reasonable." *See* State Water Board Order 92-49. The following aspects of the proposed cleanup prevent it from achieving the "best water quality reasonable."

A. Narrative Alternative Cleanup Levels for Aquatic Life Cannot Ensure that These Beneficial Uses will not be Unreasonably Affected at the Shipyard Sediment Site.

The Order and DTR fail to include numeric clean-up levels for benthic invertebrates and fish. *See* MacDonald 2011 at 18-20. Instead the Order relies on a narrative directive to protect aquatic life. *See* Order, Table 2 at 15 ("Remediate all areas determined to have sediment pollutant levels likely to adversely affect the health of the benthic community.). This failure is particularly egregious with respect to fish, as no information was presented in the Order or the DTR on how the potential for adverse effects on fish were explicitly considered. *See* MacDonald 2011 at 18 and 20. Furthermore, the lines of evidence developed to assess benthic invertebrate communities are likely to be minimally protective as they rely on comparisons to a reference pool that included samples that would not meet criteria for negative control samples. *See* MacDonald 2011 at 19. Without appropriate numeric limits for fish and benthic invertebrates, there will be no way to quantitatively measure compliance with measures to protect fish and benthic invertebrates.

B. The Proposed Remedial Footprint is Too Small to Ensure that the Remaining Pollutant Levels will not Unreasonably Affect Present and Anticipated Beneficial Uses of San Diego Bay.

The Proposed Remedial Footprint indicating "polygons targeted for remediation" is too small to ensure that present and anticipated beneficial uses of San Diego Bay are protected. *See* Order at 38, Attachment 2.

1. Problems with the development of the Proposed Remedial Footprint results in a cleanup that achieves less than the best water quality reasonable.

First, an insufficient number of samples were collected to accurately determine the nature and extent of contamination at the 148-acre Shipyard Site, given the variability of contaminants at the site. *See* MacDonald 2011 at 10.

Second, ranking the polygons from most- to least-contaminated using the Composite Surface Weighted Average Concentration (SWAC) Value fails to consider the potential adverse effects on human health or the environment. *See* MacDonald 2011 at 10. The method also ignores concentrations of other contaminants—such as lead, zinc, and low molecular weight PAHs—that could be elevated in sediments from the site. *See* MacDonald 2011 at 10.

Third, the Proposed Remedial Footprint arbitrarily excludes 15 polygons that are more contaminated—from a sediment chemistry standpoint—than the least-contaminated polygon in the Proposed Remedial Footprint. *See* MacDonald 2011 at 11.

Fourth, the thresholds the DTR uses to determining whether polygons that are "Likely" impacted are problematic. The DTR fails to explain why the Site Specific Median Effects Quotient (SS-MEQ) is used to evaluate sediment chemistry in the non-Triad sediment samples, when the metric used for the Triad sediment samples (SQGQ1) is reliable. *See* MacDonald 2011 at 19. The DTR and record provide no evidence demonstrating how or why 0.9 was chosen as the "optimal threshold." DTR § 32.5.2 at 32-32; *See* MacDonald 2011 at 11. Likewise, the 60% Lowest Apparent Effects Threshold for classifying sediment samples as "Likely" impacted is too high. *See* MacDonald 2011 at 11-13; *See* DTR § 32 at Table 32-19.

Additionally, the DTR failed to explicitly consider the potential effects exposure to contaminated sediments would have on fish with small home ranges. This failure is problematic because fish with small home ranges are known to utilize benthic habitats at the Site and the concentrations of PCBs in sediments are sufficient to adversely affect the reproduction of fish at various locations. *See* MacDonald 2011 at 15.

2. The Proposed Remedial Footprint excludes eight polygons that, under the DTR's own methodology, should have been included.

Polygons NA22, NA01, NA04, NA07, NA16, SW06, SW18, and SW29 should have been included in the Proposed Remedial Footprint and should be added to the final remedial footprint.

a. The Proposed Remedial Footprint improperly excludes NA22.

The DTR acknowledges that polygon NA22 is "Likely" impaired and should be remediated because Contaminants of Concerns in sediments are likely adversely affecting benthic invertebrates within this polygon. *See* DTR Section 33.1.1. However, NA22 has improperly been excluded from the Proposed Remedial Footprint, principally because NA22 is in the vicinity of a Total Maximum Daily Load being prepared for the Mouth of Chollas, Switzer, Paleta Creeks ("Creek Mouth TMDL").

The Creek Mouth TMDL will not address the existing contamination in polygon NA22. TMDLs "function primarily as planning devices and are not self-executing." *See City of Arcadia v. EPA*, 265 F.Supp.2d 1142, 1144 -1145 (N.D. Cal. 2003), citing *Pronsolino v. Nastri*, 291 F.3d 1123, 1129 (9th Cir.2002) ("TMDLs are primarily informational tools that allow the states to proceed from the identification of waters requiring additional planning to the required plans.”).

A TMDL does not, by itself, prohibit any conduct or require any actions. *See id*. A TMDL merely “forms the basis for **further administrative actions** that may require or prohibit conduct with respect to particularized pollutant discharges and waterbodies.” *See id*. (emphasis added), citing *Idaho Sportsmen's Coalition v. Browner*, 951 F. Supp. 962, 966 (W.D.Wash.1996)(“TMDL development in itself does not reduce pollution.... TMDLs inform the design and implementation of pollution control measures.”).

The TMDL process cannot provide a vehicle for remediating contaminated sediment within the NA22 polygon. A new and separate remediation process—another Cleanup and Abatement Order—would need to be initiated after completion of the Creek Mouth TMDL to address existing contaminated sediment in NA22, if it is not remediated under the current Order. When asked in depositions, no Cleanup Team member could point to a TMDL that had been implemented through dredging. This means that removing NA22 from the Proposed Remedial Footprint virtually guarantees that it will never be dredged—even though the DTR agrees that it is “Likely” impaired. Furthermore, TMDLs are given a long time period—typically twenty years—before they need to be implemented. Adding this delay together with the time it would take to develop another cleanup and abatement order to address NA22 means that any possible cleanup of NA22 would not be for decades down the road. It is a waste of time and resources to put off remediating NA22 when a framework for its remediation has already been established in this process.

b. The Proposed Remedial Footprint excludes—NA01, NA04, NA07, NA16, SW06, SW18 and SW29—which pose unacceptable risks to fish and the benthic community.

The DTR arbitrarily excluded at least a dozen polygons from the Proposed Remedial Footprint without explanation. *See* MacDonald 2011 at 14-15. An independent evaluation of the available data and information by sediment remediation expert Donald MacDonald indicates that seven of these excluded polygons pose risks to organisms utilizing habitats within the study area. (MacDonald 2009). The following presents the results of an evaluation for seven polygons that should be added to the Remedial Footprint to address inconsistencies in the procedures applied in the DTR and the risks posed to fish and benthic organisms. *See* MacDonald 2011 at 39, Table 5.

Metric	Threshold Value	NA01	NA04	NA07	NA16	SW06	SW18	SW29
Composite SWAC Ranking Value[1]	5.5	6.8	6.4	9.9	6.7	7.2	6.7	7.5
SS-MEQ[2]	0.9	0.73	0.62	0.97	0.71	0.7	0.68	0.8
P_{max} for Sediment Chemistry[3]	0.49	0.76 (H)	0.74 (H)	0.72 (H)	0.77 (H)	0.69 (H)	0.69 (H)	0.66 (H)
Substances Exceeding SQGs for Sediment[4]	0	mercury, PCBs	mercury	mercury, PCBs	mercury, PCBs	mercury, PCBs	mercury, PCBs	mercury, PCBs
Substances Exceeding WQCs in Pore Water[3]	0	copper, PCB	ND	ND	lead, PCBs	ND	ND	ND
Control-Adjusted Survival of Amphipods[3]	82%	80% (S)	80% (S)	74% (S)	90% (S)	ND	74% (S)	ND
Control-Adjusted Normal Development of Bivalves[3]	76%	49% (S)	84% (S)	88% (S)	3% (S)	ND	64% (S)	ND
Control-Adjusted Fertilization of Echinoderms[3]	70%	86% (S)	88% (S)	102% (S)	84% (S)	ND	83% (S)	ND
Hazard Quotient for Fish ([PCB]/TRV)[3]	1	.25	.77	.16	.24	.05	1	2.59
Number of Criteria Exceeded		**7**	**5**	**6**	**6**	**4**	**6**	**4**

ND = no data; S = survival; TRV = tissue residue value; SQGs = sediment quality guidelines; WQC = water quality criteria; PCB = polychlorinated biphenyls; H = high; SWAC = surface-area weighted average concentration; P_{max} = maximum probability model.

[1]From Table A33-1 of DTR

[2]Calculated independently using the data in Table A33-3 of the DTR

[3]From MacDonald *et al* 2010.

[4]From DTR

C. The Remediation Monitoring is Insufficient to Assess Remedial Activities' Impacts on Water Quality, to Evaluate the Effectiveness of Remedial Measures, or to Identify the Need for Further Dredging to Achieve Clean-up Goals at the Shipyard Sediment Site.

The Order and the DTR indicate that the Dischargers must conduct water quality monitoring: ***(1)*** to demonstrate that remedial dredging does not violate water quality standards outside the construction area and ***(2)*** to confirm that the dredging and other remedial activities have achieve target clean-up goals within the remedial footprint. *See* Order Section B.l.1; DTR Section 34.1. Unfortunately, the water quality component of the Remediation Monitoring program set out in the Order and the DTR falls short of meeting the monitoring goals for several reasons.

1. The water quality component of the Remediation Monitoring program fails to provide safeguards to ensure data collected reveals actual water quality conditions.

The water quality component of the Remediation Monitoring Program falls short in two ways: ***(1)*** some of the requirements are specific but are not designed to collect data to accurately reflect water quality impacts during remediation and ***(2)*** some requirements are vague, allowing Dischargers to collect data in a way that masks the true water quality impacts during dredging.

For example, the Remediation Monitoring program allows the Dischargers to measure compliance with ambiguous water quality monitoring goals through modeling, which will not provide data of actual conditions sufficient to determine whether dredging is violating water quality standards. *See* MacDonald 2011 at 22; DTR § 34.1.1. at 34-2. Water quality impacts can only be adequately assessed by comparing the results of real-time turbidity monitoring, dissolved oxygen sampling, and sampling of contaminants of concern to water quality standards in the Basin Plan and/or state water quality standards. *See* MacDonald 2011 at 22. Similarly, the Remediation Monitoring allows Dischargers to abandon daily water quality monitoring if no samples exceed water quality targets for three days in a row. DTR § 34.1.1. at 34-2. Abandoning daily monitoring is problematic because variability in turbidity or dissolved oxygen levels may not be associated primarily with operation of the dredge. *See* MacDonald 2011 at 23.

Vagueness in the Remediation Monitoring requirements include: ***(1)*** failing to specify the numeric "water quality standards" that must be complied with during remediation. *See* MacDonald 2011 at 22; ***(2)*** failing to require dischargers to take all the samples from down-current locations, *See* MacDonald 2011 at 22; ***(3)*** failing to define the "construction area" *See* MacDonald 2011 at 22-23; ***(4)*** mandating that samples be collected 10 feet deep instead of the depth with the highest level of monitored variables. *See* MacDonald 2011 at 23; ***(5)*** failing to require that water samples need to be collected long enough after dredging commences to give the plume time to reach the sampling location; *See* MacDonald 2011 at 23, ***(6)*** and failing to specify which best management practices should be employed to reduce or eliminate resuspended sediments from traveling to other areas, harming water quality or recontaminating adjacent areas. *See* MacDonald 2011 at 23; DTR § 34.1.1. at 34-2.

2. The sediment component of the Remediation Monitoring program fails to require data collection to confirm Cleanup Levels are achieved.

In addition to the fatal flaw of only requiring a second dredging pass if pollutant concentrations exceed 120% of background pollutant levels, the sediment portion of the Remediation Monitoring program fails to require Dischargers to collect data in an amount and through methods sufficient to competently measure compliance with the alternative clean-up levels.

First, the Order and DTR provide inconsistent sampling requirements; the Order requires that samples be collected deeper than the upper 5cm, while the DTR requires that samples be collected deeper than the upper 10cm. *See* Order Directive A.2.a; DTR § 34.1.2 at 34-2. Second, vagueness in the monitoring requirements permits Discharges to collect only one sample from each polygon, which is insufficient given the sediment chemistry variability within polygons. *See* MacDonald 2011 at 24. Vagueness in the monitoring requirements also allows sediment sampling to target the historic sampling locations, leaving other locations within the remedial footprint unsampled and ignoring elevated contaminant levels that may occur in those unsampled areas. *See* MacDonald 2011 at 25.

The DTR explains a sampling protocol that requires the sampling team to visually examine each sediment sample and try to identify “undisturbed sediments.” These sampling procedures are inappropriate and will be nearly impossible for sampling teams to follow consistently. *See* MacDonald 2011 at 25. The DTR explains that a sand cap would be necessary at times, but the Remediation Monitoring fails to explain what those criteria are and who would make such determination. *See* MacDonald 2011 at 26. The Order is silent on this issue.

D. The Post Remedial Monitoring Program is Poorly Designed and Will not Require Data Collection to Accurately Evaluate Post-Remediation Conditions.

The Post Remedial Monitoring plan provides poorly-written and confusing directions that would be difficult for sampling teams to consistently follow. *See* MacDonald 2011 at 30. The Post Remedial Monitoring excludes NA22 wholesale from the Post Remedial Monitoring plan, even though NA22 is part of the Site. *See* DTR §34. NA22 must be included in any Post

Remedial Monitoring because it is a part of the Shipyard Sediment Site. *See* MacDonald 2011 at 30.

The approach to evaluating post-remedial conditions is likely to underestimate sediment toxicity because the DTR relied on inappropriate thresholds. *See* MacDonald 2011 at 29. A better approach would be to generate sediment quality Triad data for at least six reference sites as part of the Post Remedial Monitoring plan. *See* MacDonald 2011 at 29.

Furthermore, requiring sediment samples to be collected at only five sampling stations to evaluate benthic community conditions is inadequate because it will provide data on only about eight percent of the polygons at the Sediment Shipyard Site instead of from the entire Site, which is more appropriate. *See* MacDonald 2011 at 31. As there is substantial potential for resuspension, transport, and deposition of fine sediment during the implementation of the remedy, recontamination of remediated areas or further contamination of unremediated areas could occur. *See* MacDonald 2011 at 31. The Post Remedial Monitoring plan should be expanded to provide a more robust basis for evaluating exposure of benthic invertebrates to contaminants at the site and for assessing sediment toxicity, and include testing from appropriate reference sites. *See* MacDonald 2011 at 31.

The Post Remedial Monitoring program's bioaccumulation requirements are insufficient. The nine sites selected for Post Remedial bioaccumulation sampling are arbitrary. *See* MacDonald 2011 at 31. Because the bioaccumulation criteria are not effects-based, they will not be useful for determining if conditions at the Shipyard Sediment Site will be unreasonably affecting San Diego Bay beneficial uses two years, five years, or ten years after the completion of remedial actions. *See* MacDonald 2011 at 31. Moreover, reducing bioaccumulation levels below the pre-remedial levels would not ensure that aquatic organisms utilizing habitats at the site would have tissue concentrations of contaminants of concern low enough to support beneficial uses. *See* MacDonald 2011 at 29.

The Order fails to include rules specifying what actions the Dischargers must take in several situations, including ***(1)*** if sediment chemistry results for the post-remediation sediment samples exceed the thresholds included in the Order and **(2)** if toxicity to one or more species is observed during the Post Remedial sampling and testing. *See* MacDonald 2011 at 32. The Order does not list the triggers that will be used for evaluating sediment chemistry for benthic exposure. *See* MacDonald 2011 at 32.

E. The DTR Contains Incorrect Statements.

The DTR incorrectly claims that the Proposed Remedial Footprint "captures 100 percent of triad 'Likely'… impacted stations." DTR § 33.3.1at 33-12. This claim is incorrect because the Proposed Remedial Footprint excludes NA22, which the DTR analysis determined was

"Likely" that "the health of the benthic community is adversely impacted based on three lines of evidence: sediment chemistry, toxicity, and benthic community." *See* DTR Table 18-1 at 18-2.

In performing the economic feasibility analysis, the Cleanup Team created a worst-to-least contaminated ranking of each of the 66 polygons in the Shipyard Sediment Site. *See* DTR Appendix 31. The DTR claims that the ranking process "used Triad data and site-specific median effects quotient (SS-MEQ)." DTR § 31.1 at 31-2. However, the Excel file used to create the worst-to-least contaminated ranking only includes the SS-MEQ and not Triad data. *See* Appendix 31, "2010-07-27 Economic feasibility 07-27-10.ng.xls" (SAR384569).

The Order incorrectly concludes that "clean-up of the remedial footprint will restore any injury, destruction, or loss of natural resources." *See* Order Finding 32 at 16. The San Diego Regional Board does not have authority to conduct natural resource damage assessments because only the Natural Resources Trustees have authority to conduct natural resource damage assessments and to draw conclusions regarding injury to natural resources and the effectiveness of remedial actions in terms of restoring natural resource values. *See* MacDonald 2011 at 20.

The DTR repeatedly refers to "65" polygons, even though there are a total of 66 polygons in the Shipyard Sediment Site. *See* DTR § 31.1 at 31-2; § 32.2 at 32-9; 32-11; §32.5 at 32-28; §34.2.1 at 34-5. The economic feasibility documentation in Appendix 31, Table A31-2 and "2010-07-27 Economic feasibility 07-27-10.ng.xls" (SAR384569) reveal that all 66 polygons were ranked in the economic feasibility analysis. Similarly, Appendix 32, Tables A32-1 and A32-3 and supporting data and calculations in "01-Final pre-remedial SWAC 8-17-10.XLS" (SAR384570) and "02-Final post-remedial SWAC_1.xls" (SAR384571) show all 66 polygons were included in calculating the pre-remedial SWACs and post-remedial SWACs. The DTR cannot pretend that NA22 no longer exists or is no longer part of the Shipyard Sediment Site just because the Cleanup Team chose not to include it in the Proposed Remedial Footprint in the hope that someday another process might address contamination in that polygon.

CONCLUSIONS

The Order and DTR fail to demonstrate based on substantial evidence in the record that cleanup to background concentrations is not economically feasible. The proposed cleanup fails to meet legal requirements for a cleanup to a pollutant level greater than background and does not represent a cleanup to the best water quality which is reasonable "considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." *See* State Water Board Order 92-49. However, minor changes in alternative cleanup level implementation, monitoring requirements, and the remedial footprint can transform the proposed cleanup into a cleanup that is both legal and the protective of existing and anticipated beneficial uses in San Diego Bay.

The Order and DTR Must Require that the Remediation Achieve the Alternative Clean-up Levels.

The proposed cleanup violates the law because it sets alternative clean-up levels that are not actually maximum pollutant concentrations. *See* State Water Board Order 92-49. While the Proposed Site-Wide Alternative Cleanup Levels are reasonable, the "120% of background" second-dredging pass trigger and the "Trigger Concentrations" work together to allow the pollutant levels at the Site to exceed Alternative Cleanup Levels at the Site following remediation. The Regional Board cannot legally approve the Order and DTR with the provisions that allow pollutant levels to exceed the Alternative Cleanup Levels because there is no evidence in the record that pollutant levels above the Alternative Cleanup Levels "will not pose a substantial present of potential hazard to human health and the environment." *See* CAL. CODE REGS. tit. 23 §2550.4 (c).

To address this problem, the Regional Board should do three things:

1. Direct that a second dredging pass is required if the concentration of any primary contaminant of concern exceeds background concentration in a remediated polygon (or, as explained below, retain the 120% of background second-pass dredging rule and add eight more polygons to the remedial footprint);
2. Set the "Trigger Concentration" at the Alternative Cleanup Levels listed in Table 2 of the Order (the Site-wide Post-Remedial SWACs); and
3. Mandate additional remediation if the "Trigger Concentrations" are exceeded.

The Regional Board Should Make an Independent Finding of What Level of Cleanup is Economically Feasible Based on all the Evidence in the Record Regarding Economic Feasibility.

The economic feasibility analysis presented in DTR § 31 fails to present the results of the analysis in a manner that allows that Regional Board to make a reasoned decision regarding what level of cleanup is economically feasible. Once the results are presented on pollutant-by-pollutant basis and along a continuous "dollars spent" x-axis, it becomes clear that $33 million is not a reasonable cut-off for what cleanup is economically feasible "considering all demands being made and to be made on those waters and the total values involved, beneficial and detrimental, economic and social, tangible and intangible." *See* State Water Board Order 92-49. Therefore, economic feasibility conclusions based solely or heavily on analysis in DTR § 31 are arbitrary and capricious.

The Regional Board should independently evaluate the economic feasibility analysis and determine at what point, if any, benefits of additional remediation become "negligible" and above which no further remediation should be required. We urge the Regional Board to set this level well above the $33 million level set in DTR § 31 and that forms the basis for setting the Alternative Cleanup Levels. *See* DTR §32.2 at 32-12 ("An assessment of risk to wildlife receptors under projected post-remedial conditions was conducted to confirm *the alternative cleanup levels established by economic analysis (Section 31)* are adequately protective of aquatic-dependent wildlife beneficial uses." (emphasis added)).

The Proposed Remedial Footprint Should Be Enlarged by Eight Polygons.

Station NA22 is "Likely" impaired based on moderate sediment chemistry, moderate toxicity, and moderate benthic community impairment. *See* DTR § 33.1.1 at 33-4. Polygon NA22 should be added to the Remedial Footprint to address the real risks pollution in this polygon poses to current beneficial uses. Excluding NA22 from the remedial footprint in the hope that another process will address contamination there decades from now ignores the present threat contamination in NA22 poses to current beneficial uses. *See* above at IV.B.2.a. Further, by excluding NA22 from the Post Remedial Monitoring program, the Order and DTR try to pretend that NA22 is not part of the Shipyard Sediment Site. By failing to include NA22 in the Post Remedial Monitoring, the Order and DTR underestimate the site-wide average pollutant levels in an attempt to mask the true consequences of refusing to remediate a portion of the Site that poses unacceptable risk to beneficial uses.

Likewise, NA01, NA04, NA07, NA16, SW06, SW18 and SW29 pose unacceptable risks to fish and the benthic community and should be added to the remedial footprint to address these risks. *See* above at IV.B.2.b.

Furthermore, adding NA22, NA01, NA04, NA07, NA16, SW06, SW18 and SW29 would ensure that the alternative cleanup levels are met even if the 120% background trigger level for a second dredging pass is retained.

Coastkeeper/EHC Table 4. Comparison of Post-Remedial Pollutant Concentration When Second-Pass Dredging Trigger Set at 120% of Background for Proposed Remedial Footprint and for Proposed Remedial Footprint with Eight Additional Polygons.[9]

Priority COC	Alternative Cleanup Levels (Site-wide Post-remedial SWAC assuming remediation to background)	Site Wide Post-remedial SWAC Levels Assuming Remediation to 120% background—Proposed Remedial Footprint	Site Wide Post-remedial SWAC Levels Assuming Remediation to 120% of background with eight additional polygons
Copper	**159 mg/kg**	**161 mg/kg**	**156 mg/kg**
Mercury	**0.68 mg/kg**	**0.69 mg/kg**	**0.67 mg/kg**
HPAHs	**2451 µg/kg**	**2,466 µg/kg**	**2,108 µg/kg**
PCBs	**194 µg/kg**	**196 µg/kg**	**176 µg/kg**
TBT	**110 µg/kg**	**111 µg/kg**	**101 µg/kg**

Remediating eight additional polygons is economically feasible. To remediate the additional eight polygons would require dredging an additional 120,000 cubic yards of sediment—30,550 cubic yards from NA22 and the remaining 89,400 cubic yards from the other 7 polygons. *See* "2010-07-27 Economic feasibility 07-27-10.ng.xls" (SAR384569). At an estimated cost of $7 per cubic yard outside the leasehold and $13 per cubic yard inside the leasehold,[10] the total additional dredging cost would be approximately $1.5 million, [11] or only 2% of the current estimated cleanup cost.[12]

[9] See Exhibit K.
[10] These numbers represent the "Probable Likely Unit Cost" as represented in "Economic Feasibility Source Data," provided to counsel for San Diego Coastkeeper and Environmental Health Coalition at the deposition of David Barker on March 3, 2011. It is unclear whether these numbers are a fair representation of actual dredging costs because the source of this cost assumption was not provided.
[11] This number includes only the cost to dredge the additional eight polygons and does not add in additional costs that may be associated with dredging, such as sediment disposal or mitigation costs.
[12] According to DTR § 32.7.1 at 32-40, the estimated cleanup cost is $58 million.

Coastkeeper/EHC Table 5. Dredging Cost for Additional Polygons[13]

Polygon	Dredging Area - inside (sf)	Dredging Area - outside (sf)	Dredging volume (inside) (cy)	Dredging volume (outside) (cy)[14]	Total Dredging Volume	Cost for inside dredging ($13 cu yd)	Cost for outside dredging ($7 cu yd)
NA07	32593	0	4828			62771.28	
SW29	0	66095		9792		0	68542.53
NA04	74178	0	27473			357153.8	
NA01	99946	0	25912			336855.9	
NA16	36736	0	10885			141501.3	
SW06	20429	0	3026			39344.37	
SW18	50318	0	7454			96908.38	
Subtotal	**314200**	**66095**	**79580**	**9792**	**89371**	**1034535**	**68542.53**
NA22	206207	0	30549			397138.8	
TOTAL	**520407**	**6095**	**110129**	**9792**	**119921**	**1431674**	**68542.53**
					Total Dredging Cost	**1500216**	

As Section II above demonstrates, $58 million does not achieve the best water quality reasonable, nor is the proposed cleanup the lowest levels economically achievable. *See* CAL. CODE REGS. tit. 23 §2550.4 (e).

A map of the additional eight polygons in relation to the polygons already included in the Proposed Remedial Footprint is incorporated herein and attached as Exhibit I.

<u>The Monitoring Requirements Should Be Strengthened to Ensure the Best Water Quality Reasonable.</u>

To ensure the cleanup achieves the "best water quality reasonable," the Remediation Monitoring and Post Remedial Monitoring requirements should be strengthened. *See* MacDonald 2011 at 20. Without stringent Remediation Monitoring to ensure that the Alternative Cleanup Levels are actually achieved throughout the entire Shipyard Sediment Site, it is highly likely that existing and/or future beneficial uses in San Diego Bay will be unreasonably affected. *See* MacDonald 2011 at 20. We recommend that the water quality and sediment monitoring protocols recommended by Donald MacDonald be adopted. *See* MacDonald 2011 at 27.

Likewise, the current Post Remedial Monitoring requirements are insufficient to evaluate the effectiveness of the remedial measures and identify the need for further remediation to achieve the clean-up goals at the Shipyard Sediment Site. To ensure the Post Remedial

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[13] Source of data: DTR Appendix 31, table A31-2.

Monitoring requirements can determine whether or not the remedial measures were effective and whether or not additional remediation is necessary to achieve cleanup goals, we recommend that the changes to the Post Remedial Monitoring Program recommended by Donald MacDonald should be adopted. *See* MacDonald 2011 at 32-33.

Additional Trigger Concentrations and Triggers for Benthic Invertebrates Should Be Added to Ensure the Best Water Quality Reasonable.

To ensure the "best water quality reasonable," additional "trigger concentrations" for the secondary Contaminants of Concern should be added to the Post-Remedial Monitoring requirements. Likewise, triggers addressing benthic invertebrates should be added to the Post-Remedial Monitoring requirements. According to Donald MacDonald's recommendations, we urge the Regional Board to adopt the following additional trigger concentrations:

RECOMMENDED ADDITIONAL TRIGGER CONCENTRATIONS[15]

Metric	Concentration/Value
Arsenic	8.7 mg/kg
Cadmium	0.2 mg/kg
Lead	66 mg/kg
Zinc	221 mg/kg
Control-Adjusted Survival of Amphipods	82%
Control-Adjusted Normal Development of Bivalves	76%
Control-Adjusted Fertilization of Echinoderms	70%

Respectfully submitted on this 26th day of May, 2011by:

Jill M. Witkowski, Cal. Bar No. 270281

On behalf of San Diego Coastkeeper and
Environmental Health Coalition

[15] *See* MacDonald 2011 at 35.

San Diego Coastkeeper and Environmental Health Coalition Technical Comments and Legal Argument Summary Chart
Tentative Cleanup and Abatement Order No. R9-2011-001 and Draft Technical Report for the Shipyard Sediment Site

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The Law Requires Cleanup to Background Except Where Evidence in the Record Demonstrates that Alternative Cleanup Levels Greater than Background Water Quality are Appropriate.	Legal Argument	Order Finding 31 at 14-15; DTR § 31.	**1**
Cleanup to a Pollutant Level Greater than Background Conditions is Only Allowed if the Regional Board Makes Two Findings.	Legal Argument	Order Finding 31 at 14-15; DTR § 31.	**2**
Alternative Cleanup Levels Must Be a Concentration Limit Set on a Constituent-by Constituent Basis and Must Meet Requirements in State Water Board Order 92-49.	Legal Argument	Order Finding 31 at 14-15; DTR § 31.	**2**
The Regional Board's Findings Must be Supported By Evidence in the Record.	Legal Argument	N/A	**3**
The Order's Conclusion that Cleanup to Background Water Quality Levels is Economically Infeasible is Arbitrary and Capricious and Not Supported By Substantial Evidence in the Record.	Legal Argument	Order Finding 31 at 14-15; DTR Section 31 at 31-1 to 31-3.	**3**
The Economic Feasibility Analysis Arbitrarily Assessed Costs in Six-Polygon Groups.	Legal Argument and Technical Comment	DTR §31.1 at 31-2	**4**
The economic feasibility analysis fails to identify the source of data for the surface weighted average concentration of the five priority pollutants.	Technical Comment	DTR §31; DTR Appendix 31, Table A31-1	**5**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The record fails to identify the source of the cost data in Table A31-1.	Technical Comment	DTR Appendix 31; Table A31-1	**5**
The record fails to identify the source of the data in Table A31-2.	Technical Comment	DTR Appendix 31; Table A31-2	**5**
There is no explanation in the economic feasibility analysis why polygons identified with a "depth to clean" as the undefined term "sur" have differing "dredging depth[s]."	Technical Comment	DTR § 31; DTR Appendix 31 Table A31-2	**6**
DTR Appendix 31 Table A31-2 groups the economic feasibility results together in an arbitrary manner.	Legal Argument; Technical Comment	DTR § 31; DTR Appendix 31, Table A31-2	**6**
DTR Figure 31-1 would have looked different if results had been presented for each of the eleven cost scenarios.	Technical Comment	DTR §31; Figure 31-1 at 31-2	**8**
The DTR incorrectly summarizes cumulative exposure reduction percentages per $10 million spent.	Technical Comment	DTR § 31; Figure 31-1 at 31-3	**9**
The Economic Feasibility Was Not Determined on a Constituent-by-Constituent Basis.	Technical Comment	DTR § 31 at 31-1, 31-2; Appendix 31; Figure 31-1 at 31-3	**10**
The economic feasibility data was not presented in a scaled manner.	Technical Comment	DTR § 31 at 31-2; Figure 31-1 at 31-3	**11**
The DTR's economic feasibility conclusions based on DTR Figure 31-1 are arbitrary and capricious.	Legal Argument	DTR § 31; Figure 31-1; DTR § 32.7.1 at 32-40	**12**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The Conclusion that The Alternative Cleanup Levels Are the Lowest Levels Economically Achievable is Arbitrary and Capricious and Not Supported by the Evidence	Legal Argument; Technical Comment	Order Finding 32 at 16; DTR § 32.7.1 at 32-40	**14**
The Economic Feasibility Analysis Fails to Demonstrate that the Chosen Alternative Cleanup Levels Represent the "Best Water Quality" Based on All Demands.	Legal Argument; Technical Comment	DTR § 31 at 31-1; DTR §32.2 at 32-12	**14**
The Order Fails to Meet Legal Requirements for Cleanup to Pollutant Levels Greater Than Background.	Legal Argument	N/A	**15**
The Site-Wide Alternative Cleanup Levels Were Calculated Based on Remediating to Background Pollutant Levels.	Technical Comment	DTR §32.2.3 at 32-12; DTR Table A32-3.	**15**
The Remediation Monitoring Fails to Require Remedial Areas to Achieve Background Levels.	Technical Comment	Order Directive B.l.1; DTR Section 34.1	**16**
The "120% of background" could lead to site-wide pollutant concentrations above the Alternative Clean-up Levels.	Technical Comment	Order Directive A.2.a. at 20; DTR § 34.1.2. at 34-3; DTR Table A32-3.	**16**
The Regional Board cannot approve the Order and DTR with the 120% of background second-pass rule because it fails to ensure that Alternative Cleanup Levels will not be exceeded.	Legal Argument	Order Directive A.2.a at 20	**17**
The "120% of background" decision rule violates the Order's corrective action directive.	Technical Comment	Order Directive A.2.a; A.2.c. at 20-21.	**18**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The "120% of background" decision rule for a second dredging pass is ambiguous.	Technical Comment	Order Directive A.2.a. at 20;	**18**
The Post Remedial Monitoring Fails to Evaluate Whether Alternative Cleanup Levels are Achieved.	Technical Comment	Order Directive D; DTR § 34.2	**19**
The Order sets the "Remedial Goals" as compliance with "Trigger Concentrations" above the Alternative Cleanup Levels—and in some cases ABOVE existing pollutant levels.	Technical Comment	Order Directive D at 27, 29	**19**
The Post Remedial Monitoring program will mask ongoing pollutant problems.	Technical Comment	Order Directive D at 25-30.	**21**
The Post Remedial Monitoring program fails to require samples from each polygon at the site.	Technical Comment	Order Directive D.1.c at 26-27.	**21**
Compositing surface sediment into six polygon groups during Post Remedial Monitoring will mask the true extent of contamination remaining at the Shipyard Sediment Site.	Technical Comment	Order Directive D; DTR § 34.2.1	**22**
The "success" of the clean-up will rely heavily on data from polygons that were not dredged.	Technical Comment	Order Directive D; DTR § 34.2.1	**22**
The Post Remedial Monitoring program's six sampling areas are arbitrary.	Technical Comment	Order Directive D; DTR § 34.2.1	**22**
The Post Remedial Monitoring plan's requirement to test replicate sub-samples of composited sediment samples tests how good the lab is, not the variability of pollutants remaining at the Site.	Technical Comment	Order Directive D; DTR § 34.2.1	**22**
The Post Remedial Monitoring plan will not provide the data to verify whether the remediation has been effective in protecting human health and aquatic-dependent wildlife.	Technical Comment	Order Directive D; DTR § 34.2.1	**22**
The sub-sampling approach will not provide Regional Board staff with the information necessary to determine whether remediation has been effective at protecting human health or aquatic-dependent wildlife.	Technical Comment	Order Directive D; DTR § 34.2.1	**22**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
Failure to assure that the Alternative Cleanup Levels are met through the remediation process renders the cleanup illegal.	Legal Argument	Order Directive D.6 at 27	**22**
The Proposed Cleanup Fails to Require the Best Water Quality Reasonable.	Legal Argument	Order Directive A; Order Directive B.1.l; Order Directive D; DTR § 32.	**23**
The Alternative Clean-up Levels Cannot Ensure that Fish and Benthic Invertebrate Beneficial uses Will Not Be Unreasonably Affected at the Shipyard Sediment Site.	Technical Comment	Order Finding 32; Order Directive A.2.a; Order Directive A.2.c; DTR § 32.	**24**
The Order and DTR fail to include numeric clean-up levels for benthic invertebrates and fish.	Technical Comment	Order Finding 32; Table 2 at 15; Order Directive A.2.a; Order Directive A.2.c; DTR § 32.	**24**
Failure to include numeric cleanup levels to protect fish is particularly egregious, as no information was presented in the Order or the DTR on how the potential for adverse effects on fish were explicitly considered.	Technical Comment	Order Finding 32; Table 2 at 15; Order Directive A.2.a; Order Directive A.2.c; DTR § 32.	**24**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The lines of evidence developed to assess benthic invertebrate communities are likely to be minimally protective as they rely on comparisons to a reference pool that included samples that would not meet criteria for negative control samples.	Technical Comment	Order Finding 32; Table 2 at 15; Order Directive A.2.a; Order Directive A.2.c; DTR § 32.	**24**
The Proposed Remedial Footprint is Too Small to Ensure that the Remaining Pollutant Levels will not Unreasonably Affect Present and Anticipated Beneficial Uses of San Diego Bay.	Technical Argument	Order at 38, Attachment 2	**24**
Problems with the development of the Proposed Remedial Footprint results in a cleanup that achieves less than the best water quality reasonable.	Technical Comment	DTR § 32.5.2 at 32-32; DTR at Table 32-19	**24**
An insufficient number of samples were collected to accurately determine the nature and extent of contamination at the 148-acre Shipyard Site, given the variability of contaminants at the site.	Technical Comment	DTR § 32.2.2	**24**
Ranking the polygons from most- to least-contaminated using the Composite Surface Weighted Average Concentration (SWAC) Value fails to consider the potential adverse effects on human health or the environment	Technical Comment	DTR §32.2.3	**24**
The Proposed Remedial Footprint arbitrarily excludes 15 polygons that are more contaminated—from a sediment chemistry standpoint—than the least-contaminated polygon in the Proposed Remedial Footprint	Technical Comment	DTR § 33, Table 33-2	**25**
The thresholds the DTR uses to determining whether polygons that are "Likely" impacted are problematic.	Technical Comment	DTR § 32.5.2; § 32.6	**25**
The Proposed Remedial Footprint excludes eight polygons that, under the DTR's own methodology, should have been included.	Technical Comment	Order Attachment 2; DTR § 33	**25**
The Proposed Remedial Footprint improperly excludes NA22.	Technical Comment	Order Attachment 2; DTR § 33	**25**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The Proposed Remedial Footprint excludes—NA01, NA04, NA07, NA16, SW06, SW18 and SW29—which pose unacceptable risks to fish and the benthic community.	Technical Comment	Order Attachment 2; DTR § 33; Table A33-1, Table A33-3	**26**
The Remediation Monitoring is Insufficient to Assess Remedial Activities' Impacts on Water Quality, to Evaluate the Effectiveness of Remedial Measures, or to Identify the Need for Further Dredging to Achieve Clean-up Goals at the Shipyard Sediment Site.	Legal Comment	Order Directive B.l.1; DTR Section 34.1.	**28**
The water quality component of the Remediation Monitoring program fails to provide safeguards to ensure data collected reveals actual water quality conditions.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1	**28**
The Remediation Monitoring program allows the Dischargers to measure compliance with ambiguous water quality monitoring goals through modeling, which will not provide data of actual conditions sufficient to determine whether dredging is violating water quality standards.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**28**
The Remediation Monitoring allows Dischargers to abandon daily water quality monitoring if no samples exceed water quality targets for three days in a row. Abandoning daily monitoring is problematic because it the variability in turbidity or dissolved oxygen levels is not associated primarily with operation of the dredge.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**28**
The Remediation Monitoring fails to specify the numeric "water quality standards" that must be complied with during remediation.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**28**
The Remediation Monitoring fails to require dischargers to take all the samples from down-current locations.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**28**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The Remediation Monitoring fails to define the "construction area."	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**28**
The Remediation Monitoring mandates that samples be collected 10 feet deep instead of the depth with the highest level of monitored variables.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**28**
The Remediation Monitoring fails to require that water samples need to be collected long enough after dredging commences for the day to give the plume time to reach the sampling location.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**29**
The Remediation Monitoring fails to specify which best management practices should be employed to reduce or eliminate resuspended sediments from being traveling to other areas, harming water quality or recontaminating adjacent areas.	Technical Comment	Order Directive B.l.1; DTR § 34.1.1. at 34-2.	**29**
The sediment component of the Remediation Monitoring program fails to require data collection to confirm Cleanup Levels are achieved.	Technical Comment	Order Directive B.l.1; DTR § 34.1.2	**29**
The Order and DTR provide inconsistent sampling requirements; the Order requires that samples be collected deeper than the upper 5cm, while the DTR requires that samples be collected deeper than the upper 10cm.	Technical Comment	Order Directive A.2.a; DTR § 34.1.2 at 34-2.	**29**
Vagueness in the monitoring requirements permits Discharges to collect only one sample from each polygon, which is insufficient given the sediment chemistry variability within polygons.	Technical Comment	Order Directive B.l.1; DTR § 34.1.2	**29**
Vagueness in the monitoring requirements allows sediment sampling to target the historic sampling locations, leaving other locations within the remedial footprint unsampled and ignoring elevated contaminant levels that may occur in those unsampled areas.	Technical Comment	Order Directive B.l.1; DTR § 34.1.2	**29**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The DTR explains a sampling protocol that requires the sampling team to visually examine each sediment sample and try to identify "undisturbed sediments." These sampling procedures are inappropriate and will be nearly impossible for sampling teams to follow consistently.	Technical Comment	Order Directive B.l.1; DTR § 34.1.2	**29**
The DTR explains that a sand cap would be necessary at times, but the Remediation Monitoring fails to explain what those criteria are and who would make such determination.	Technical Comment	Order Directive B.l.1; DTR § 34.1.2	**29**
The Post Remedial Monitoring Program is Poorly Designed and Will not Require Data Collection to Accurately Evaluate Post-Remediation Conditions.	Technical Comment	Order Directive D.1; DTR §34.2	**29**
Post Remedial Monitoring excludes NA22 wholesale from the Post Remedial Monitoring plan, even though NA22 is part of the Site. NA22 must be included in any Post Remedial Monitoring because it is a part of the Shipyard Sediment Site.	Technical Comment	Order Directive D.1; DTR §34.2.1	**29**
The approach to evaluating post-remedial conditions is likely to underestimate sediment toxicity because the DTR relied on inappropriate thresholds.	Technical Comment	Order Directive D.1.c; DTR §34.2.1.	**30**
Requiring sediment samples to be collected at only five sampling stations to evaluate benthic community conditions is inadequate because it will provide data on only about eight percent of the polygons at the Sediment Shipyard Site.	Technical Comment	Order Directive D.1.c; DTR §34.2.3 at 34-8.	**30**
The Post Remedial Monitoring plan should be expanded to provide a more robust basis for evaluating exposure of benthic invertebrates to contaminants at the site and for assessing sediment toxicity, and include testing from appropriate reference sites.	Technical Comment	Order Directive D.1.c; DTR §34.2.3 at 34-8.	**30**
The Post Remedial Monitoring program's bioaccumulation requirements are insufficient.	Technical Comment	Order Directive D.1.; DTR § 34.2.1 at 34-5.	**30**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
Because the bioaccumulation criteria are not effects-based, they will not be useful for determining if conditions at the Shipyard Sediment Site will be unreasonably affecting San Diego Bay beneficial uses two years, five years, or ten years after the completion of remedial actions.	Technical Comment	Order Directive D.1.; DTR § 34.2.1 at 34-5.	**30**
Reducing bioaccumulation levels below the pre-remedial levels would not ensure that aquatic organisms utilizing habitats at the site would have tissue concentrations of contaminants of concern low enough to support beneficial uses.	Technical Comment	Order Directive D.1.; DTR § 34.2.1 at 34-5.	**30**
The Order fails to include rules specifying what actions the Dischargers must take if sediment chemistry results for the post-remediation sediment samples exceed the thresholds included in the Order.	Technical Comment	Order Directive D.1.	**30**
The Order fails to include rules specifying what actions the Dischargers must take if toxicity to one or more species is observed during the Post Remedial sampling and testing.	Technical Comment	Order Directive D.1.	**30**
The Order does not list the triggers that will be used for evaluating sediment chemistry for benthic exposure.	Technical Comment	Order Directive D.1.	**30**
The DTR incorrectly claims that the Proposed Remedial Footprint "captures 100 percent of triad 'Likely'… impacted stations."	Technical Comment	DTR § 33.3.1. DTR at 33-12.	**30**
The DTR claims that the ranking process "used Triad data and site-specific median effects quotient (SS-MEQ)," but the Excel file used to create the worst-to-least contaminated ranking only includes the SS-MEQ and not Triad data	Technical Comment	DTR § 31.1 at 31-2.	**31**
The Order incorrectly concludes that "clean-up of the remedial footprint will restore any injury, destruction, or loss of natural resources." The San Diego Regional Board does not have authority to conduct natural resource damage assessments because only the Natural Resources Trustees have authority to conduct natural resource damage assessments and to draw conclusions regarding injury to natural resources and the effectiveness of remedial actions in terms of restoring natural resource values.	Technical Comment	Order Finding 32 at 16.	**31**

Comment	Technical Comment or Legal Argument	Order or DTR Citation	San Diego Coastkeeper and EHC Comment Page
The DTR repeatedly refers to “65” polygons, even though there are a total of 66 polygons in the Shipyard Sediment Site.	Technical Comment	DTR § 31.1 at 31-2; § 32.2 at 32-9; 32-11; §32.5 at 32-28; §34.2.1 at 34-5.	**31**
The Order and DTR Must Require that the Remediation Achieve the Alternative Clean-up Levels.	Legal Argument; Technical Comment	Order Directive B.l; Order Directive D	**32**
The Regional Board Should Make an Independent Finding of What Level of Cleanup is Economically Feasible Based on all the Evidence in the Record Regarding Economic Feasibility.	Legal Argument; Technical Comment	Order Finding 31; Order Finding 32	**32**
The Proposed Remedial Footprint Should Be Enlarged by Eight Polygons.	Technical Comment	Order Attachment 2	**32**
The Monitoring Requirements Should Be Strengthened to Ensure the Best Water Quality Reasonable.	Technical Comment	Order Directive B; Order Directive D	**32**
Additional Trigger Concentrations and Triggers for Benthic Invertebrates Should Be Added to Ensure the Best Water Quality Reasonable.	Technical Comment	Order Directive D.6.	**32**

San Diego Coastkeeper and Environmental Health Coalition Evidence on the Tentative Cleanup and Abatement Order No. R9-2011-001 and Draft Technical Report for the San Diego Bay Shipyard Sediment Site

Exhibit Letter	Description	San Diego Coastkeeper/EHC Comment Page
A	Review and Evaluation of Tentative Clean-up and Abatement Order (No. R9-2011-001) for the Shipyard Sediment Site, San Diego Bay, San Diego, California" dated March 11, 2011	***passim***
B	Description of DTR Figure 31-1 by Cost Scenarios and Polygons	**7**
C	Percent Exposure Reduction Per $10 Million, for Each Cost Scenario	**8**
D	Cleanup Team response to San Diego Coastkeeper and Environmental Health Coalition economic feasibility questions, dated May 20, 2011	**9**
E	Percent Exposure Reduction Per $10 million, by Pollutant	**11**
F	Percent Pollution Exposure Reduction Per $10 million, by Pollutant and in Continuous Dollars, with background marked	**12**
G	Percent Pollution Exposure Reduction Per $10 million, by Pollutant and in Continuous Dollars, with Background and $33 million Marked.	**13**
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Exhibit A

San Diego Coastkeeper and Environmental Health Coalition

Review and Evaluation of Tentative Clean-Up and Abatement Order (No. R9-2011-001) for the Shipyard Sediment Site, San Diego Bay, San Diego, California

March 11, 2011

Prepared on Behalf of:

San Diego Coastkeeper
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Expert Report of:

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List of Acronyms

AET	-	apparent effects threshold
BAP	-	benzo(a)pyrene
BMP	-	best management practice
COC	-	chemical of concern
DO	-	dissolved oxygen
DTR	-	Draft Technical Report
DW	-	dry weight
ERM	-	effects range median
HPAHs	-	high molecular weight polynuclear aromatic hydrocarbons
LAETs	-	lowest apparent effects threshold
LDEQ	-	Louisiana Department of Environmental Quality
LOE	-	line-of-evidence
MESL	-	MacDonald Environmental Sciences Ltd.
ND	-	no data
NOAA	-	National Oceanic and Atmospheric Administration
PCBs	-	polychlorinated biphenyls
Pmax	-	maximum probability model.
QAPP	-	Quality Assurance Project Plan
RAO	-	remedial action objective
S	-	survival
SAP	-	Sampling and Analysis Plan
SCSA	-	sediment confirmation sampling area
SFF	-	Sustainable Fisheries Foundation
SMU	-	sediment management unit
SQGQ	-	sediment quality guideline quotient
SQG	-	sediment quality guideline
SQT	-	sediment quality triad
SS-MEQ	-	site-specific median effects quotient
SWAC	-	Surface-Area Weighted Average Concentration
TBT	-	tributyltin
TCAO	-	Tentative Clean-Up and Abatement Order
TMDL	-	total maximum daily load
TRV	-	tissue residue value
UCL	-	upper confidence limit
USDOJ	-	United States Department of Justice
USEPA	-	United States Environmental Protection Agency
USFWS	-	United States Fish and Wildlife Service
WQC	-	water quality criteria

Expert Report of Donald D. MacDonald Regarding the Tentative Clean-Up and Abatement Order (No. R9-2011-0001) for the Shipyard Sediment Site, San Diego Bay, San Diego, CA

A. Qualifications

1. I, Donald Douglas MacDonald, am the principal of MacDonald Environmental Sciences Ltd. (MESL) and Canadian Director of the Sustainable Fisheries Foundation (SFF). The Canadian offices of both organizations are located in Nanaimo, British Columbia, Canada.

2. I am a Registered Professional Biologist, a member of the British Columbia College of Applied Biology, and a Certified Fisheries Practitioner.

3. I am an expert in the field of ecological risk assessment, natural resource damage assessment, and ecosystem-based management. I specialize in designing and conducting investigations to evaluate the effects of contaminated sediment on ecological receptors, including benthic invertebrates, fish, and aquatic-dependent wildlife. I also specialize in the design and implementation of environmental quality monitoring programs.

4. I received my Bachelor of Science in Zoology in 1981 from the University of British Columbia, which is located in Vancouver, British Columbia.

5. Between 1982 and 1989, I was employed by a federal government agency (Environment Canada) as a Technical Planning Coordinator and as a Physical Scientist.

6. MESL was incorporated in 1989 and I have worked as an independent consultant over the past 21 years. Over that period, I have provided specialized consulting services to a wide range of clients in Canada, the United States, and elsewhere, including federal, state, provincial, and tribal government agencies, academic institutions, non-governmental organizations, and industry.

7. Over my professional career, I have authored over 300 primary journal articles, book chapters, and technical reports on a wide range of topics related to environmental assessment and management. In addition, I have edited several books that were published by various scientific organizations.

8. I have designed, conducted, and/or provided technical oversight on numerous ecological risk assessments and/or natural resources damage assessments at sediment-contaminated sites in North America. The tasks that were completed at several of these sites are briefly described to illustrate relevant experience in contaminated site assessment and remediation. My experience in the design and implementation of environmental monitoring programs is also briefly described.

    a. The Calcasieu Estuary site is located in the vicinity of Lake Charles, LA. At this site, I have conducted a baseline ecological risk assessment (2000-2002), developed preliminary remediation goals (i.e., clean-up goals) and evaluated post-remedial risks (2003), conducted a natural resource damage assessment (2005), evaluated the effects of the Citgo oil spill (2006), estimated ecological service losses in Bayou d'Inde (2009 - 2010), and provided advice on post-remediation monitoring (2010). To support these projects, I designed and implemented two sediment and biota sampling programs to provide the data and information needed to evaluate risks and/or injury to benthic invertebrates, fish, birds and mammals associated with exposure to metals, polycyclic aromatic hydrocarbons, polychlorinated biphenyls, polychlorinated dibenzo-*p*-dioxins and polychlorinated dibenzofuran, and other contaminants. Clients included United States Environmental Protection Agency (USEPA), National Oceanic and Atmospheric Administration (NOAA), United States Fish and Wildlife Service (USFWS), and Louisiana Department of Environmental Quality (LDEQ).

b. The Tri-State Mining District is located in the Spring and Neosho river basins of Kansas, Missouri, and Oklahoma. At this site, I prepared the sampling and analysis plan to support evaluation of the effects on benthic invertebrates associated with exposure to contaminated sediments. The resultant data were used to develop concentration-response models and toxicity thresholds for selected chemicals of potential concern and contaminant mixtures. I used these data, including the toxicity thresholds, to evaluate risks to benthic invertebrates utilizing habitats throughout the study area. I have also developed sediment injury thresholds to support a natural resource damage assessment of the site (2006-2011). Clients included USEPA and USFWS.

c. The Upper Columbia River is located between the Canada-U.S. border and Grand Coulee Dam in Washington State. At this site, I developed numerical sediment quality standards to support sediment management initiatives in the study area (2002). I have also provided USEPA with oversight support on the remedial investigation that was being conducted by the Discharger (2005-2010). This work included development of a problem formulation document, establishing expectations for data collection, reviewing and evaluating of sampling and analysis plans, providing oversight of laboratory toxicity testing programs, and reviewing environmental data and information. I have also supported the Natural Resources Trustees by contributing to the Natural Resource Damage Assessment Plan, reviewing settlement offers, and interpreting matching sediment chemistry and toxicity data from the site (2010-2011). Clients included USEPA, USFWS, Washington Department of Ecology, and the Confederated Tribes of the Colville Reservation.

d. The Indiana Harbor site is located in the vicinity of Gary, Indiana. Activities at the Indiana Harbor site have included reviewing and evaluating historical data and information, conducting a natural resource damage assessment, developing remedial action objectives, deriving preliminary remedial goals (i.e., clean-up goals), reviewing remedial alternatives, and predicting post-remedial risks to ecological receptors (1998-2007). Clients included United States Department of Justice and USFWS.

e. The Quathiaski Cove is located on Quadra Island, British Columbia. At this site, I have designed and implemented environmental sampling programs, evaluated the nature and extent of contamination, assessed risks to ecological receptors, developed numerical clean-up goals, reviewed and evaluated remedial alternatives, provided oversight during remediation, evaluated confirmation monitoring data, oversaw site restoration, prepared applications for certificates of compliance (2005-2011). The client was Weston Foods Canada.

f. I have also conducted investigations to assess risks and/or natural resource injury at the Passaic River-Newark Bay Complex (NJ), Hudson River site (NY), Bloomington PCB site (IN), Piles Creek site (NJ), Cornell-Dubilier site, NJ, Vermont Asbestos site (VT), Anniston PCB site (AL), Sauget site (IL), Crofton site (BC), Portland Harbor site (OR), and others. Furthermore, I have designed and/or implemented environmental monitoring programs (i.e., for water, sediment, and/or biota) for the Fraser River and Estuary (BC), Columbia River (BC), Flathead River (BC), Similkameen River (BC), Thompson River (BC), Kootenay River (BC), Strait of Juan de Fuca (BC), Slave River (NWT), Liard River (NWT), Peel River (NWT), Presque Isle Bay (PA), Delaware River (PA, DE), and Tampa Bay (FL).

9. An accurate copy of my Curriculum Vitae is included as Appendix 1 of this expert report.

10. In 2009, I authored "Development of a Sediment Remediation Footprint to Address Risks to Benthic Invertebrates and Fish in the Vicinity of the Shipyards Sediment Site in San Diego Bay, California." This report provided an alternative approach to identifying a remediation footprint that would address impacts on benthic invertebrates and benthic fish utilizing aquatic habitats in the vicinity of the Shipyard Sediment Site. The remediation footprint presented in that document was intended to

complement the remediation footprint that was being developed for addressing risks to human health and aquatic-dependent wildlife.

11. This expert report contains my expert opinions, which I hold to a reasonable degree of scientific certainty. My opinions are based on application of professional judgment, training, experience, knowledge of facts or data related to my fields of expertise, as well as consultation with a qualified expert on Total Maximum Daily Loads (Barry W. Sulkin, M.S.), as applied to the review of the Tentative Clean-Up and Abatement Order and Draft Technical Report that were issued by the San Diego Water Board in 2010. These facts and data are typically and reasonably relied upon by experts in my field.

B. Summary of Expert Opinion

In my expert opinion, the remedial actions required under the Tentative Clean-Up and Abatement Order (No. R9-2011-0001; hereafter referred to as the "TCAO") and Draft Technical Report for Tentative Clean-Up and Abatement Order (No. R9-2011-0001; hereafter referred to as the "DTR") for the Shipyard Sediment Site, San Diego Bay, San Diego, California will likely result in improvements in sediment quality conditions at the site. However, there are a number of issues that must be addressed to ensure that the clean-up results in pollutant concentrations that do not unreasonably affect San Diego Bay beneficial uses. These issues include:

1. The Proposed Remedial Footprint does not include all of the polygons that meet the requirements for clean-up according to the methodology described in the DTR. Therefore, the Proposed Remedial Footprint should be expanded to include all of the polygons that meet the selection criteria.

2. Limitations on the establishment and implementation of the Alternative Clean-Up Levels make it difficult to determine if San Diego Bay beneficial uses will be unreasonably affected by the post-remedial contamination levels. To assure that beneficial uses are protected, Remediation Monitoring and Post-Remedial Monitoring must be improved to ensure that the Alternative Clean-Up Levels are achieved at the Shipyard Sediment Site following remediation.

3. The requirements for Remediation Monitoring, as specified in Section B.1.l of the TCAO and in Section 34.1 of the DTR, do not mandate development and implementation of a Remediation Monitoring plan that will provide the data and information needed to assess compliance with water quality standards, to evaluate the effectiveness of remedial measures, or to identify the need for further dredging to achieve clean-up goals at the Shipyard Sediment Site. Therefore, the Remediation Monitoring requirements must be revised to address each of these issues.

4. The requirements for Post Remedial Monitoring, as specified in Section D of the TCAO and in Section 34.2 of the DTR, do not mandate development and implementation of a Post Remedial Monitoring plan that will provide the data and information needed to determine if the pollutant concentrations remaining in the sediments will not unreasonably affect San Diego Bay beneficial uses. In other words, the current Post Remedial Monitoring requirements do not require collection of the data and information needed to evaluate the effectiveness of remedial measures and to identify the need for further remediation to achieve clean-up goals at the Shipyard Sediment Site. Therefore, the Post Remedial Monitoring results cannot be used to objectively evaluate the effectiveness of the remedial measures or to assess the need for further remediation to achieve the clean-up goals at the Shipyard Sediment Site.

5. The Trigger Exceedance Investigation and Characterization process, described in Section D.4 of the TCAO and DTR, will not provide a basis for compelling the persons responsible for discharging contaminants of concern to conduct further remediation to achieve clean-up goals at the Shipyard Sediment Site.

C. Expert Opinion #1: Proposed Remedial Footprint

The Proposed Remedial Footprint does not include all of the polygons that meet the requirements for clean-up according to the methodology described in the DTR. Therefore, the Proposed Remedial Footprint should be expanded to include all of the polygons that meet the selection criteria.

C.1 Description of Methodology Used

The Proposed Remedial Footprint—the portion of the site that is targeted for remediation—is described in Section 33 and shown in Attachment 2, 3, and 4 of the TCAO. Section 33 of the DTR describes the process that was used to identify the polygons that were included in the Proposed Remedial Footprint. Briefly, this process involved the following steps:

- A number of polygons, termed Thiessen Polygons, were created using information on the locations of the stations where sediments were sampled by the Dischargers. *See* Exponent (2003) for details on the creation of Thiessen Polygons. Each Thiessen Polygon is intended to define the area of influence around its sampling point, so that any location inside the polygon is closer to its sampling point than it is to any of the other sampling points;

- After dividing the site into polygons, the Proposed Remedial Footprint was established by evaluating the available data for each station. According to the TCAO, the Proposed Remedial Footprint was established by identifying all of the polygons that had sediment pollutant levels likely to adversely affect the health of the benthic community and by ranking each polygon based on the level of contamination by the five primary chemicals of concern (COCs);

- Polygons with contaminant concentrations sufficient to adversely affect the health of the benthic community were identified in two ways. For those stations for which sediment quality triad data were available—sediment chemistry, sediment toxicity, and benthic invertebrate community structure—any polygon that was identified as "Likely" impaired was included in the Proposed Remedial Footprint, while "Possibly" impaired polygons were further evaluated to determine their priority for inclusion. *See* Table 18-14 of the DTR for more information on the weight-of-evidence framework that was used in the aquatic life impairment assessment. For non-Triad stations, sediment chemistry data alone were used to identify polygons for inclusion in the Proposed Remedial Footprint. More specifically, all non-triad stations exceeding the 60% lowest apparent effect threshold (LAET) values for the five primary COCs[1] or a site-specific median effects quotient (SS-MEQ) value of 0.9 were designated for remediation. The SS-MEQ was calculated by averaging the quotients derived for the five primary COCs. This was determined by dividing the measured concentration of the COC by the median concentrations of that COC in six triad samples, three of which were designated as likely impaired and three of which were designated as possibly impaired;

- The concentrations of the five primary COCs were also used to calculate a Composite Surface-Area Weighted Average Concentration (SWAC) Ranking Value for each polygon. In this approach, Composite SWAC Ranking Values were calculated for each polygon by dividing the concentration of each COC by the pre-remedial SWAC for that COC and summing the quotients that were calculated for the five primary COCs. This index of contamination was used to identify the most contaminated polygons that should be removed on a "worst first" basis. Such polygons were included in the Proposed Remedial Footprint on a priority basis. The polygons included in the Proposed Remedial Footprint had Composite SWAC Ranking Values ranging from 5.5[2] to 46.6.

- Finally, a number of polygons were excluded from the Proposed Remedial Footprint based on other considerations, including the results of triad evaluation or technical infeasibility. Station NA22 was excluded from the Proposed Remedial Footprint because a total maximum daily load (TMDL) is being developed for the mouth of Chollas Creek.

Using this procedure, 23 polygons were included in the Proposed Remedial Footprint. These polygons have composite SWAC Ranking Values greater than or equal to 5.5 and/or SS-MEQ greater than or equal to 0.9.

C.2 Evaluation of the Methodology Used

The methods used to identify polygons for inclusion in the Proposed Remedial Footprint are described in the TCAO and in the DTR. Evaluation of these methods indicates that there are a number of limitations of

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[1] Copper of 552 mg/kg, mercury of 2.67 mg/kg, high molecular weight polynuclear aromatic hydrocarbons (HPAH) of 15.3 mg/kg, polychlorinated biphenyls, of 3.27 mg/kg, and tributyltin (TBT) of .11 mg/kg; *See* DTR Table 32-19

[2] While DTR Table 33-1 lists the lowest Composite SWAC Ranking Value as 5.5, Appendix Tables A33-1 and A33-2 list the lowest Composite SWAC Ranking Value as 5.4.

the underlying data and of the selection criteria that substantially influence the selection of polygons for inclusion in the Proposed Remedial Footprint including:

C.2.1 The sampling density is insufficient to accurately characterize the nature and extent of contamination at this type of site.

According to the TCAO and DTR, sediment samples were collected at only one location within each Thiessen Polygon. Yet, examination of the underlying sediment chemistry data indicates that there is substantial variability in contaminant concentrations across the site. More specifically, the concentrations of COCs typically varied by two orders of magnitude or more among sampling stations. *See* Table A33-3 of the DTR for more information on the variability of COC concentrations. Substantial variability was also evident for adjacent polygons. For example, the pre-remedy average surface sediment concentration of PAHs was 23.41 mg/kg DW at SW10.[3] In the adjacent polygons, PAH concentrations ranged from 7.0 to 15.0 mg/kg DW.

To address concerns regarding spatial variability in sediment chemistry, investigators frequently design sediment sampling programs to provide a high density of samples in the vicinity of point source discharges of contaminants. At Quathiaski Cove in British Columbia, for example, I collected sediment chemistry data at 82 stations to characterize a five-acre water lot at a shipyard site resulting in a sampling density of 17 stations per acre (MacDonald *et al.* 2008). By comparison, sediment chemistry data for 66 sampling locations were used to characterize about 148 acres at the Shipyard Sediment Site in San Diego Bay—a sampling density of 0.44 stations per acre. In some cases, such as NA21 and NA25, data from a single sediment sampling location was used to characterize over 11 acres of benthic habitat. Hence, sediment sampling conducted at the Shipyard Sediment Site was inadequate to accurately characterize the nature and extent of sediment contamination. The uncertainty in the nature and extent of contamination means that there is uncertainty in the protectiveness of the Proposed Remedial Footprint.

C.2.2 The Composite SWAC Ranking Value provides a consistent, but incomplete, basis for ranking polygons for inclusion in the Proposed Remedial Footprint.

As indicated above, the Composite SWAC Ranking Value was calculated using data on the pre-remedy average surface sediment concentrations of the five primary COCs for each polygon and on the SWACs of these COCs for the entire site. Accordingly, this index of contamination provides information on the magnitude of contamination at each location relative to the average concentration of the five primary COCs at the site. However, it is important to understand that this index does not provide a basis for evaluating the potential for adverse effects on human health or the environment. In addition, the index does not consider the concentrations of other contaminants that could be elevated in sediments from the site. Specifically, lead, zinc, low molecular weight (L) PAHs all exceed toxicity thresholds in surficial sediments at one or more sampling stations. *See* DTR Table A33-3.

[3] *See* DTR Table A33-3, column "Fairey 13 total PAH - half detection limit"

C.2.3 The Composite SWAC Ranking Value was not applied consistently to identify polygons for inclusion in the Proposed Remedial Footprint.

According to the DTR, the lowest composite SWAC Ranking Value for stations included in the Proposed Remedial Footprint was 5.5. However, a total of 15 stations with Composite SWAC Ranking Values higher than 5.5 were not included in the Proposed Remedial Footprint. *See* Tables A33-1 and A33-2 of the DTR.

Table 33-6 of the DTR provides the rationale for excluding five of the fifteen polygons with Composite SWAC Ranking Values greater than 5.5 from the Proposed Remedial Footprint. However, the rationale provided in Table 33-6 is not always correct. For example, the rationale for excluding NA07 indicates that the concentrations of all COCs are below 60% LAET values. Yet, Table A33-3 indicates that high molecular weight (H) PAH levels in surficial sediments were 15.85 mg/kg DW at NA07, which exceeds the 60% LAET value of 15.3 mg/kg DW for HPAH. *See* Table 32-19. In addition, the rationale provided in Table 33-6 indicates that sediments from NA07 had low toxicity and low benthic impacts, but no benthic invertebrate community structure data were included for NA07 in the triad database that was provided by the San Diego Regional Board.

Furthermore, Table 33-6 fails to provide an explanation for excluding ten polygons with Composite SWAC Ranking Values greater than 5.5 from the Proposed Remedial Footprint. Therefore, the rationale provided in Table 33-6 of the DTR for excluding stations with Composite SWAC Ranking Values greater than 5.5 is arbitrary and does not justify the exclusions.

C.2.4 There is insufficient evidence to demonstrate that the SS-MEQ threshold (0.9) provides a reliable basis for identifying polygons that are "Likely" impacted and hence, should be included in the Proposed Remedial Footprint. Without clear and convincing evidence in the record demonstrating that 0.9 is an appropriate threshold, it is not possible to demonstrate that the polygons included in the Proposed Remedial Footprint are sufficient to protect existing and reasonably foreseeable beneficial uses of San Diego Bay.

According to the information provided in Section 33.1.3 of the DTR, non-Triad stations with SS-MEQ values greater than 0.9 were predicted to be "Likely" impacted and included in the Proposed Remedial Footprint. However, the technical basis for selecting 0.9 as the threshold for "Likely" impacted sediment samples is not described in Section 32.5.2 of the DTR. Rather, the text indicates that a threshold of 0.9 had 73% overall reliability.[4] While the results of the reliability evaluation are presented in Table 32-21, the underlying data are not provided. Therefore, it is not possible to determine if alternate thresholds for SS-MEQ would have higher or lower reliability. Therefore, it is uncertain if the selected SS-MEQ threshold provides the most reliable tool for identifying non-Triad stations that are "Likely" impacted.

In addition, Table 33-2 of the DTR indicates that supporting calculations for SS-MEQ values are presented in Appendix 33, yet no such calculations are provided in Tables A33-1 to A33-8. Failure to provide the calculations of SS-MEQ values for each polygon prevents reviewers from determining if stations with SS-MEQ values greater than 0.9 have been excluded from the Proposed Remedial Footprint.

C.2.5 There is insufficient evidence to demonstrate that the 60% LAET values provide a reliable basis for identifying polygons that are "Likely" impacted and, hence, should be included in the Proposed Remedial Footprint.

Importantly, the 60% LAET values presented in Table 32-19 are substantially higher than the sediment quality guidelines that were used in the Triad assessment presented in the DTR and those that have been routinely used to evaluate sediment quality conditions at marine and estuarine sites throughout the United States (Table 1).

[4] DTR Table 32-21 reports this value as 70%.

TABLE 1. COMPARISON OF 60% LAET VALUES TO EFFECTS RANGE MEDIAN (ERM) VALUES

Priority COC	60% LAET Value	ERM Value[1]
Copper	552 mg/kg DW	270 mg/kg DW
Mercury	2.67 mg/kg DW	0.71 mg/kg DW
HPAH	15.3 mg/kg DW	9.6 mg/kg DW
TPCB	3.27 mg/kg DW	0.18 mg/kg DW
TBT	1.1 mg/kg DW	0.06 mg/kg OC[2]

[1]From Long *et al.* (1995)
[2]From Meador *et al.* (2002): Reported as 6000 ng/g OC, which was converted to 0.06 mg/kg assuming an organic carbon content of 1%.

According to the information provided in Section 32.5.2 of the DTR, additional sampling was conducted in 2009 to provide the data needed to determine if the 60% LAET and SS-MEQ thresholds could reliably predict the likelihood of sediment quality impacts to the benthic community at the Shipyard Sediment Site. Sediment samples were collected at five stations located outside the Proposed Remedial Footprint and submitted for chemical analysis, toxicity testing, and benthic invertebrate community analysis. Based on comparisons of the measured concentrations of COCs to the 60% LAET and to the SS-MEQ threshold (0.9), it was predicted that none of the samples would be "Likely" impacted. All five samples were classified as "Unlikely" impacted or "Possibly" impacted based on examination of the sediment chemistry, sediment toxicity, and benthic community. Hence, it was concluded that the 60% LAET and the SS-MEQ threshold provided reliable predictors of likely benthic impairment at the Shipyard Sediment Site.

This conclusion is invalid for the following reasons:

- A scientifically-defensible evaluation of the reliability of the 60% LAET values and SS-MEQ threshold requires data on chemical composition, toxicity, and benthic community structure for substantially more than five sediment samples. Such evaluations of reliability or predictive ability are typically conducted with matching sediment chemistry and toxicity data on at least 50 sediment samples. For example, at the Tri-State Mining District and Calcasieu Estuary sites, 70 to 100 sediment samples were used to evaluate reliability of the toxicity thresholds (MacDonald et al. 2002; 2009; 2010).

- The samples that were collected to support the reliability assessment had maximum concentrations of the five primary COCs that were substantially lower than the 60% LAET values, as follows:

TABLE 2. COMPARISON OF 60% LAET VALUES TO THE MAXIMUM CONCENTRATIONS OF COCS MEASURED DURING THE SUPPLEMENTAL SAMPLING PROGRAM

Priority COC	60% LAET Value	Maximum Concentration
Copper	552 mg/kg DW	258 mg/kg DW
Mercury	2.67 mg/kg DW	1.18 mg/kg DW
HPAH	15.3 mg/kg DW	8.1 mg/kg DW
TPCB	3.27 mg/kg DW	0.83 mg/kg DW
TBT	1.11 mg/kg DW	0.15 mg/kg DW

Therefore, much lower values than the 60% LAET would also have provided a reliable basis for classifying these sediment samples as not "Likely" impacted. That is, the data that were collected did not provide a basis for determining if the 60% LAET values represented thresholds for adverse effects on benthic organisms or if adverse effects would be observed at lower levels:

- The samples that were collected to support the reliability assessment had SS-MEQ values that were substantially below the threshold that was used to identify "Likely" impacted samples; they ranged from 0.38 to 0.69 (calculated from data presented in Table 32-20 of the DTR) compared to the threshold of 0.9. Therefore, lower values than the selected SS-MEQ threshold would also have provided a reliable basis for classifying these sediment samples as not "Likely" impacted;

- The available data did not provide a basis for determining if the selected 60% LAETs or the SS-MEQ threshold provided reliable bases for classifying sediment samples as "Likely" impacted because the thresholds were never exceeded in these five sediment samples; and

- The procedures that were used to classify sediment samples as "Likely" impacted may not provide a sensitive basis for identifying sediment samples that are toxic to benthic invertebrates or associated with impairment of the benthic invertebrate community.

C.2.6 The procedures that were used to designate sediment samples from the Shipyard Sediment Site as "Likely" impacted are not protective.

These procedures are not protective for the following reasons.

- Sediment samples from the Shipyard Sediment Site were designated as moderately or highly toxic if: *(1)* the survival of amphipods exposed to a sediment sample was statistically significantly different from the control treatment **and** *(2)* control-adjusted survival was lower than the lower prediction limit for the reference sediment samples (72.9% survival; as presented in Table 18.7 of the DTR). Table 6 presents the data that were used in the DTR to establish the lower prediction limits for reference sediment samples.

- This approach to defining the normal range of amphipod responses is not consistent with the practices that are currently recommended by the Science Advisory Group on Sediment Quality Assessment. *See* Sustainable Fisheries Foundation (2007). Current guidance for determining reference conditions includes screening the toxicity test results and including samples in the reference envelope only if response rates are within the range specified for an acceptable negative control treatment: control-adjusted survival of 80 to 100% for amphipods. *See* American Society for Testing and Materials (2010). This screening step is applied to ensure that candidate reference samples with response rates that are influenced by the presence of unmeasured contaminants are not included in the reference pool. By applying this criterion, sediment samples with less than about 82% (see Table 7 for details on the recalculation of the reference envelope for the amphipod toxicity test) control-adjusted survival would be designated as toxic at the Shipyard Sediment Site. This is generally consistent with the guidance established by the California State Water Resources Control Board in its draft "Water quality control plan for enclosed bays and estuaries (CSWRCB 2008)." This limitation of the toxicity designation procedures also applies to the other toxicity test endpoints.

C.2.7 The rationale for excluding polygon NA22 from the Proposed Remedial Footprint is inappropriate. This area was included in the geographic scope of the Shipyard Sediment Site and, therefore, should be included on the list of the candidate Remedial Footprint stations.

According to Section 33.1.1 of the DTR, Station NA22 was "Likely" impaired based on moderate sediment chemistry, moderate toxicity, and moderate benthic community impairment. These results indicate that NA22 should be remediated because COCs in sediments are likely adversely affecting benthic invertebrates within this polygon. The conjecture about the potential effects of propeller testing on the benthic community is inconsistent with the methodology outlined in the DTR and should have no bearing on the results of the evaluation of this station. Importantly, the suggestion that the TMDL process will provide a more effective basis for making a decision on NA22 is invalid for the following reasons:

- The Mouth of Chollas, Switzer, Paleta Creeks TMDL ("Creek Mouth TMDL") will not address the existing contamination in polygon NA22. TMDLs are forward-looking policies intended to reduce the loading of contaminants to receiving water bodies, not to remove existing contamination. That is, the TMDL process will not provide a vehicle for remediating contaminated sediment within the NA22 polygon. A new and separate remediation process would need to be initiated after completion of the Creek Mouth TMDL to address existing contaminated sediment in NA22, if it is not remediated under the TCAO.

- The Creek Mouth TMDL does not address the same list of contaminants as the TCAO for the Sediment Shipyard Site. That is, the TMDL is focused on chlordane, PAHs, PCBs, and DDTs. Metals and TBT are not being addressed under the TMDL.

- The Creek Mouth TMDL will help to prevent the recontamination of the Shipyard Site, particularly polygon NA22.

- NA22 polygon is not included in post-remedial monitoring so it will not be possible to determine whether or not the TMDL achieves the same clean-up goals as those achieved under the TCAO for the Sediment Shipyard Site.

C.2.8 The rationale provided in Table 33-6 of the DTR for excluding certain polygons from the Remedial Footprint is not sufficient.

The rationale provided for excluding several polygons from the Proposed Remedial Footprint is flawed in several ways:

- The polygon SW03 was excluded from the Proposed Remedial Footprint, even though sediments within this polygon had elevated levels of cadmium. Cadmium levels in SW03 were not considered in the development of the Proposed Remedial Footprint because it was categorized as a secondary contaminant of concern at the Shipyard Sediment Site. This rationale is not reasonable because any substance that is identified as a risk driver—as cadmium was for SW03—should necessarily be considered in the development of clean-up goals.

- Technical infeasibility was identified as a rationale for excluding NA07, NA08, NA23, and NA27 from the Remedial Footprint. However, the evaluations of the technical feasibility of dredging within all or a portion of these polygons, as presented in Section 33.1.4 of the DTR, only include conclusory statements about technical infeasibility. These conclusions are not supported by evidence in the record, such as engineering assessments, that would render these conclusions scientifically valid.

- No rationale was provided for excluding NA01, NA04, NA06, NA16, NA16, NA21, SW25, or SW 29 from the Remedial Footprint.

C.2.9 The DTR failed to explicitly consider the potential effects on fish with small home ranges associated with exposure to contaminated sediments during the development of the Proposed Remedial Footprint.

This represents a major limitation of the Proposed Remedial Footprint because fish with small home ranges are known to utilize benthic habitats at the site and the concentrations of PCBs in sediments are sufficient to adversely affect the reproduction of fish at various locations. As a result, adverse effects on the health of benthic fish could occur at the site following remediation if the polygons with elevated levels of PCBs in sediments are not included in the Proposed Remedial Footprint. The polygons with concentrations of PCBs in sediments sufficient to adversely affect fish reproduction include NA01, NA04, NA07, NA16, SW06, SW18, and SW29 (see Table 1 of this document for more information on the hazard quotients that were calculated for these polygons). According to the DTR, the work that was done at the site on fish with large home ranges was inconclusive[5] and, hence, was not used in the development of the Proposed Remedial Footprint.

C.3 Conclusions Regarding the Proposed Remedial Footprint

The TCAO and the DTR describe the process that was used to develop the Proposed Remedial Footprint for the Sediment Shipyard Site. This process was designed to enable the Dischargers to meet Alternative Clean-Up Levels for the Shipyard Sediment Site and generally involved:

- Identifying and including in the Proposed Remedial Footprint all of the polygons where contaminated sediments were likely to adversely affect the health of the benthic community; and,

- Ranking the remaining polygons based on the concentrations of the five priority contaminants and selecting the most highly contaminated of these polygons—on a “worst first” basis—for inclusion in the Proposed Remedial Footprint, such that the predicted post-remedial SWACs for all five primary COCs would meet the Alternative Clean-Up Goals for aquatic-dependent wildlife and human health.

Based on the results of the evaluation of the methods that were presented in the TCAO and the DTR, I draw the following conclusions on the Proposed Remedial Footprint:

C.3.1. Developing the Proposed Remedial Footprint using Thiessen Polygons constructed to identify the area represented by each sediment sampling location is a scientifically valid method that has been used in other sediment remediation projects. However, the polygons developed at the Shipyard Sediment Site using this method are unusually large (i.e., up to 12 acres), which generates uncertainty in remedial decisions made for large areas based on limited sampling.

C.3.2 Evaluating risks to human health and aquatic-dependent wildlife using SWACs of contaminants in sediment is a scientifically valid approach that has been used in other sediment remediation projects. However, SWACs do not provide a basis for accurately assessing the impacts on benthic invertebrates or benthic fish. Other tools are needed to evaluate risks to these ecological receptors.

5 DTR Appendix 15, section A15.2.3

C.3.3 Evaluating risks to benthic invertebrates using a sediment quality triad (SQT) approach is a scientifically valid approach that has been used in other sediment remediation projects. However, effective application of this approach requires appropriate interpretation of sediment chemistry, sediment toxicity, and benthic invertebrate community structure data. The procedures described in the DTR for interpreting such data are not always consistent with the best current guidance.

C.3.4 Virtually all of the SQT stations evaluated had concentrations of contaminants that indicated that benthic invertebrates receive moderate to high exposure to contaminants at the Shipyard Sediment Site. This finding is in agreement with other interpretations of the sediment chemistry data, including my prior analysis in 2009 (MacDonald 2009).

C.3.5 The sediment toxicity data collected at the Shipyard Sediment Site have not been interpreted using methods that are consistent with the current guidance by the Science Advisory Group on Sediment Quality Assessment. *See* MacDonald *et al.* (2009 for more information). While reference conditions were defined for each toxicity test endpoint, the calculations of the 95% prediction limits were unduly influenced by inclusion of data for reference sediment samples that had unacceptably low amphipod survival, bivalve normal development, and/or sea urchin fertilization. For the bivalve toxicity test endpoint, insufficient data were compiled to support calculation of a valid reference envelope. This problem could be effectively addressed by adopting the procedures for determining level of toxicity established by the California State Water Resources Control Board (CSWRCB 2008). Table 6 and 7 provide comparisons of the reference envelope developed for use in the DTR to a reference envelope that was developed using procedures that are more scientifically defensible.

C.3.6 For polygons for which sediment chemistry data only were available, the DTR switched assessment methods from the SQGQ1 to SS-MEQ to assess impacts on the benthic invertebrate community, even though SQGQ1 method is preferable (i.e., the SQGQ1 method is effects-based and could be consistently applied at the site). While calculation of SS-MEQ values provides a consistent index of contamination in sediment samples from the Shipyard Sediment Site, SS-MEQ does not provide an effects-based tool for predicting adverse effects on the benthic community. In the context of this review, an effects-based tool is an indicator of contamination that is based on relationships between sediment chemistry and sediment toxicity. Such effects-based tools (e.g., SQGQ1) provide a basis for understanding the probability and/or magnitude of toxicity to benthic invertebrates (or other receptors) at specific levels of contaminations. The SQGQ1, the frequency of exceedance of SQGs, and the upper prediction limit for reference samples provide much more relevant tools for predicting adverse effects on the benthic community. *See* Finding 18 of the DTR; MacDonald (2009). Assuming toxicity to benthic invertebrates is classified using the criteria established by the California State Water Resources Control Board (CSWRCB 2008), 21 of the 29 (i.e., 72%) sediment samples, with moderate or high line-of-evidence (LOE) rankings for sediment chemistry were moderately or highly toxic to benthic invertebrates. *See* Table18-6 of the DTR. Further, all of the sediment samples with low LOE rankings for sediment chemistry were not toxic or had low toxicity to benthic invertebrates, resulting in an overall reliability of 73%. *See* Table18-6 of the DTR. With this level of reliability of the selected sediment chemistry metrics for the Triad samples, there is no rational reason to develop a different tool for evaluating the non-Triad sediment samples, particularly when SS-MEQ is not based on effects on benthic invertebrates (i.e., the SS-MEQ is not more reliable than the SQGQ1 method in terms of correctly classifying sediment samples as toxic or not toxic).

C.3.7 The Composite SWAC Ranking Value that was developed to identify the most contaminated polygons that would be included first in the Proposed Remedial Footprint was not applied consistently in the TCAO or the DTR. The Proposed Remedial Footprint includes 23 polygons with SWAC ranking values greater than or equal to 5.5, but left out 15 polygons with Composite SWAC Ranking Values greater than 5.5.

C.3.8 The Proposed Remedial Footprint excludes polygons, like NA07, with concentrations of contaminants in sediment that likely pose higher risks to human health and aquatic-dependent wildlife than some of the polygons included in the Proposed Remedial Footprint.

C.3.9 The Proposed Remedial Footprint excludes polygons with concentrations of contaminants in sediment that likely pose high risks to benthic fish.

C.3.10 The Proposed Remedial Footprint excludes polygons or portions of polygons, like NA20, NA21, and NA22, which are being considered in the Mouth of Chollas Creek TMDL assessment process. The DTR explains that these polygons or portions of these polygons were removed from the Proposed Remedial Footprint because they "fall within an area that is being evaluated as part of the TMDLs for Toxic Pollutants in Sediment at the Mouth of Chollas Creek TMDL and is not considered part of the Shipyard Sediment Site for the purposes of the TCAO." This decision was based on the assertion that "the additional samples from the TMDL will allow a better assessment of the causes of potential impairment in the mouth of the Chollas Creek area." While additional data could support a more in-depth assessment of this area, the conclusion that the TMDL process will address sediment contamination in these polygons is incorrect because the TMDL process will not provide a vehicle for remediating contaminated sediment.

C.3.11 The DTR explains why the Proposed Remedial Footprint excludes seven polygons—NA07, NA08, NA23, NA27, SW03, SW06, and SW19—that would otherwise be included in the Proposed Remedial Footprint. *See* Table 33-6 of the DTR. However, the explanation for excluding these polygons is not scientifically valid and is, in some cases, based on erroneous conclusions regarding contaminant concentrations or potential for impacts to the benthic community. For example, the DTR excluded NA07 and NA23 from the Proposed Remedial Footprint based on conclusions that dredging these polygons "had technical feasibility problems." Specifically, the DTR concluded that dredging both polygons would "undermine the slope." In order to be scientifically valid, these conclusions of technical infeasibility must be supported by detailed engineering studies of the existing slope and the impacts that various dredging techniques would have on the slope. The DTR provides no information about the existing sediment slope and includes no engineering studies to support its conclusion that dredging these polygons is technically infeasible. For this reason, the technical infeasibility conclusion for these polygons is not scientifically defensible.

In summary, the process for developing the Proposed Remedial Footprint is conceptually sound and is consistent with the approach used at other sites in the United States to guide remedial activities. However, there are a number of inconsistencies in the application of the procedures that need to be corrected to ensure that the Proposed Remedial Footprint will meet the goals articulated in the TCAO and DTR. In addition, the results of an independent evaluation of the available data and information that I performed in 2009 indicate that additional polygons should be included in the sediment remedial footprint for the Shipyard Sediment Site (MacDonald 2009). Table 5 presents the results of an evaluation for seven polygons that should be added to the Remedial Footprint to address inconsistencies in the procedures applied in the DTR and to address risks to fish utilizing habitats within the study area.

The results of this analysis indicate that the following polygons pose unacceptable risks to fish and would likely or possibly adversely affect the benthic community: NA01, NA04, NA07, NA16, SW06, SW18, and SW29. In addition, polygon NA22 should be included in the Remedial Footprint because it meets the criteria established in the DTR and it is not valid to exclude it based on its consideration in the TMDL process for the Mouth of Chollas Creek. Hence, these eight polygons, at minimum, should also be included in the Remedial Footprint for the Shipyard Sediment Site.

D. Expert Opinion #2: Alternative Clean-Up Levels

Limitations on the establishment and implementation of the Alternative Clean-Up Levels make it difficult to determine if San Diego Bay beneficial uses will be unreasonably affected by the post-remedial contamination levels. To assure that beneficial uses are protected, Remediation Monitoring and Post Remedial Monitoring must be improved to ensure that the Shipyard Sediment Site is remediated to the Alternative Clean-Up Levels.

D.1 Overview of Methods Used to Establish Alternative Clean-Up Levels

The methods that were used to develop the Alternative Clean-Up Levels for the Shipyard Sediment Site are described in Section 32 of the TCAO and Finding 32 of the DTR. The Alternative Clean-Up Levels for aquatic life is a narrative statement that indicates that all areas determined to have sediment pollution levels likely to adversely affect the health of the benthic community are to be remediated. The procedures for identifying the polygons with sediment pollution levels likely to adversely affect the health of the benthic community are described in Findings 15, 16, 17, and 18 of the DTR. In contrast, numerical Alternative Clean-Up Levels for human health and aquatic-dependent wildlife were established for the five primary COCs at the Shipyard Sediment Site: copper, mercury, HPAH, PCBs, and TBT. The DTR claims that these Alternative Clean-Up Levels, which represent surface-area weighted averaged concentrations (SWACs) of the five primary COCs, were established at the lowest levels that were considered to be technologically and economically achievable at the Shipyard Sediment Site. The DTR also claims that the Alternative Clean-Up Levels are protective of human health and aquatic-dependent wildlife.

D.2 Uncertainties Associated with the Alternative Clean-Up Levels

The appropriateness and protectiveness of the Alternative Clean-Up Levels described in Section 32 of the TCAO and Finding 32 of the DTR are uncertain for several reasons, including:

D.2.1 The Alternative Clean-Up Levels are substantially higher than background levels of the primary COCs in San Diego Bay.

Clean-Up Levels that correspond with background conditions in San Diego Bay would provide the highest, practically achievable, level of protection to ecological receptors utilizing habitats in the vicinity of the Shipyard Sediment Site. In recognition of the importance of establishing background conditions in San Diego Bay, the San Diego Water Board selected a group of reference stations located within relatively cleaner areas of San Diego Bay considered to be unaffected by the Shipyard Sediment Site. While there has been substantial debate regarding which stations should be included in the reference pool, it is certain that clean-up to the background sediment chemistry levels identified in Table 1 of the TCAO would provide ecological receptors with a higher level of protection than would clean-up to the Alternative Clean-Up Levels presented in Table 2 of the TCAO. The Alternative Clean-Up Levels are 19 to 500% higher than the background sediment chemistry levels.

D.2.2 Neither the TCAO nor the DTR explicitly identify numerical Alternative Clean-Up Levels for the protection of aquatic life.

Table 2 of the TCAO and Section 32 of the DTR present the numerical Alternative Clean-Up Levels for aquatic-dependent wildlife and human health. More specifically, these tables present the numerical Alternative Clean-Up Levels for copper, mercury, HPAHs, PCBs, and TBT in sediment.

In contrast, the Alternative Clean-Up Levels for aquatic organisms is a narrative statement that directs the Dischargers to "remediate all areas determined to have sediment pollutant levels likely to adversely affect the health of the benthic community." Application of this narrative statement requires evaluation of multiple lines-of-evidence that are focused on assessing effects on benthic invertebrates. No information was presented in the TCAO or the DTR on how the potential for adverse effects on fish were explicitly considered in development of the Alternative Clean-Up Levels. Although the DTR does address fish bile data and fish histopathology, the results of those analyses were not incorporated into the Alternative Clean-Up Levels. The DTR should have considered effects on fish other than the inconclusive data that were collected on the bile and histopathology of fish with large home ranges. Without evidence in the record demonstrating that potential for adverse effects on fish were considered, I conclude that the Alternative Clean-Up Levels were developed without considering the potential for adverse impacts on fish. Therefore, the Alternative Clean-Up Levels do not ensure that fish are protected. Because fish are key receptors in San Diego Bay, effects on fish need to be addressed during development of the Proposed Remedial Footprint.

D.2.3 The Alternative Clean-Up Levels fail to include numerical limits to protect benthic invertebrates.

The DTR employs a procedure for evaluating risks to aquatic life associated with exposure to contaminated sediments that relies on sediment chemistry, sediment toxicity, and benthic invertebrate community data. While reliance on multiple lines-of-evidence is generally recommended for assessing contaminated sediments, the procedures that were used to interpret individual lines-of-evidence do not correctly identify all of the sediment samples that would adversely affect benthic invertebrate communities. Specific examples of limitations in the data interpretation procedures include:

- The metric for evaluating sediment chemistry data in the non-Triad samples is not effects-based. The DTR fails to explain why the SS-MEQ is used to evaluate sediment chemistry in the non-Triad sediment samples, when the metric used for the Triad sediment samples (SQGQ1) is reliable. This disconnect between the evaluations of the Triad and non-Triad sediment samples adds to the uncertainty in the identification of “Likely” impacted samples.

- The criteria that were established for interpreting amphipod toxicity data rely upon establishment of a 95% lower prediction limit for the reference pool to classify sediment samples into risk categories. Yet, several samples were included in the reference pool that did not meet criteria for negative control samples, which is that at least 80% survival is required for an acceptable negative control sample. This same criterion is routinely applied to identify reference sediment samples (Sustainable Fisheries Foundation 2007; MacDonald et al. 2009). Inclusion of samples that had amphipod survival lower than 80% in the reference pool results in calculation of a 95% lower prediction limit—72.9%—that is too low. See Table 18-7 of the DTR. As a result, sediment samples are identified as toxic only if survival is less that 72.9%. Application of the biological criteria for identifying acceptable reference sediment samples would have resulted in a threshold of about 82% control-adjusted survival for amphipods. The following polygons would have been identified as toxic to amphipods using a more appropriate procedure for establishing reference conditions: NA01, NA04, NA06, NA07, SW11, SW18, and SW27.

- Only four samples were included in the reference pool for the bivalve development toxicity test. This does not represent a robust data set and its use results in calculation of a 95% lower prediction limit of 37.4% normal. See Table 18-7 of the DTR. This number is substantially lower than the result for any of the samples included in the reference pool, where percent normal development ranged from 66 to 101%. Therefore, the procedure that was used to identify toxic samples relative to bivalve development is invalid.

- The data that were used to establish the reference envelope for the sea urchin fertilization test included samples that have fertilization rates below test acceptability criteria (70% for negative controls). This results in the calculation of a 95% lower prediction limit of 41.9%, which is inappropriately low. Hence many of the samples from the site could be misclassified as not toxic using this threshold.

Because the procedures used to interpret individual lines-of-evidence are not protective, it is likely that determinations of risks to benthic invertebrates associated with exposure to sediment from the Shipyard Sediment Site will not provide an adequate basis for protecting benthic invertebrate communities. Hence, the Alternative Clean-Up Levels are unlikely to provide an adequate level of protection to the benthic community and are likely to be only minimally protective of benthic invertebrates.

D.2.4 The Alternative Clean-Up Levels fail to include numerical limits to protect fish.

This is a serious limitation of the Alternative Clean-Up Levels because many of the contaminants present at the Shipyard Sediment Site have the potential to accumulate in the tissues of benthic fish and adversely affect their survival, growth, or reproduction. My analysis of data from the Shipyard Sediment Site indicates that benthic fish are at risk throughout portions of the site and at least seven polygons were not included in the Proposed Remedial Footprint that had unacceptable risks to fish (MacDonald 2009). This finding demonstrates that risks to fish are not effectively addressed by the Alternative Clean-Up Levels.

D.2.5. The shortcomings of the Alternative Clean-Up Levels lead to uncertainty in the protectiveness of the remediation. This problem can be addressed, at least in part, by setting stringent Remediation and Post Remedial Monitoring requirements.

Short of going back to the drawing board and developing new Alternative Clean-Up Levels, the best way to address uncertainties in the protectiveness of the Alternative Clean-Up Levels is to strengthen the Remediation Monitoring and Post Remedial Monitoring requirements. Without stringent Remediation and Post Remedial Monitoring to ensure that the Alternative Clean-Up Levels are actually achieved throughout the entire Shipyard Sediment Site, it is highly likely that existing and/or future beneficial uses in San Diego Bay may be unreasonably affected.

D.2.6 The TCAO provides no evidence that "clean-up of the remedial footprint will restore any injury, destruction, or loss of natural resources."

While Section 32 of the TCAO concludes that the proposed remedial action will restore any natural resources that may have been injured by releases of hazardous substances at the Shipyard Sediment Site, neither the TCAO nor the DTR includes any evidence to support this assertion. Importantly, the San Diego Regional Water Quality Control Board has not conducted a natural resource damage assessment at the Shipyard Sediment Site and, hence, has no basis for making this assertion. More importantly, the San Diego Regional Board does not have authority for conducting natural resource damage assessments. Rather, the Natural Resources Trustees have authority to conduct natural resource damage assessments and to draw conclusions regarding injury to natural resources and the effectiveness of remedial actions in terms of restoring natural resource values. Therefore, all statements regarding the injury to natural resources, natural resource service losses, and associated damages must be removed from the TCAO and the DTR.

D.3 Conclusions Regarding the Alternative Clean-Up Levels

Collectively, these limitations on the establishment and implementation of the Alternative Clean-Up Levels mean that these Alternative Clean-Up Levels cannot ensure that beneficial uses will not be unreasonably affected at the Shipyard Sediment Site. The results of the foregoing evaluation indicate that the clean-up within the Proposed Remedial Footprint will likely leave harmful levels of contaminants in place throughout portions of the Shipyard Sediment Site because the clean-up will be minimally protective of benthic invertebrates and fish. Therefore, I conclude that:

D.3.1 It is essential that the Remediation Monitoring program provide a reliable basis for documenting that water quality standards have been violated outside the construction area during remedial activities.

D.3.2 It is essential that the Remediation Monitoring program that is conducted during the remedial activities provide a reliable basis for documenting that the target clean-up levels for sediment have been reached within the remedial footprint and that remedial activities have not further contaminated areas located outside the remedial footprint.

D.3.3 It is essential that the Post Remedial monitoring program provide data and information of sufficient quality and quantity to determine if the Alternative Clean-Up Levels have been met at the Shipyard Sediment Site following implementation of remedial measures.

D.3.4 It is essential that the San Diego Regional Board be prepared to require additional remediation if the Alternative Clean-Up Levels have not been met following completion of the remedial activities at the site.

D.3.5 Regardless of the assertions made in the TCAO regarding the effectiveness of the clean-up for restoring any injury, destruction, or loss of natural resources, the Natural Resources Trustees may conduct a natural resource damage assessment to evaluate injuries to natural resources, to estimate the ecological service losses and other service losses associated with such injuries, and to calculate any damages to the public associated with natural resource service losses. Such damages would cover damages that have accrued between 1981 (the year that CERCLA was enacted) and the time that the remedial activities are completed. In addition, residual damages to natural resources will also be evaluated if the remedial measures are not sufficient to restore injured natural resources. Residual damages would be lower if a more protective clean-up was implemented at the Shipyard Sediment Site.

E. Expert Opinion #3: Remediation Monitoring

The requirements for Remediation Monitoring, as specified in Section B.1.l of the TCAO and in Section 34.1 of the DTR, do not mandate development and implementation of a Remediation Monitoring Plan that will provide the data and information needed to assess compliance with water quality standards, to evaluate the effectiveness of remedial measures, or to identify the need for further dredging to achieve clean-up goals at the Shipyard Sediment Site. Therefore, the Remediation Monitoring requirements must be revised to address each of these issues.

E.1 Overview of Remediation Monitoring Requirements

A Remediation Monitoring program is an environmental monitoring program that is implemented while remedial activities are being conducted. In this case, Remediation Monitoring is the monitoring that will be conducted during dredging of sediments at the Shipyard Sediment Site. Remediation Monitoring is an essential element of any sediment remediation because it provides the data and information needed: ***(1)*** to confirm, while the work is being done, whether or not the sediment is being appropriately remediated so that the levels of contaminants in sediment following dredging meet the clean-up goals; and, ***(2)*** to determine if sediment and/or pore water disturbed during dredging are impacting water quality, causing violations of water quality standards, or are traveling to areas not slated for remediation.

Based on the information presented in Section B1 of the TCAO, the Dischargers must develop a Remediation Monitoring Plan consisting of water quality monitoring, sediment monitoring, and disposal monitoring consistent with Section 34.1 of the DTR. The water quality monitoring must be sufficient to demonstrate that implementation of the selected remedial activities does not result in violations of water quality standards outside the construction area. The sediment monitoring must be sufficient to confirm that the selected remedial activities have achieved target clean-up levels within the remedial footprint specified in Directive A.2. The disposal monitoring must be sufficient to adequately characterize the dredged sediments in order to identify appropriate disposal options.

E.2 Deficiencies of the Remediation Monitoring Requirements—Water Quality

Section B.l.1 of the TCAO and Section 34.1 of the DTR indicate that water quality monitoring must be conducted to demonstrate that implementation of the selected remedial activities do not result in violations of water quality standards outside the construction area and to confirm that the selected remedial activities have achieved target clean-up goals within the remedial footprint. The water quality component of the

Remediation Monitoring program specified in the TCAO and the DTR is inadequate for the following reasons:

E.2.1 The DTR allows water quality impacts to be assessed through modeling and turbidity measurements alone, but water quality impacts can be adequately assessed only by comparing results of real-time monitoring of turbidity and dissolved oxygen and sampling of contaminants of concern to the water quality standards included in the San Diego RWQCB Basin Plan and/or state water quality standards.

The DTR requires water quality monitoring during remediation to assess compliance with "water quality monitoring goals." The DTR's water quality monitoring approach presents several problems. First, the DTR fails to explicitly define "water quality monitoring goals." Although the DTR states that the goal of water quality monitoring "is to demonstrate that remedy implementation does not result in violations of water quality standards outside the construction area," the DTR fails to explicitly state the water quality standards. To address this problem, the DTR should explicitly include the numeric water quality standards that must be achieved during remediation.

Second, the DTR gives the Dischargers discretion to measure compliance with ambiguous water quality monitoring goals through two separate measures. The first method involves developing a model of turbidity and synoptic water quality measures prior to remedy implementation to determine if monitored turbidity would likely result in unacceptable water quality. Under this method, turbidity would be used as the only indicator of water quality conditions. The second method involves real-time monitoring of turbidity and dissolved oxygen at locations 250 feet from the dredge zone, 500 feet from the dredged zone, and at ambient locations.

Modeling with turbidity measurements alone is not an appropriate method to accurately gauge water quality impacts as they are occurring because such information cannot demonstrate compliance with numeric water quality standards for dissolved oxygen or other contaminants of concern which may be released during dredging. To assess compliance with numeric water quality standards during remediation, the Dischargers must conduct real-time monitoring of turbidity and dissolved oxygen, and collect surface water samples for analysis of all primary and secondary contaminants of concern. The information collected must be compared to numeric water quality standards established in the San Diego RWQCB Basin Plan—and listed in the DTR—to determine whether the Dischargers are complying with applicable water quality standards during remediation.

E.2.2 The DTR allows Dischargers to take all water quality samples from up-current locations, which would mask true water quality impacts.

The water quality monitoring program specifies that Dischargers must collect four water samples on each of two arcs outside the construction area, with one arc located at 250 feet and the other arc located at 500 feet from the construction area. However, the DTR is silent as to where along the arcs the samples need to be collected. This means that Dischargers are free to collect all the samples from up-current locations. Collecting samples only from up-current locations will mask the true water quality impacts that are experienced down-current form the dredging. To address this problem, the DTR must require that sampling locations be determined according to the impact of tidal flow on the plume from the construction area. Specifically, the DTR should require that all samples be collected in locations that are down-current from the dredging.

E.2.3 The DTR's failure to define the size of the construction area means that samples can be collected far from the locus of the dredging activity.

The DTR's failure to define the construction area is a problem because the DTR directs Dischargers to collect water quality monitoring data at specific distances from the construction area: 250 feet and 500 feet, respectively. This could, for example, result in early warning water samples being collected 250 feet, 500 feet, or 1250 feet from the dredging location if the construction area was defined as having a radius of 0 ft, 250 ft, or 1000 ft. To address this problem, the DTR must explicitly define the boundaries of the construction area. By doing so, water sampling locations on the 250 and 500 foot arcs can be consistently identified. To provide the best protection for water quality, DTR should define the "construction area" as a point at the center of the construction activity for the day on which the samples are taken.

E.2.4 The DTR fails to provide the rationale for collecting water samples at a depth of 10 feet.

According to the DTR, water samples must be collected from a depth of 10 feet below the water surface. However, the DTR provides no rationale for selection of the 10 foot water depth for collecting these samples. To best protect water quality, the DTR should require Dischargers to collect water samples at multiple water depths early in the sampling program to identify the depths that have the highest levels of monitored variables. This is an easy and inexpensive solution to the problem because water quality sensors will likely be used to provide real time measurements of turbidity and dissolved oxygen in the field. Alternatively, the results of turbidity measurements taken throughout the water column on each sampling date should be used to identify the water depth that has the highest turbidity. Grab samples for analysis of COCs in surface water should be taken at the water depth with the highest turbidity.

E.2.5 The DTR's failure to specify the time that water samples need to be collected each day means that Dischargers are free to collect samples at times when daily water quality impacts are likely to be the lowest and mask the true water quality impacts during remediation.

The DTR generally requires that water quality sampling be conducted on a daily basis, but fails to specify when during the day such water samples need to be collected. This is a problem because water samples could be collected early in the day, when dredging has just been initiated, or even prior to dredging beginning. In this case, the plume from the dredging activities may not have had time to reach the 250 or 500 sampling arcs. In addition, water samples could be collected at slack tide when the plume is least likely to reach the 250 or 500 foot sampling arcs. To address this problem, the DTR must specify when during the day water quality samples need to be collect. To best protect water quality, I recommend that samples be collected half-way through a flooding or ebbing tide at least four hours after dredging activities are initiated for the day.

E.2.6 The DTR fails to require collection of water samples on at least a daily basis.

The DTR generally requires water quality sampling to be conducted on a daily basis. But if three days of daily monitoring show that no samples exceed water quality targets, the Dischargers can abandon daily water quality monitoring in lieu of weekly monitoring. Sampling would only return to daily monitoring if a "significant change in operations occurs." However, neither the DTR nor the TCAO define the term "a significant change in operations." This is a problem because it is not clear what criteria will be used to trigger a resumption of daily water quality sampling. This is also a problem because it assumes that variability in turbidity or dissolved oxygen levels is associated primarily with operation of the dredge. This is incorrect. Other sources of variability in water quality conditions include variability in the effectiveness of silt curtains or other best management practices, changes in the timing of tidal cycles, alteration of current velocity, and other factors. A project of this size and importance requires a full time monitor (i.e., a person or persons who are dedicated to conducting the remediation monitoring) to evaluate water quality and other conditions, such as the status of silt curtains and other best management practices, on a daily basis. To best protect water quality, the DTR should require daily water quality monitoring and should not sanction weekly monitoring.

E.2.7 The DTR fails to define best management practices for dredging activities.

While the DTR alludes to the application of best management practices (BMPs), no guidance is provided that defines BMPs for dredging activities. Therefore, the DTR should explicitly state that measures to reduce or eliminate the transport of sediments that are resuspended during dredging must be used throughout the dredging program. Such measures may include the use of silt curtains, gunderbooms, mechanical dredge operational controls, use of a closed or environmental bucket, measures that apply to barge operation, and selected work windows.

E.3 Deficiencies of the Remediation Monitoring Requirements—Sediment

Section B.l.1 of the TCAO and in Section 34.1.2 of the DTR indicate that sediment monitoring must be conducted during dredging activities to confirm that remediation has achieved target clean-up levels within the remedial footprint. The sediment component of the Remediation Monitoring program specified in the TCAO and the DTR is inadequate for the following reasons:

E.3.1 The DTR allows Dischargers to collect only one sediment sample from each polygon in the Proposed Remedial Footprint, which will not provide sufficient data to assess compliance with clean-up goals.

The DTR requires that Dischargers conduct sediment monitoring in each of polygons within the remedial footprint. But because the DTR is silent on how many sediment samples Dischargers must collect from within each polygon, Discharges are free to collect only one sample from each polygon.

There is ample evidence in the record demonstrating the variability in sediment chemistry within a given polygon,[6] meaning that collecting only a single sample within each footprint polygon or sediment management unit (SMU), ignores that variability and fails to provide sufficient information to assess compliance with clean-up goals.

In order to collect sufficient information to assess compliance with clean-up goals during remediation, I recommend that each SMU be divided into a number of sediment confirmation sampling areas (SCSAs) that have an area of 2500 ft^2 each (50 feet by 50 feet) or less. A total of nine surficial sediment samples should be collected within each SCSA, including one sediment sample collected from the middle of the SMU and two sediment samples collected north, south, east, and west of the original sampling location, at 25 foot intervals. The sediment sample collected from the middle of the SCSA should be analyzed for the primary COCs identified in the TCAO and the resultant COC concentrations compared to the clean-up goals. If the concentration of one or more of the primary COCs exceeds the corresponding clean-up goal, then additional sediment samples should be analyzed to evaluate the spatial extent of contamination. In this way, the areas that require additional dredging to achieve clean-up goals can be identified with greater certainty.

E.3.2 The DTR fails to identify the locations that must be sampled to confirm that clean-up goals have been met.

This is a problem because sediment sampling may target the historic sampling locations, for which data are already available. Other locations within the remedial footprint that have not been sampled to date may not be characterized. As a result, sediments with elevated levels of contaminants may be missed during sediment monitoring. I recommend that the DTR require that the Discharger must sample in locations that have not previously been sampled. This will be the case if the concept of sampling within sediment confirmation sampling areas is adopted.

E.3.3 The TCAO and the DTR provide inconsistent requirements on sampling depth.

The TCAO requires that samples be collected deeper than the upper 5cm, while the DTR requires that samples be collected deeper than the upper 10cm. The TCAO and the DTR must be revised to provide consistent guidance on target sampling depths.

E.3.4 The DTR's sampling guidance will be difficult, if not impossible to apply systematically at all sampling locations. The DTR should specifically require that samples be collected within the top 10 cm.

[6] For example, see Table A32-30 of the DTR

Instead of identifying specific sampling depths that must be addressed, the DTR provides a narrative that will be difficult, if not impossible, to apply systematically at all sampling locations. Specifically, the DTR provides the following direction: "sample sediments deeper than 10 cm and sample the first undisturbed depth beneath the dredge depth; sample just deep enough to collect a sufficient volume for analysis." This type of narrative requires the sampling team to visually examine each sediment sample and try to identify "undisturbed sediments." It is unlikely that this guidance can be consistently followed. More, importantly, this guidance is inappropriate and its application will ensure that the data needed to determine if the clean-up goals have been met will not be collected by the Dischargers.

To ensure the Dischargers collect sediment samples that will assess impacts to benthic invertebrates exposed to surficial sediments, the DTR should require Dischargers to collect sediment samples within the top 10 cm. Failure to collect surficial sediment samples will ensure that insufficient data are available to determine if beneficial uses at the site are unacceptably affected by contaminated sediments. To address future impacts in areas prone to erosion, the DTR should direct the Dischargers to collect additional samples of deeper sediment in those erosion-prone areas.

E.3.5 The DTR's "120% of background" trigger level for additional dredging is ambiguous and arbitrary.

The DTR states: "If concentrations of COCs in subsurface sediments (deeper than 10 cm) are above 120% of background sediment chemistry levels, then additional sediments will be dredged by performing an additional pass with the equipment." There are three main problems with this approach.

First, the DTR's direction is ambiguous. The DTR could be interpreted to mean additional dredging is required either ***(1)*** if the concentrations of <u>all</u> COCs exceed 120% of background levels or ***(2)*** if the concentrations of <u>one</u> or more COCs exceed 120% of background. This is an important distinction that has the potential to influence the extent of re-dredging at the Shipyard Sediment Site and it must be clarified.

Second, the DTR's additional dredging trigger is arbitrary. The DTR fails to present any evidence or provide any explanation of how requiring an additional dredging pass when the 120% of background sediment chemistry concentrations are exceeded will ensure that the post-remedial SWACs—the Alternative Clean-Up Levels—will actually be met for the entire Shipyard sediment Site.

Third, by establishing decision criteria for evaluating dredge performance that are 20% higher than the background sediment chemistry levels, it is possible that surficial sediments following remediation will have COC concentrations that are higher than the clean-up goals. In turn, the presence of elevated levels of COCs in surficial sediments may lead to calculation of post-remedial SWACs that exceed those predicted in the TCAO and the DTR. Hence, use of decision criteria that are inconsistent with the background sediment chemistry levels could lead to implementation of a clean-up that does not provide adequate protection for beneficial resources (i.e., the Alternative Clean-Up Levels may not be achieved in the near term; i.e., within the next 10 years). The DTR should show the results of calculations that demonstrate that post-remediation SWACs will be met if the concentrations of COCs in all of the remediated areas are equal to 120% of background levels (i.e., equal to 120% of the post-remedial dredge area concentrations listed in Section A2.a of the TCAO).

To address these very real concerns, the DTR language should read: "If the concentrations of one or more COCs in any surficial sediment sample exceed background sediment chemistry levels, then additional sediments will be dredged by performing an additional pass with the equipment over the entire area represented by that sediment sample. The area that was re-dredged must then be re-sampled to confirm that the clean-up goals have been met." In addition, these thresholds for additional pass dredging, or "Triggers for Redredging," should be explicitly presented in the DTR, as follows:

TABLE 3. LIST OF TRIGGERS FOR REDREDGING

Priority COC	Triggers for Redredging
Copper	121 mg/kg DW
Mercury	0.57 mg/kg DW
HPAHs	663 µg/kg DW
PCBs	84 µg/kg DW
TBT	22 µg/kg DW

E.3.7 The DTR fails to specify the criteria when a sand cap would be necessary and who would make such a determination.

The second decision rule indicates that “a sand cap will be placed on the sediment surface, if necessary.” Yet, the DTR fails to describe the criteria that would need to be met to justify placement of a sand cap. In addition, the DTR fails to identify who would be responsible for determining if such a sand cap is needed. The third decision rule states that “if no sample can be collected because the equipment cannot penetrate a hard substrate, then this area will be evaluated to determine whether a sand cap is required.” However, the DTR fails to describe how such an evaluation should be conducted or who would be responsible for making a decision on the need for, and design criteria for, a sand cap. This decision rule also fails to recognize that sediment samples in areas with hard substrate can frequently be collected by divers. Failure to establish clearly interpretable decision rules that consider the various possible outcomes will almost certainly result in decisions that are not consistent with the expectations of the San Diego Regional Board and other participants in the process.

E.4 Conclusions Regarding the Remediation Monitoring Program

The requirements for conducting Remediation Monitoring are described in Section 34.1 of the DTR. Based on the results of this review of the requirements described in the DTR, the remediation monitoring program that is implemented during remedial activities at the Shipyard Sediment Site will not provide the data and information needed to:

- Assess compliance with water quality standards;
- Evaluate the effectiveness of remedial measures; or,
- Identify the need for further dredging to achieve clean-up goals.

Sections E.2 and E.3 document numerous problems with the remediation monitoring requirements specified in the DTR. These problems are serious because the clean-up activities described in the TCAO are likely to be only minimally protective of beneficial uses at the Shipyard Sediment Site. Accordingly, effective Remediation Monitoring is required to provide the data and information needed to document that water quality standards have not been exceeded during remediation and that clean-up levels have been achieved within the remedial footprint. Failure to collect the necessary and sufficient data on water quality conditions in the vicinity of the construction area and on sediment quality conditions within the remedial footprint will make it impossible to manage the clean-up operations in a way that will assure that the clean-up goals are met. Therefore, it is essential that the Remediation Monitoring program be revised to address each of these critically important issues. The key changes that need to be made to the Remediation Monitoring program include:

E.4.1 The DTR must include detailed requirements for surface-water sampling. These requirements should:

1. Require daily real-time monitoring of turbidity and dissolved oxygen,

2. Require daily water sampling of each primary and secondary COCs;

3. Define the "construction area" as a point in the center of the construction activity;

4. Mandate that water samples be collected half-way through a flooding or ebbing tide at least four hours after dredging activities have initiated for the day at locations down-current from the dredging;

5. Require Dischargers to collect water samples at multiple water depths early in the sampling program to identify the depths that have the highest levels of monitored variables and then require that water be sampled at those depths thereafter;

6. Explicitly list the water quality standards for dissolved oxygen, turbidity, and each primary and secondary contaminant concern and risk-driver that must be met at compliance monitoring locations;

7. Mandate the use of Best Management Practices that include, but are not limited to, silt curtains, gunderbooms, mechanical dredge operational controls, use of a closed or environmental bucket dredge, measures that apply to barge operation, and selected work windows; and

8. Require a full-time monitor to evaluate water quality and Best Management Practices on a daily basis.

E.4.2 The DTR must make the following changes to the sediment portion of the Remediation Monitoring program:

1. Set the required sediment sampling depth at 0-10cm in both the TCAO and DTR;

2. Divide each sediment management unit into a number of sediment confirmation sampling areas (SCSAs) that have an area of 2500 ft^2 each (50 feet by 50 feet) or less. A total of nine surficial sediment samples should be collected within each SCSA, including one sediment sample collected from the middle of the SMU and two sediment samples collected north, south, east, and west of the original sampling location, at 25 foot intervals. The sediment sample collected from the middle of the SCSA should be analyzed for the primary COCs identified in the TCAO and the resultant COC concentrations compared to the clean-up goals. If the concentration of one or more of the primary COCs exceeds the corresponding clean-up goal, then additional sediment samples should be analyzed to evaluate the spatial extent of contamination. This information will be used to determine the scope of additional pass dredging for each SCSA;

3. Specify that an additional dredging pass is required if any priority COC is greater than background and add a table with the explicit triggers provided in Table 3.

4. Specify the criteria for placing a sand cap on the sediment surface.

F. Expert Opinion #4: Post Remedial Monitoring

The requirements for Post Remedial Monitoring, as specified in Section D of the TCAO and in Section 34.2 of the DTR, do not mandate development and implementation of a Post Remedial Monitoring Plan that will provide the data and information needed to determine if the remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. In other words, the current Post Remedial Monitoring requirements do not require collection of the data and information needed to evaluate the effectiveness of remedial measures and identify the need for further remediation to achieve clean-up goals at the Shipyard Sediment Site. Therefore, Post Remedial Monitoring results will not provide a comprehensive basis for objectively evaluating the effectiveness of the remedial measures or the need for further remediation to achieve the clean-up goals at the Shipyard Sediment Site.

F.1 Overview of Post Remedial Monitoring Requirements

As stated in Section D of the TCAO and in Section 34.2 of the DTR,[7] the Dischargers must submit a Post Remedial Monitoring Plan to the San Diego Water Board within 90 days of adoption of the TCAO. The Post Remedial Monitoring Plan must be designed to verify that the remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. Post Remedial Monitoring is to be conducted after the remedial activities have been completed. It is a key component of any sediment remediation because it provides the data and information needed to confirm that the remedial work has been successfully completed and, therefore. to confirm that the clean-up goals have been met.

According to the requirements specified in the TCAO, the Post Remedial Monitoring Plan must include a Sampling and Analysis Plan and a Quality Assurance Project Plan. The TCAO mandates that composite sediment sampling be conducted to confirm that the post-remedial SWACs for the five primary COCs have been met. Accordingly, sediment samples must be "collected at all 65 sampling stations used to develop Thiessen polygons and composited on a surface-area weighted basis" to prepare six sediment samples (that correspond to six polygon groups) for analysis of the five primary COCs. The Post Remedial Monitoring Plan must also include bioaccumulation testing of nine sediment samples using 28-day bioaccumulation tests with the bivalve, *Macoma nasuta*. Furthermore, chemical analysis, toxicity testing, and benthic community assessment must be conducted for sediment samples collected at five locations at the site.

F.2 Deficiencies of the Post Remedial Monitoring Requirements

The post-remediation monitoring program specified in the TCAO and the DTR is inadequate for the following reasons:

F.2.1 Neither the TCAO nor the DTR establish narrative remedial action objectives (RAOs) for each San Diego Bay beneficial use.

The TCAO concludes that the remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. However, neither the TCAO nor the DTR defines the term "will not unreasonably affect San Diego Bay beneficial uses." Without a clear definition of what the remedial actions are intended to achieve, it is difficult to determine if the clean-up was successful in terms of protecting or restoring beneficial uses in San Diego Bay. Therefore, the TCAO and the DTR should be revised to include narrative RAOs and numerical targets so that it can be determined if those objectives are attained.

[7] While the TCAO refers to "Post Remedial Monitoring," (pages 25-31, Attachment 6), the DTR refers to "Post-Remediation Monitoring" (see Section 34.2). This report uses the term "Post Remedial Monitoring" to refer to requirements in both the TCAO and DTR.

For example, one ROA that should be adopted is "to prevent exposure to whole sediments that are sufficiently contaminated to pose moderate or high risks to benthic invertebrates." The numerical targets that should be established to assess attainment of the RAO would be the SQGQ1 values that were used in the SQT evaluation (i.e., 0.25-1.0 for moderate exposure and ≥1.0 for high exposure) and/or the revised thresholds for sediment toxicity set out in Table 6 of this document.

F.2.2 It is not clear that attainment of the Remedial Goals presented in Section D.3.c.1 (Year 2), D.3.c.2 (Year 5), and D.3.c.3 (Year 10) of the TCAO ensure that San Diego Bay beneficial uses will not be unreasonably affected by sediment-associated contaminants at the Shipyard Sediment Site.

The stated Remedial Goals are inadequate for several reasons, including:

- Statistical comparison of the toxicity testing results to the results obtained for reference stations is likely to underestimate sediment toxicity because several stations were included in the reference pool for amphipods and sea urchins that did not meet negative control criteria and because the reference pool for bivalve development is limited to four samples. *See* Finding 17 of the DTR. In short, the thresholds for identifying toxic sediment samples are inappropriate. In addition, some of the protocols for conducting these toxicity tests have been refined since the reference data were generated. Therefore, a better approach would be to generate Sediment Quality Triad data for at least six reference stations as part of the Post Remedial Monitoring program. In this way, the reference data would be directly comparable to the data collected at the site. Toxicity testing should be conducted within numerous polygons located within and outside the Proposed Remedial Footprint to determine if benthic invertebrates are adequately protected. Sediment samples for defining current reference conditions and for evaluating

- Reduction of bioaccumulation levels below the pre-remedial levels would not ensure that aquatic organisms utilizing habitats at the site would have tissue COC concentrations low enough to support beneficial uses. In other words, implementing the remedial goal for bioaccumulation to achieve lower tissue concentrations does not ensure that the bioaccumulation levels are low enough. Therefore, the bioaccumulation data should be evaluated relative to the risks that are posed to aquatic-dependent wildlife and human health associated with exposure to COCs in the tissues of aquatic organisms.

F.2.3 The procedures that are prescribed for calculating Site-Wide SWACs will not provide the data required to determine the concentrations of COCs within each polygon at the Shipyard Sediment Site.

This is important because certain ecological receptors—including benthic invertebrates and certain benthic fish species, such as gobies—have small home ranges and are therefore exposed to contaminants that occur within small geographic areas. The sediment sampling requirements described in paragraphs 1 to 5 of Section D.1.c of the TCAO will provide data on the average levels of COCs in the top 2 cm of sediment contained within six polygon groups only. Additional data on COC concentrations will be generated only if archived sediment samples are analyzed in the future. This means that the data needed to evaluate the spatial extent of attainment of conditions that support beneficial uses will not be available. Importantly, neither the TCAO nor the DTR adequately explain the rationale for when additional data will be generated for the polygon groups.

F.2.4 Compositing surface sediment into six polygon groups is inappropriate because it will mask the true extent of contamination remaining at the Shipyard Sediment Site.

The DTR explains that the goal of the Post Remedial Monitoring program is to verify that remaining pollutant concentrations in the sediments will not unreasonably affect San Diego Bay beneficial uses. The DTR divides the Shipyard Sediment Site into six sampling areas and then directs the Dischargers to use a compositing scheme to evaluate the efficacy of the remediation. This process has significant problems for several reasons.

First, only two of the six groups represent areas where remedial actions will be taking place, and these areas represent a relatively small proportion of the site as a whole. Therefore, the assessment of how successful the clean-up has been will largely rest on composite data from sites that were not remediated. This is an inappropriate basis for evaluating the efficacy of remedial actions.

Second, the six sampling areas are arbitrary. Neither the TCAO nor the DTR provide any explanation of how the six sampling areas were selected, nor do the documents describe how this is a scientifically-defensible method to assess remediation success. I am not aware of any other sediment-contaminated site in the United States that has utilized an investigative sampling program, confirmation sampling program, or post-remedial sampling program that relies on preparation of composite sediment samples using the procedures described in the TCAO. Without a detailed, scientifically-based explanation of how the sites were selected and how it would accurately gauge remediation success, this sampling method is not scientifically justified and is arbitrary.

Third, the Post Remedial Monitoring plan is likely to create a number of practical challenges for a field sampling team. These challenges include ensuring that the correct volume of material is collected from each of the sampling stations and ensuring that these materials are correctly mixed to create six composite sediment samples. Such a program would require careful oversight by regulators to ensure that it is conducted correctly and is unlikely to provide reliable information for determining if the clean-up goals have been met.

Fourth, the Post Remedial Monitoring plan only requires samples for 65 of the 66 polygons in the Shipyard Sediment Site. The Post Remedial Monitoring plan does not require collection of samples from NA22 and excludes NA22 wholesale from the Post Remedial Monitoring plan. NA22 must be included in any Post Remedial Monitoring because it is a part of the Shipyard Sediment Site, regardless of the decision to exclude it from the remedial footprint in the hope that after the Chollas Creek TMDL is completed, another process may be initiated to address existing contamination within NA22.

F.2.5 The 0-2 cm horizon is not the appropriate sediment depth to sample to evaluate attainment of conditions that support beneficial uses.

At most sites, the 0 - 10 cm horizon is sampled to represent conditions in the biologically-active zone. Without further information on the depth of the biologically-active zone within San Diego Bay—not just within the contaminated portions of the Shipyard Sediment Site—is selection of the 0-2 cm horizon as the target sampling depth is not scientifically justified and is arbitrary. The Post Remedial Monitoring program should require samples be collected in the 0-10 cm horizon.

F.2.6 Collecting replicate sub-samples of composite sediment sample is not an appropriate method of evaluating the effectiveness of remedial monitoring COC.

The goal of the Post Remedial Monitoring plan, as described in section 34.2.1 of the DTR, is to verify whether the remediation has been effective in protecting human health and aquatic-dependent wildlife. However, the plan described will not provide the data to draw these conclusions. As written, the plan relies on sub-sampling sediments that have been composited from multiple polygons. This approach will only provide information on the consistency of the homogenization process that is applied to the composite sediment samples. It is therefore an acceptable part of a lab quality assurance plan but it is not an effective approach to analyze variability of COCs at the site post-remediation. Thus, this sub-sampling approach will not provide Regional Board staff with the information necessary to determine whether remediation has been effective at protecting human health or aquatic-dependent wildlife. Any monitoring required should include data that evaluates the level of variability of COC concentrations within individual polygons, within polygon groups, and within the site as a whole.

F.2.7 Trigger Concentrations for Primary COCs that are presented in Section D.1.c.6 of the TCAO and Table 34-1 of the DTR will not effectively identify conditions at the Shipyard Sediment Site that unreasonably affect San Diego Bay beneficial uses.

The Trigger Concentrations are likely to be relatively unhelpful in this respect because they are not based on the concentrations of COCs that need to be achieved to support attainment of the beneficial uses. Rather, they represent a statistical construct that is rationalized based on the assumed variability in COC concentrations at the site. The ineffectiveness of the triggers is demonstrated by the Trigger Concentration for mercury, which is higher than the pre-remedy SWAC of mercury at the Shipyard Sediment Site. It does not make any sense to have Trigger Concentrations, that are intended to provide a basis for determining if further action is needed, that exceed existing concentrations. Even though mercury bioaccumulation is a serious concern at this site, the only way further action can be triggered based on mercury concentrations is if the dredging somehow made the polygons more contaminated than they are today. It is more logical to set the Trigger Concentrations at the predicted post-remedy SWACs, particularly since the triggers are being compared to SWACs calculated based on compositing of sediment samples from 66 sampling stations.

F.2.8 Neither the TCAO nor the DTR provided the rationale for collecting sediment samples at nine sampling stations—SW04, SW08, SW13, SW21, SW28, NA06, NA11, NA12, and NA20—to support bioaccumulation testing.

The TCAO and the DTR should be revised to provide the underlying rationale that was used to select the nine sampling stations for bioaccumulation testing. In addition, there is a need to measure the concentrations of bioaccumulative COCs in both tissue and sediment to interpret the results of these tests. If a 56-day time-to-steady-state bioaccumulation test has not yet been conducted at the Shipyard Sediment Site, such a test should be conducted on one or more sediment samples to support interpretation of the data generated from the 28-day bioaccumulation tests.

F.2.9 The criteria presented in the TCAO for interpreting the results of the bioaccumulation tests—"bioaccumulation should be below pre-remediation levels"—are not effects-based. Because the criteria are not effects-based, they will not be useful for determining if conditions at the Shipyard Sediment Site will be unreasonably affecting San Diego Bay beneficial uses two years, five years, or ten years after the completion of remedial actions.

In addition, it is not clear how the results of these bioaccumulation tests would be used to inform decisions on the need for further actions at the site. Therefore, the TCAO and the DTR should be revised to describe how the bioaccumulation testing results will be used to identify conditions at the Shipyard Sediment Site that unreasonably affect San Diego Bay beneficial uses. In addition, these documents need to describe how the results from bioaccumulation testing will be used to determine if further action is required at the site.

F.2.10 The requirements for collecting and analyzing sediment samples for evaluating sediment chemistry for benthic exposure and sediment toxicity are inadequate.

The TCAO and DTR indicate that sediment samples are to be collected at a total of five sampling stations—SW04, SW13, SW22, SW23, and NA06—and analyzed for total metals, PAHs, PCBs, and TBT. This is inadequate because it will provide data on only about eight percent of the polygons at the Sediment Shipyard Site. No data for assessing benthic exposure will be collected for 61 of the 66 polygons at the site. As there is substantial potential for resuspension, transport, and deposition of fine sediment during the implementation of the remedy, recontamination of remediated areas or further contamination of unremediated areas could occur.

Therefore, this component of the Post Remedial Monitoring program must be expanded to provide a more robust basis for evaluating exposure of benthic invertebrates to contaminants at the site and for assessing sediment toxicity. To do so, sediment samples must be tested from appropriate selected reference areas. The DTR and TCAO should explicitly identify which protocols need to be used to evaluate toxicity to each indicator species. It addition, the list of analytes should be expanded to include simultaneously-extracted metals, acid-volatile sulfides, additional organotins, and organochlorine pesticides. These additional variables need to be measured to support a robust evaluation of the potential for adverse effects on benthic invertebrates.

F.2.11 Neither the TCAO nor the DTR present decision rules that describe how the sediment chemistry data generated in the Post Remedial Monitoring program will be used to inform decisions on the need for further actions at the site.

While the TCAO indicates that sediment chemistry should be below the SS-MEQ and 60% LAET thresholds, no decision rules are presented that describe the actions that must be taken if the thresholds are exceeded. Therefore, the TCAO and the DTR should be revised to describe how the sediment chemistry results will be used to identify conditions at the Shipyard Sediment Site that unreasonably affect San Diego Bay beneficial uses and to determine if further action is required at the site. In addition, these documents need to list the triggers that will be used for evaluating sediment chemistry for benthic exposure; they should explicitly identify the SS-MEQ thresholds and 60% LAET thresholds that trigger further action. Again, it is unclear why the remedial tools used to evaluate sediment chemistry for the Triad stations—SQGQ1 and frequency of exceedance of SQGs–have been abandoned in favor of the SS-MEQ and 60% LAET values.

F.2.12 Neither the TCAO nor the DTR present decision rules that describe how the sediment toxicity data generated in the Post Remedial Monitoring program will be used to inform decisions on the need for further actions at the site.

While the DTR describes the procedures that were used to interpret sediment toxicity for the purpose of establishing the remedial footprint, no decision rules are presented that describe the actions that must be taken if toxicity to one or more species is observed. Therefore, the TCAO and the DTR should be revised to describe how the sediment toxicity results will be used to identify conditions at the Shipyard Sediment Site that unreasonably affect San Diego Bay beneficial uses and to determine if further action is required at the site. In addition, these documents need to list the triggers that will be used to evaluate the sediment toxicity data. See Table 6 of this document for recommended thresholds for sediment toxicity.

F.3 Conclusions Regarding the Post Remedial Monitoring Requirements

Post Remedial Monitoring represents an essential component of any sediment remediation project. While the requirements set forth in Section D of the TCAO provide some of the guidance needed to ensure that the Dischargers develop and implement an effective Post Remedial Monitoring program, these requirements have a number of deficiencies that, if not corrected, will result in data gaps and uncertainties relative to the effects of contaminated sediments on San Diego Bay beneficial uses. Therefore, the requirements for Post Remedial Monitoring presented in the TCAO and DTR must be revised. Some of the revisions that are needed include:

F.3.1 Narrative remedial action objectives and specific indicators of attainment of those objectives (i.e., targets for specific metrics) should be included in the TCAO.

F.3.2 Sediment samples should be collected from all 66 polygons and evaluated for sediment chemistry to provide the data needed to determine if the site-wide SWAC for the five priority COCs have been met. The sediment samples should not be composited.

F.3.3 Sediment samples for evaluating attainment of the Alternative Clean-Up Levels should be collected from the 0 - 10 cm horizon to better reflect the biologically-active zone in San Diego Bay.

F.3.4 Trigger concentrations should be revised to correspond to the post-remedy SWACs for the five primary COCs.

F.3.5 The rationale for selecting the nine sampling locations for bioaccumulation testing should be provided. In addition, bioaccumulation testing should include a 56-day time-to-steady-state test to support interpretation of the bioaccumulation data.

F.3.6 Biological-effects based criteria should be established for interpreting the results of the bioaccumulation tests.

F.3.7 The number of polygons that are sampled for evaluating sediment chemistry, sediment toxicity, and benthic invertebrate community structure must be increased to include all of the polygons included in the Proposed Remedial Footprint and all of the polygons that are located adjacent to the footprint polygons. Such sampling is required to demonstrate that the Alternative Clean-Up Levels for aquatic organisms have been met throughout the site, not just at five pre-selected locations.

F.3.8 The decision rules that will be used to determine the need for further actions, based on the results of the Post Remedial Monitoring Program, must be clarified. It is inappropriate to empower the Dischargers to make recommendations ***after*** the Post Remedial monitoring data have been collected. This is not in the public interest.

G. Expert Opinion #5: Trigger Exceedance Investigation

The Trigger Exceedance Investigation and Characterization process, described in Section D.4 of the TCAO, will not provide a basis for compelling the Dischargers to conduct further remediation to achieve clean-up goals at the Shipyard Sediment Site.

G.1 Overview of the Trigger Exceedance Investigation and Characterization Process

Section D.4 of the TCAO describes the process that will be undertaken by the Dischargers if one or more exceedances of the post-remediation Site-Wide SWAC Trigger Concentrations are observed based on the results of Post Remedial Monitoring. In this event, the Dischargers must conduct a trigger exceedance investigation and characterization study to determine the cause(s) of the exceedance. The approaches that may be used in the study include:

- Recalculating the 95% UCL by incorporating more recent sampling data;
- Identifying specific sub-areas that caused the exceedance;
- Evaluating changes in site conditions that could have resulted from disturbances since the previous sampling; and/or,
- Analyzing archived samples used to prepare composite samples for the specific COC(s) that exceed the 95% UCL.

After completing the study, the Dischargers are to submit a report that describes the results of the investigation and, if the exceedances are deemed to be significant, include recommendations for addressing the exceedances. Approaches for addressing exceedances could include re-sampling the affected area, re-dredging, natural recovery, re-analysis following the next scheduled sampling event, or other appropriate methods.

G.2 Deficiencies of the Trigger Exceedance Investigation and Characterization Process

The TCAO sets out the process that the Dischargers must follow if the Post Remedial Monitoring Program shows exceedances of the Site-Wide SWAC Trigger Concentrations. The Trigger Exceedance Investigation and Characterization process is an important enforcement tool because it provides a mechanism for addressing any issues that arise after remediation is completed, if the remedial measures were not sufficiently effective to achieve the clean-up goals for the site. This process is essential at the Shipyard Sediment Site because the proposed clean-up is likely to be only marginally protective of beneficial uses and the requirements for Remediation Monitoring are not sufficiently rigorous to ensure that the clean-up goals have been met at the site. However, the Trigger Exceedance Investigation and Characterization process as set forth in the TCAO and DTR fails to function as an effective enforcement mechanism for the following reasons:

G.2.1 Exceedance of the Trigger Concentrations does not trigger further remedial actions.

Exceedance of one or more Trigger Concentrations triggers an investigation to identify the specific sub-areas that are causing the exceedance(s), instead of automatically triggering additional clean-up. The investigation could involve one or more of the four approaches described in the TCAO, such as recalculating 95% UCLs, identifying specific subareas that are causing exceedances, evaluating the effects of spills and other sources, and analyzing archived samples. The results of such investigations must be described in a Trigger Exceedance Investigation and Characterization report. The report must include recommendations for addressing the exceedances, such as conducting additional sampling, re-dredging, natural recovery, continued Post Remedial Monitoring, or other methods. By giving the Dischargers discretion to follow-up on exceedances of Trigger Concentrations using various methods other than additional clean-up, it is virtually certain that additional remedial work will not be conducted at the site following completion of the remedy.

G.2.2 The DTR and TCAO fail to establish Trigger Concentrations based on the Alternative Clean-Up Levels for aquatic life.

The DTR and TCAO only establish Trigger Concentrations based on the Alternative Clean-Up Levels for aquatic-dependent wildlife and human health. As a result, the Trigger Exceedance Investigation and Characterization process ignores exceedances of the effect thresholds for benthic invertebrates and the potential effects on fish associated with exposure to contaminated sediments and/or consumption of contaminated prey.

G.2.3 Trigger Concentrations have been established for five COCs only.

The Trigger Exceedance Investigation and Characterization process ignores exceedances of toxicity thresholds for other chemicals that could be adversely affecting aquatic organisms or other ecological receptors. This is important because arsenic, lead, and zinc were identified as risk drivers for aquatic-dependent wildlife and/or human health. In addition, Trigger Concentrations were established for HPAHs, yet benzo(a)pyrene (BAP) was identified as a key risk driver for aquatic-dependent wildlife and human health. By considering all HPAHs, rather than BAP alone, the potential effects associated with exposure to BAP may be masked.

G.2.4 The Trigger Concentrations that have been established may not provide an effective basis for evaluating the potential for adverse effects on San Diego Bay beneficial uses because they are statistically-based values, rather than effect-based values.

This limitation is emphasized by the Trigger Concentration for mercury (0.78 mg/kg DW), which is higher than the pre-remedy SWAC for this substance (0.75 mg/kg DW). By establishing a Trigger Concentration that is higher than existing concentrations, it is certain that no additional work will be conducted to address issues related to mercury at the site. Yet, mercury is known to be a problem at the Shipyard Site. This example emphasizes that insufficient care and attention has been used to establish the Trigger Concentrations.

G.3 Conclusions Regarding the Trigger Exceedance Investigation and Characterization Process

The Trigger Exceedance Investigation and Characterization process is the one tool that the San Diego Regional Board has to compel the Dischargers to implement the remedial activities set forth in the TCAO and DTR. However, the Trigger Exceedance Investigation and Characterization process, as described in

Section D.4 of the TCAO, does not provide a basis for compelling the Dischargers to conduct further remediation to achieve clean-up goals at the Shipyard Sediment Site. Added to the inadequacies of Remediation Monitoring and Post Remedial Monitoring requirements, the impotence of the Trigger Exceedance Investigation and Characterization process results in a proposed clean-up that is likely to be only marginally protective of beneficial uses. Therefore, this process needs to be revised to ensure that the San Diego Regional Board has the tools it needs to protect the public interest at the Shipyard Sediment Site. Key refinements that are needed to this process include:

TABLE 4. RECOMMENDED TRIGGER CONCENTRATIONS

Metric	Concentration/Value
Copper	159 mg/kg[1]
Mercury	0.68 mg/kg[1]
HPAHs	2,451 µg/kg[1]
PCBs	194 µg/kg[1]
TBT	110 µg/kg[1]
Arsenic	8.7 mg/kg[1]
Cadmium	0.2 mg/kg[1]
Lead	66 mg/kg[1]
Zinc	221 mg/kg[1]
Control-Adjusted Survival of Amphipods	82%[2]
Control-Adjusted Normal Development of Bivalves	76%[2]
Control-Adjusted Fertilization of Echinoderms	70%[2]

[1]From DTR Table 33-8
[2]From Table 6 of this document

G.3.1 The Dischargers should not be given authority to make recommendations regarding the actions that will be taken to address exceedances of the Trigger Concentrations. Rather, the San Diego Regional Board must retain the authority to review the data and make such decisions.

G.3.2 To the extent possible, the TCAO should clearly identify the actions that need to be taken if the Trigger Concentrations are exceeded. While it may not be possible to identify the required actions for all contingencies on an *a priori* basis, certain decision rules should be established in the TCAO. For example, step-out sampling to determine the size of the area that requires re-dredging should be required if conditions sufficient to impact the benthic community are identified within one or more polygons.

H. Summary of Recommendations

The TCAO and the DTR provide a great deal of valuable information for identifying the remedial actions needed to address impacts on designated uses associated with the presence of contaminants at the Shipyard Sediment Site. However, there are a number of important deficiencies in these documents that have the potential to compromise the effectiveness of the clean-up and the monitoring programs that will be conducted to assess its sufficiency. The following recommendations are provided to assist the San Diego Regional Board in revising the TCAO and DTR in a manner that serves the long-term public interest relative to the Shipyard Sediment Site:

H.1 Expand the Proposed Remedial Footprint to include all of the polygons that meet the selection criteria established in the TCAO and DTR. The highest priority additional polygons for inclusion in the remedial footprint include: NA01, NA04, NA07, NA16, NA22, SW06, SW18, SW29.

H.2 Revise the Remediation Monitoring requirements to dictate surface-water sampling locations and timing, to compel the Discharger to collect data on additional chemicals, to identify the water quality standards that must be met for each chemical, and to establish the steps that must be taken if the water quality standards for one or more chemicals are exceeded during remediation.

H.4 Revise the Remediation Monitoring requirements to dictate sediment sampling locations, to specify target sampling depths, and to require that multiple samples be collected from each SMU.

H.5 Revise the Remediation Monitoring requirements to clarify the decisions rules that will be used to determine if sufficient dredging has been conducted within each SMU.

H.6 Revise the Post Remedial Monitoring requirements to clearly state narrative remedial action objectives, to eliminate the collection of composite sediment samples, to include collection and analysis of sediment samples from each polygon, to modify the target sampling depth to 0 - 10 cm, to include chemical analysis of sediment samples collected from all 66 polygons, and to require toxicity for all polygons located within and adjacent to the Proposed Remedial Footprint.

H.7. Revise the Trigger Exceedance Investigation and Characterization process to ensure that the triggers are not higher than existing levels of contaminants at the site, that triggers for additional contaminants are included, that triggers that consider effects on benthic invertebrates and fish are established, and that the remedial actions that must be undertaken if the triggers that are exceeded are clearly described.

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TABLE 5. CHEMICAL AND TOXICOLOGICAL CHARACTERISTICS FOR POLYGONS THAT POSE UNACCEPTABLE RISKS TO FISH

Metric	Threshold Value	NA01	NA04	NA07	NA16	SW06	SW18	SW29
Composite SWAC Ranking Value[1]	5.5	6.8	6.4	9.9	6.7	7.2	6.7	7.5
SS-MEQ[2]	0.9	0.73	0.62	0.97	0.71	0.7	0.68	0.8
P_{max} for Sediment Chemistry[3]	0.49	0.76 (H)	0.74 (H)	0.72 (H)	0.77 (H)	0.69 (H)	0.69 (H)	0.66 (H)
Substances Exceeding SQGs for Sediment[4]	0	mercury, PCBs	mercury	mercury, PCBs	mercury, PCBs	mercury, PCBs	mercury, PCBs	mercury, PCBs
Substances Exceeding WQCs in Pore Water[5]	0	copper, PCB	ND	ND	lead, PCBs	ND	ND	ND
Control-Adjusted Survival of Amphipods[5]	82%	80% (S)	80% (S)	74% (S)	90% (S)	ND	74% (S)	ND
Control-Adjusted Normal Development of Bivalves[3]	76%	49% (S)	84% (S)	88% (S)	3% (S)	ND	64% (S)	ND
Control-Adjusted Fertilization of Echinoderms[3]	70%	86% (S)	88% (S)	102% (S)	84% (S)	ND	83% (S)	ND
Hazard Quotient for Fish ([PCB]/TRV)[3]	1	.25	.77	.16	.24	.05	1	2.59
Number of Criteria Exceeded		7	5	6	6	4	6	4

ND = no data; S = survival; TRV = tissue residue value; SQGs = sediment quality guidelines; WQC = water quality criteria; PCB = polychlorinated biphenyls; H = high; SWAC = surface-area weighted average concentration; P_{max} = maximum probability model.
[1]From Table A33-1 of DTR
[2]Calculated independently using the data in Table A33-3 of the DTR
[3]From MacDonald (2009)
[4]From DTR

TABLE 6. INDIVIDUAL STATION CHARACTERISTICS, SUMMARY STATISTICS, AND 95% LOWER PREDICTIVE LIMITS FOR CONTROL ADJUSTED AMPHIPOD SURVIVAL (%), BIVALVE DEVELOPMENT (% NORMAL), AND URCHIN FERTILIZATION (%) IN THE REFERENCE POOL (TABLE 18-7 OF THE DTR).

Station	Amphipod Survival	Bivalve Development[1]	Urchin Fertilization
CP 2231	76		66
CP 2238	90		36
CP 2243	84		97
CP 2433	84		100
CP 2441	82		102
SY 2231	84	93	99
SY 2243	92	66	92
SY 2433	96	101	79
SY 2441	95	70	90
2235	7		
2241	98		
2242	92		
2243	96		
2256	100		
2257	91		
2258	92		
2260	73		
2265	85		
N	18	4	9
Minimum	71	66	36
Maximum	100	101	102
Mean	88	82.5	85
Std Dev	8.4	17.1	22
RSD	10%	21%	26%
95% PL	72.9	37.4	41.9

[1]The 95% predictive limit for bivalve endpoint is calculated using the same methodology described in SCCWRP and U.S. Navy 2005b. The supporting calculation is provided in the Appendix to Section 18

TABLE 7. RECALCULATION OF REFERENCE ENVELOPES FOR THE TOXICITY TESTS USED AT THE SHIPYARD SEDIMENT SITE [1]

Station	Amphipod Survival	Bivalve Development	Urchin Fertilization
CP 2231	76 (excluded)		66 (excluded)
CP 2238	90		36 (excluded)
CP 2243	84		97
CP 2433	84		100
CP 2441	82		102
SY 2231	84	93	99
SY 2243	92	66	92
SY 2433	96	101	79
SY 2441	95	70	90
2235	7 (excluded)		
2241	98		
2242	92		
2243	96		
2256	100		
2257	91		
2258	92		
2260	73 (excluded)		
2265	85		
N	15	4	7
Minimum	82	66	79
Maximum	100	101	102
San Diego Bay Reference Envelope[2]	82-100%	Insufficient Data	79-102%
California SQOs - Non Toxic or Low Toxicity	82-100%	77-100%	None Available

SQOs = sediment quality objectives
[1]Sediment samples from the site with lower survival, development or fertilization than the lower of the reference envelope would be classified as toxic.
[2] Lower limit of reference envelope was calculated as the minimum survival for samples that met test acceptability criteria (i.e., 80% control-adjusted survival).

Exhibit B

San Diego Coastkeeper and Environmental Health Coalition

EXHIBIT B

Coastkeeper/EHC Table 1. Description of DTR Figure 31-1 by Cost Scenarios and Polygons

"Remediation Dollars Spent" in Table 31-1	Cost Scenarios	Additional Polygons	Total Polygons
$0 - $24	1, 2	12	12
$24 - $33	3	6	18
$33 -$45	4	6	24
$45 - $185	5, 6, 7, 8, 9	30	54
$185- $288	10, 11	12	66

Data source: DTR § 31, Appendix 31

Exhibit C

San Diego Coastkeeper and Environmental Health Coalition

Remediation Dollars Spent	Percent of Exposure Reduction Per $10 Million
$0-13.5	12.50%
$14 - $24	12.4%
$24 - $33	12.0%
$33 - $45	6.6%
$45-$69.5	4.9%
$69.5 -85.3	7.1%
$85.3 -$101.6	6.3%
$101.6 - $155.2	2.6%
$155.2 -$185	1.9%
$185- $238	0.6%
$238- $288	-0.8%

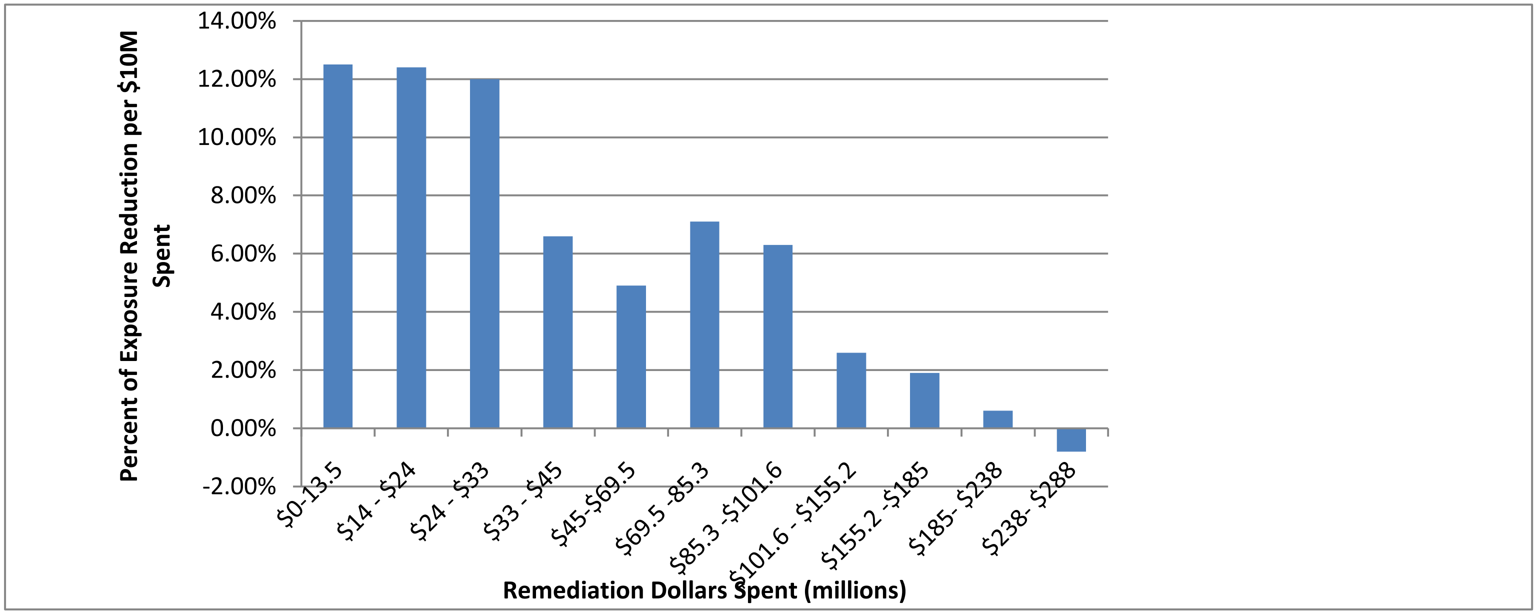


Exhibit D

San Diego Coastkeeper and Environmental Health Coalition

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SAN DIEGO REGION

In the matter of Tentative Cleanup and Abatement Order No. R9-2011-0001 (Formerly R9-2010-0002) Shipyard Sediment Cleanup	Regional Board Cleanup Team's Responses & Objections to Designated Parties Environmental Health Coalition's and San Diego Coastkeeper's Questions Concerning Economic Feasibility

Propounding Parties: Environmental Health Coalition and San Diego Coastkeeper (collectively "EHC/Coastkeeper")

Responding Party: California Regional Water Quality Control Board, San Diego Region Cleanup Team (the "Cleanup Team")

Set Number: One (1)

Pursuant to the Presiding Officer's February 18, 2010 Order Issuing Final Discovery Plan for Tentative Cleanup and Abatement Order No. R9-2010-0002 and Associated Draft Technical Report, the Presiding Officer's October 27, 2010 Order Reopening Discovery Period, Establishing Discovery Schedule, and Identifying Star and Crescent Boat Company as a Designated Party for Purposes of Tentative Cleanup and Abatement Order R9-2011-0001 (the "10.27.10 Order"), the Parties' August 9, 2010 Stipulation Regarding Discovery Extension, the Cleanup Team's agreement with EHC/Coastkeeper to respond to certain questions concerning economic feasibility issues after the discovery cut off, and all applicable law, the Cleanup Team, hereby responds and objects to EHC/Coastkeeper's economic feasibility questions as follows:

GENERAL STATEMENT OF OBJECTIONS

The Cleanup Team makes the following general objections, whether or not separately set forth in response to each Interrogatory, to each and every economic feasibility question by EHC/Coastkeeper, all as set forth herein and incorporated specifically into each of the responses below:

1. Privilege Objection. The Cleanup Team objects to each question to the extent it requests information protected by the attorney-client privilege, joint prosecution privilege, common interest privilege, mediation privilege, official information privilege and/or deliberative process privilege, and to the extent it requests information subject to the work-product exemption, collectively referred to herein as the "privilege" or "privileged." The Cleanup Team contends that all communications exchanged between it and its counsel are privileged. The Cleanup Team objects to identifying or producing any and all products of investigations or inquiry conducted by, or pursuant to the direction of counsel, including, but not limited to, all products of investigation or inquiry prepared by the Cleanup Team in anticipation of this proceeding, based on the attorney-client privilege and/or the work-product doctrine. The Cleanup Team further objects to providing information subject to or protected by any other privilege, including, but not limited to, settlement communications, the joint prosecution privilege, the common interest privilege, the mediation privilege, the official information privilege and/or the deliberative process privilege. Inadvertent provision of privileged information shall not constitute a waiver of said privileges.

2. Scope of Discovery Objection. The Cleanup Team objects to each question to the extent it purports to impose any requirement or discovery obligation other than as set forth in Title 23 of the California Code of Regulations, sections 648 et seq., the California Government Code, sections 11400 et seq. and/or applicable stipulations, agreements and/or orders governing this proceeding, including, but not limited to, the limitations on the proper scope of discovery set forth in the 10.27.10 Order, and the Cleanup Team's agreement with EHC/Coastkeeper to provide responses to written deposition questions concerning economic feasibility after the discovery cut off. The Cleanup Team further objects to each question to the extent it calls for speculation about analyses not performed by the Cleanup Team and/or poses incomplete or irrelevant hypothetical questions.
3. Irrelevant Information Objection. The Cleanup Team objects to each question to the extent it is overbroad and/or seeks information that is not relevant to the claims or defenses asserted in this proceeding and is not reasonably calculated to lead to the discovery of admissible evidence.
4. Burdensome and Oppressive Objection. The Cleanup Team objects to each question to the extent it purports to require the Cleanup Team to perform analyses it has not performed and/or to the extent it requires the Cleanup Team to engage in hypothetical scientific analyses. The inquiry in this proceeding is whether the Cleanup Team's analyses and recommendations in the TCAO and DTR are supported by substantial evidence. In the event EHC/Coastkeeper believe different analyses should be undertaken, the burden of so

doing is equal or less on EHC/Coastkeeper than it would be on the Cleanup Team.

5. Cleanup and Abatement Order Proceeding is Ongoing. The instant Cleanup and Abatement Order proceeding is ongoing, and the Cleanup Team expects that additional evidence will be provided by the Designated Parties hereto in accordance with governing statutes, regulations and applicable hearing procedures. While the Cleanup Team's response to each of these questions is based on a reasonable investigation and search for the information requested as of this date, additional information and evidence may be made available to or otherwise obtained by the Cleanup Team subsequent to the date of this response. These responses are provided without prejudice to the Cleanup Team's right to supplement these responses, or to use in this proceeding any testimonial, documentary, or other form of evidence or facts yet to be discovered, unintentionally omitted, or within the scope of the objections set forth herein.

RESPONSES TO ECONOMIC FEASIBILITY QUESTIONS

1. Section 31 of the DTR states: "Further expenditures eventually reach a point where exposure reduction benefits become negligible."

a. Please define "negligible" as used in this context.

The term "negligible" is used as defined in Webster's New World Dictionary, Third College Edition: *"…can be neglected or disregarded because [it is] small, unimportant, etc. ; trifling."*

b. Please identify the exact "point where exposure reduction benefits become negligible."

The point where exposure reduction benefits become negligible is the point where the incremental cost of achieving further reductions in contaminant concentrations exceeds the incremental benefit of so doing. The objective of Section 31 is to determine whether achieving background sediment quality is

economically feasible – not what the cleanup levels will be. Accordingly, Section 31 does not and need not identify an exact point where exposure reductions become negligible. The Cleanup Team will not undertake this analysis since the burden of so doing is equal or less on EHC/Coastkeeper and substantial evidence in the record supports its conclusion that cleanup to background is not economically feasible

c. Please fully explain the basis for choosing the exact point "where exposure reduction benefits become negligible," including any and all evidence to support that basis.

The objective of Section 31 is to determine if achieving background sediment quality is economically feasible. Section 31 does not and need not identify an exact point where exposure reductions become negligible. The question appears to conflate the determination of whether cleanup to background is economically feasible with the determination of alternative cleanup levels. The bases for the Cleanup Team's recommended alternative cleanup levels are set forth in detail in Section 32 of the DTR.

2. Section 31 of the DTR states: "Beyond $33 million, however, exposure reduction drops consistently as the cost of remediation increases."

a. Please explain the meaning of "consistently" as used in this context.

There may be some confusion because of an ambiguous sentence in the DTR. That quoted sentence really should have read: "Beyond $33 million, however, exposure reduction per dollar spent drops consistently as the cost of remediation increases." It does mean a trend, but not necessarily a continuous trend for every COC for every polygon removed. Benefits per unit cost do consistently go down, but not continuously. Accordingly, in this context consistently means with regularity. The amount of exposure reduction per unit cost continues to decrease (i.e. drop). In other words, at no point does each additional dollar spent result in greater exposure reduction than the previous dollar spent.

i. If you deny that when the exposure reduction of each scenario is plotted individually, the exposure reduction does not drop "consistently" as the cost of the remediation increases, please explain the basis for your denial.

See response to 2.c. above and the table below. The second to last column "Incremental Exposure Reduction per $10 million" reflects the result using the incorrect assumption that each scenario only includes 6 polygons, as indicated in the request for admission 2.c. The last column "Cumulative Exposure Reduction per $10 million" is based on the correct assumption that the scenarios are cumulative.

Note that, in addition to the responses above, another reason the "Incremental Exposure Reduction per $10 million" does not appear to drop

consistently when incorrectly assuming that each scenario consists of only remediating 6 polygons is that the polygons have different volumes (i.e. surface area and depth). Therefore, a larger volume polygon with lower concentrations (lower SWAC) has less incremental exposure reduction per $10M than a small volume polygon with the same or higher concentrations (higher SWAC).

Scenario	Number of Ranked Polygons	Incremental Probable Likely Cost per million	Cumulative Probable Likely Cost per million	Incremental Exposure Reduction per $10 million*	Cumulative Exposure Reduction per $10 million**
1	6	$13.5	$ 13.5	12.5%	12.5%
2	12	$10.8	$ 24.3	12.3%	12.4%
3	18	$08.6	$ 32.9	12.0%	12.3%
4	24	$12.0	$ 44.9	6.6%	10.8%
5	30	$24.5	$ 69.4	4.9%	8.7%
6	36	$15.8	$ 85.2	7.1%	8.4%
7	42	$16.3	$ 101.5	6.3%	8.1%
8	48	$53.6	$ 155.1	2.6%	6.2%
9	54	$29.7	$ 184.8	1.9%	5.5%
10	60	$53.1	$ 237.9	0.6%	4.4%
11	66	$50.3	$ 288.2	-0.8%	3.5%

*** Based on the incorrect assumption that each scenario consists of only 6 polygons.**

****Based on the correct assumption that each scenario includes all previous polygons.**

3. Section 31 of the DTR states: "Exposure reduction drops below 7 percent per $10 million spent after $33 million and below 4 percent after $45 million."

a. Please admit that, when the exposure reduction per $10 million spent is plotted for each 6-polygon scenario individually, exposure reduction does not drop below 4 percent until after $101 million spent.

See response to question 2.c. above. Also, in accordance with SWRCB Resolution 92-49, the objective of DTR Section 31 was to look at incremental cost (i.e. additional dollars spent) versus incremental benefit (i.e. additional exposure reduction). Plotting the scenarios individually and comparing them does not evaluate the <u>incremental</u> cost versus the <u>incremental</u> benefit on a cumulative basis. In other words, The Cleanup Team approach is based on a "worst first" approach – removing the most contaminated polygons prior to removing less contaminated polygons. We did not and were not required to evaluate the option of individually removing each of the 6-polygon scenarios. The Cleanup Team will not undertake this analysis since the burden of so doing is equal or less on EHC/Coastkeeper than it is on the Cleanup Team and, in any event, because substantial evidence in the record supports its conclusion that cleanup to

background is not economically feasible. The question further appears to conflate the determination of whether cleanup to background is economically feasible with the determination of alternative cleanup levels. The bases for the Cleanup Team's recommended alternative cleanup levels are set forth in detail in Section 32 of the DTR.

The following questions relate to Table A31-2 of Appendix 31 to the DTR.

4. Please explain the meaning of the term "sur" in the column labeled "Depth to Clean (ft)2."

In these polygons only surface data is available (i.e. no core data). When there is no core data available within a polygon to evaluate the "depth to clean", the core data from the nearest polygon(s) were used to interpolate the depth to clean.

5. Please explain why, for rows where "Depth to Clean (ft)2" is listed as "sur," the number in the "Dredging Depth (ft)" column varies.

See response to question 4 above.

6. Specifically, for SW05, "Depth to clean" is "sur" while the "Dredging Depth" is 5; for SW23, "Depth to clean" is "sur" while the "Dredging Depth" is 3; and for NA15, "Depth to clean" is "sur" while the "Dredging Depth" is 7. Why do these three polygons that all have "Depth to Clean" listed as "sur," have such varied dredging depths?

See response to question 4 above.

7. For rows where "Depth to Clean (ft)2" is listed as "sur," how was the number in the "Dredging Depth (ft)" column determined?

See response to question 4 above.

8. Please explain why this table does not include a column displaying the total volume to be dredged for each six-polygon grouping.

See response to question 2.c. above.
The methodology used was to evaluate the incremental cost versus the incremental benefit. Therefore the table Cumulative columns calculate cumulative costs, not individual totals for each six-polygon groups.

The following questions relate to the document entitled "Economic Feasibility Source Data.XLSX" provided to the Environmental Parties by counsel for the Cleanup Team on March 24/2011 "

9. Please identify the source or sources of the information in "Economic Feasibility Source Data.XLSX."

The Cleanup Team obtained the information in mediation and calculated SWACs for each scenario. The cost estimates involved considerable input from the various Designated Parties that have experience with environmental remediation projects. The mediation parties have now agreed to release the source data and information relating to cost estimates and assumptions, which will be produced to all parties shortly.

10. Please explain what the line item entitled "Demolition" represents.

See Response to Question 9, above. The cost estimate backup and source data, including an explanation of "Demolition" costs will be provided to all parties shortly.

11. Please explain why the Probable Minimum Unit Cost for Demolition increases from the Scenario 1 (150,000), to Scenario 3 (300,000) to the scenario 6 (400,000), to the Scenario 9 (500,000).

See Response to Question 9, above. The cost estimate backup and source data, including an explanation of "Demolition" costs will be provided to all parties shortly.

12. Please explain what the line item entitled "Internal Shipyard Costs" represents.

See Response to Question 9, above. The cost estimate backup and source data, including an explanation of "Internal Shipyard Costs" will be provided to all parties shortly.

13. Please explain why the Probable Minimum Unit Cost for Internal Shipyard Costs increases from the Scenario 1 (150,000), to Scenario 3 (175,000), to Scenario 6 (250,000), to Scenario 9 (300,000), to Scenario 10 (400,000).

See Response to Question 9, above. The cost estimate backup and source data, including an explanation of "Internal Shipyard Costs" will be provided to all parties shortly.

14. Please explain how the value of "Probable Quantity" was derived for the "Post- Dredging Confirmation Sampling."

See Response to Question 9, above. The cost estimate backup and source data, including an explanation of how "Probably Quantity" was derived for the "Post Dredging Confirmation Sampling" will be provided to all parties shortly.

15. Please explain how the determination of "Probable Quantity" for the "Post-Dredging Confirmation Sampling" is or is not consistent with the explanation at page 32-3 of the DTR that "Confirmation sediment sampling will consist of core sediment sample collection in each footprint polygon."

To clarify, probably quantity for the post dredging confirmation sampling is at cell B44 in the Economic Feasibility Source Date EXCEL Spreadsheet. The quoted text is from page 34-3 of the DTR – not page 32-3. See Response to Question 9, above. The cost estimate backup and source data, including an explanation of how "Probably Quantity" was derived for the "Post Dredging Confirmation Sampling" will be provided to all parties shortly.

The following questions relate to the "Summary" worksheet in 2010-07-27 Economic /feasibility 07-27-10.ng.xls" (SAR384569).

16. Please identify the source of data for the "SWAC" columns (columns J through N).

SWACs for this plot were calculated using data from the Exponent Report with input from the Navy.

a. If the source data is not already listed in the DTR or its appendices, please identify the administrative record number where the data can be found, or provide the document.

SWACs for this plot were calculated using data from the Exponent Report with input from the Navy. The Cleanup Team will verify whether the Navy's input resulted in any modification to the Exponent Report's source data and confirm shortly.

17. Please explain why Scenarios 10 and 11 show an increased "Hg" SWAC as compared to Scenario 9.

A conservative assumption in the Cleanup Team's analysis is that a cleaned up polygon will eventually equilibrate to background sediment concentrations even though during remediation contaminated sediment will be removed to bay bottom and/or backfilled with clean sand. All SWAC calculations include this conservative assumption. The background concentration for Hg is 0.57 mg/kg. Some of the polygons actually had lower Hg concentrations than 0.57 mg/kg so once those polygons were removed under a scenario, the SWAC will increase.

a. How could dredging additional polygons increase the mercury SWAC?

See response above to Question 17.

b. Do you agree that an erroneous increase in mercury SWAC would result in an erroneous reduction in the percentage of mercury exposure reduction?

In this case, no, because the difference between 0.57 and 0.54 mg/kg is trivial. In addition, as explained in response to the main part of question 17, above, the Cleanup Team utilized the more conservative and protective assumption that a remediated polygon will equilibrate to background concentrations rather than a lower concentration.

c. Do you agree that an erroneous reduction in the percentage of mercury exposure reduction would result in an erroneous reduction in the average percentage of exposure reduction?

See response to Question 17.b.

d. If you disagree with either part b or c above, please explain why you disagree.

See response above to Questions 17 and 17.b.

18. Please explain why Scenario 11 shows an increased "Cu" SWAC as compared to Scenario 10.

See response above to Questions 17 and 17.b.

a. How could dredging additional polygons increase the copper SWAC?

See response above to Questions 17 and 17.b.

b. Do you agree that an erroneous increase in copper SWAC would result in an erroneous reduction in the percentage of copper exposure reduction?

See response above to Questions 17 and 17.b.

c. Do you agree that an erroneous reduction in the percentage of copper exposure reduction would result in an erroneous reduction in the average percentage of exposure reduction?

See response above to Questions 17 and 17.b.

d. If you disagree with either part b or c above, please explain why you disagree.

See response above to Questions 17 and 17.b.

19. Please explain why the "Average" SWAC shows an increased between Scenario 10 and Scenario 11.

See response above to Questions 17 and 17.b.

a. How could dredging additional polygons increase the average SWAC?

See response above to Questions 17 and 17.b.

20. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 5 (average cumulative SWAC reduction of 60.4%), the result would be 4.9%?

No. See responses to Questions 2.c. and 2.c.i. The analysis suggested by the question is not the methodology used to determine incremental cost versus incremental benefit. The exposure reduction was calculated on a cumulative basis not for each individual scenario. Therefore the exposure reduction for Scenario 5 includes the exposure reductions for the previous scenarios (Scenarios 1 thru 4). If the "scenario" only included polygons 25 through 30, then the exposure reduction per $10 million would be 4.9%. However, "scenario 5" includes polygons 1 through 30, so the calculated exposure reduction per $10 million is 8.7%. Also see response above to questions 2.c. and 2.c.i.

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 5.

See response above to Question 20 and to Questions 2.c. and 2.c.i.

21. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 6 (average cumulative SWAC reduction of 71.6%), the result would be 7.1%?

See response above to Question 20 and to Questions 2.c. and 2.c.i.

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 6.

See response above to Question 20 and to Questions 2.c. and 2.c.i.

22. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 7 (average cumulative SWAC reduction of 81.9%), the result would be 6.3%?

See response above to Question 20 and to Questions 2.c. and 2.c.i.

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 7.

See response above to Question 20 and to Questions 2.c. and 2.c.i.

23. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 8 (average cumulative SWAC reduction of 95.9%), the result would be 2.6%?

See response above to Question 20 and to Questions 2.c. and 2.c.i.

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 8.

See response above to Question 20 and to Questions 2.c. and 2.c.i.

24. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 9 (average cumulative SWAC reduction of 101.6%), the result would be 1.9%?

See response above to Question 20 and to Questions 2.c. and 2.c.i.

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 9.

See response above to Question 20 and to Questions 2.c. and 2.c.i.

25. Isn't it true that the average cumulative SWAC reduction of 101.6% represented by Scenario 9 represents a cleanup to better than background conditions.
a. If you disagree, please explain why.

In the latter scenarios, the only polygons left undredged are near the shipping channel, some of which actually have concentrations below the background UPL, so the resultant SWAC would be below background. Consistent with the explanation of the Cleanup Team's conservative and protective assumption that each remediated polygon will equilibrate to background concentrations over time, when you dredge the last polygons out near the shipping channel that have current concentrations below background, you actually increase the SWAC, because you pull those polygons up to background.

26. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 10 (average cumulative SWAC reduction of 104.7%), the result would be 0.6%?

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 10.

See response above to Questions 20, 25, 2.c. and 2.c.i.

27. Isn't it true that the average cumulative SWAC reduction of 104.7% represented by Scenario 10 represents a cleanup to better than background conditions?

a. If you disagree, please explain why.

See response above to Questions 20, 25, 2.c. and 2.c.i.

28. Isn't it true that, if the "exposure reduction per $10 million" was calculated for Scenario 11 (average cumulative SWAC reduction of 100.7%), the result would be -0.8%?

a. If you disagree, please state what the "exposure reduction per $10 million" should be for Scenario 11.

See response above to Questions 20, 25, 2.c. and 2.c.i.

29. Please explain how dredging the polygons in Scenario 11 will increase the average cumulative SWAC.

An assumption of the analysis is that a cleaned up polygon has background sediment concentrations. As detailed in the responses above, if polygons initially actually had lower than background concentrations, given the conservative assumptions about remediated polygons equilibrating to background concentrations, the SWAC may increase.

30. Isn't it true that, if the "exposure reduction per $10 million" was plotted for each 6- polygon scenario separately, the result would look like this (could not duplicate the chart in the document):

See response above to Questions 20, 25, 2.c. and 2.c.i.

31. Assuming that the above chart (we could not duplicate the chart from the pdf document) accurately reflects the results of plotting the "exposure reduction per $10 million" for each scenario separately, would the Cleanup Team reach the same conclusions it has in the DTR and Tentative Cleanup and Abatement Order regarding economic feasibility?

a. Why or why not?

Yes. Despite the erroneous assumptions underlying the chart, as explained in responses to Questions 20, 25, 2.c., and 2.c.1, Section 31 would still conclude that "…cleaning up to background sediment chemistry levels is not economically feasible" because the incremental cost of achieving further exposure reduction would be outweighed by the negligible increase in exposure reduction.

32. Please admit that cleaning up 30 polygons (Scenario 6) is economically feasible.

a. If you deny that cleaning up 30 polygons (Scenario 6) is economically feasible, please explain the full basis for your denial.

Please note: Scenario 6 involves 36 polygons, not 30. The Cleanup Team cannot admit nor deny the statement since it did not and is not required to individually evaluate scenarios regarding their economic feasibility. The objective of Section 31 is to determine if achieving background sediment quality is economically feasible. Section 31 does not identify an exact point where exposure reductions become infeasible. The Cleanup Team will not undertake this analysis since the burden of so doing is equal or less on EHC/Coastkeeper than it is on the Cleanup Team and, in any event, because substantial evidence in the record supports its conclusion that cleanup to background is not economically feasible. The question further appears to conflate the determination of whether cleanup to background is economically feasible with the determination of alternative cleanup levels. The bases for the Cleanup Team's recommended alternative cleanup levels are set forth in detail in Section 32 of the DTR.

33. Please admit that cleaning up to Scenario 8 is economically feasible.

a. If you deny that cleaning up to Scenario 8 is economically feasible, please explain the full basis for your denial, including all evidence to support your conclusion.

See response to question 32.

34. Please admit that cleaning up to Scenario 9 is economically feasible.

a. If you deny that cleaning up to Scenario 9 is economically feasible, please explain the full basis for your denial, including all evidence to support your conclusion.

See response to question 32.

Dated: May 20, 2011

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SAN DIEGO REGION, CLEANUP TEAM

By: /s/

Christian Carrigan

Exhibit E

San Diego Coastkeeper and Environmental Health Coalition

Remediation Dollars Spent	PCB	Mercury	Copper	TBT	HPAH
$0-13.5	19.46%	14.34%	14.32%	11.61%	2.76%
$14 - $24	14.64%	6.84%	15.62%	12.61%	11.84%
$24 - $33	13.30%	17.39%	10.67%	6.44%	12.23%
$33 - $45	5.93%	7.16%	6.71%	6.62%	6.77%
$45-$69.5	3.94%	7.36%	5.71%	3.12%	4.25%
$69.5 -85.3	4.61%	7.87%	5.70%	4.54%	12.75%
$85.3 -$101.6	2.09%	21.22%	3.51%	1.74%	3.13%
$101.6 - $155.2	1.23%	1.33%	4.28%	4.23%	1.91%
$155.2 -$185	1.62%	1.18%	2.89%	1.69%	2.33%
$185- $238	0.88%	-1.55%	-0.21%	1.98%	1.75%
$238- $288	0.61%	-3.03%	-2.23%	0.24%	0.49%

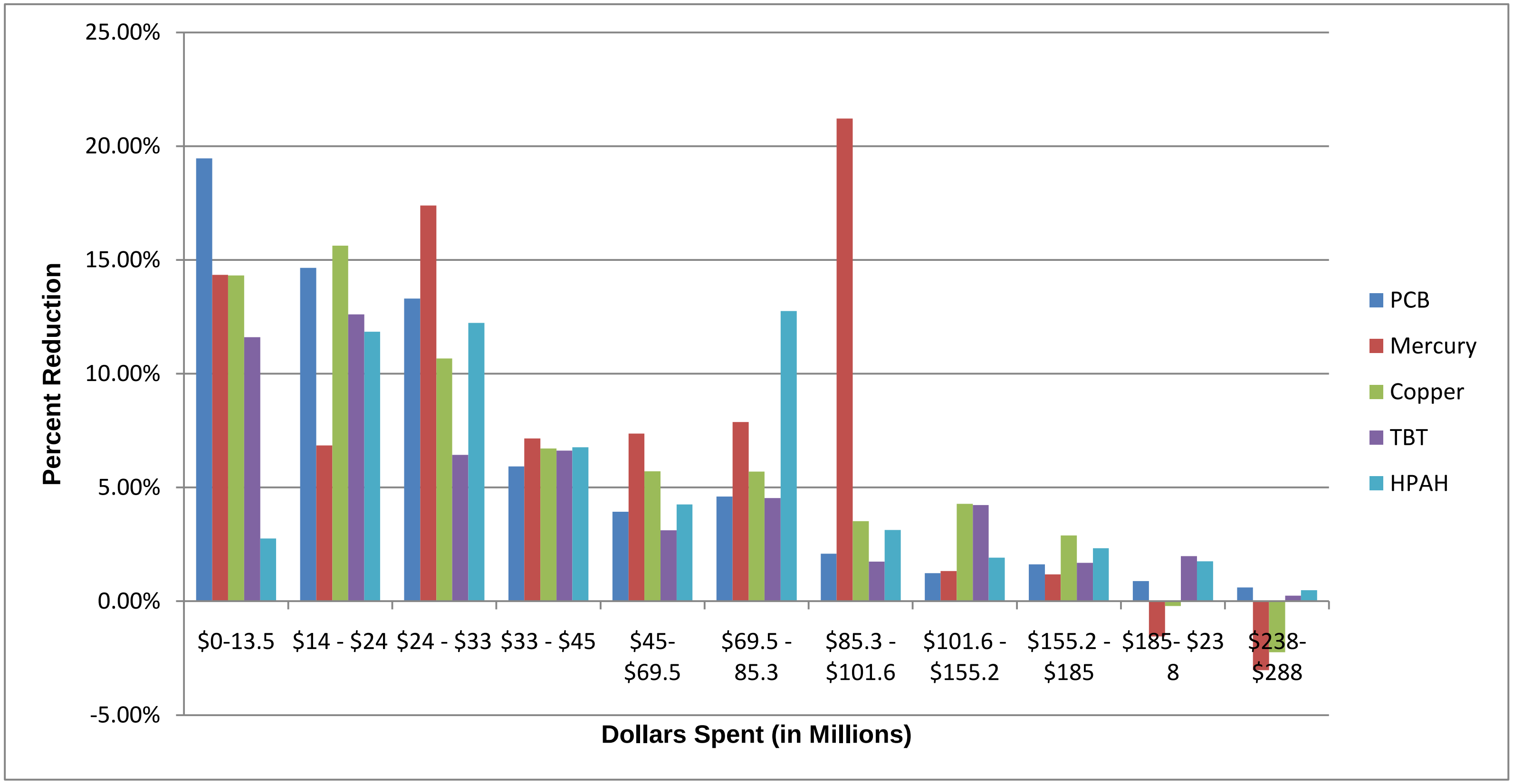


Exhibit F

San Diego Coastkeeper and Environmental Health Coalition

Probable Cost	PCB	Mercury	Lead	TBT	HPAH
$13,500,000	26.27%	19.36%	19.33%	15.67%	3.73%
$24,300,000	42.09%	26.75%	36.21%	29.29%	16.52%
$32,900,000	53.53%	41.70%	45.39%	34.83%	27.04%
$44,900,000	60.64%	50.29%	53.44%	42.78%	35.16%
$69,400,000	70.28%	68.33%	67.43%	50.41%	45.56%
$85,200,000	77.56%	80.76%	76.44%	57.58%	65.71%
$101,500,000	80.97%	115.35%	82.17%	60.41%	70.82%
$155,100,000	87.55%	122.48%	105.12%	83.11%	81.05%
$184,800,000	92.35%	126.00%	113.70%	88.13%	87.98%
$237,900,000	97.04%	117.76%	112.60%	98.66%	97.27%
$288,200,000	100.11%	102.53%	101.36%	99.87%	99.73%

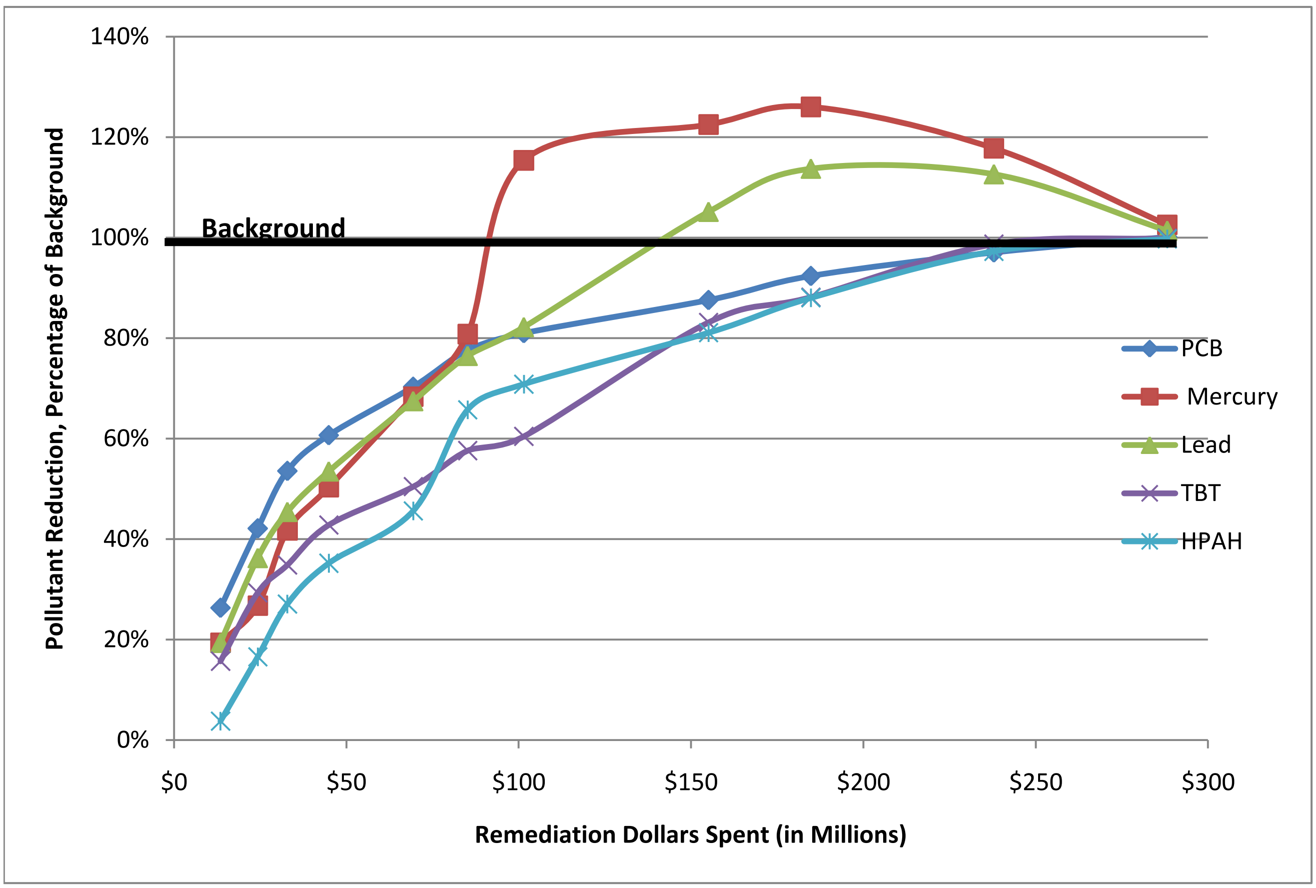


Exhibit G

San Diego Coastkeeper and Environmental Health Coalition

Probable Cost	PCB	Mercury	Lead	TBT	HPAH
$13,500,000	26.27%	19.36%	19.33%	15.67%	3.73%
$24,300,000	42.09%	26.75%	36.21%	29.29%	16.52%
$32,900,000	53.53%	41.70%	45.39%	34.83%	27.04%
$44,900,000	60.64%	50.29%	53.44%	42.78%	35.16%
$69,400,000	70.28%	68.33%	67.43%	50.41%	45.56%
$85,200,000	77.56%	80.76%	76.44%	57.58%	65.71%
$101,500,000	80.97%	115.35%	82.17%	60.41%	70.82%
$155,100,000	87.55%	122.48%	105.12%	83.11%	81.05%
$184,800,000	92.35%	126.00%	113.70%	88.13%	87.98%
$237,900,000	97.04%	117.76%	112.60%	98.66%	97.27%
$288,200,000	100.11%	102.53%	101.36%	99.87%	99.73%

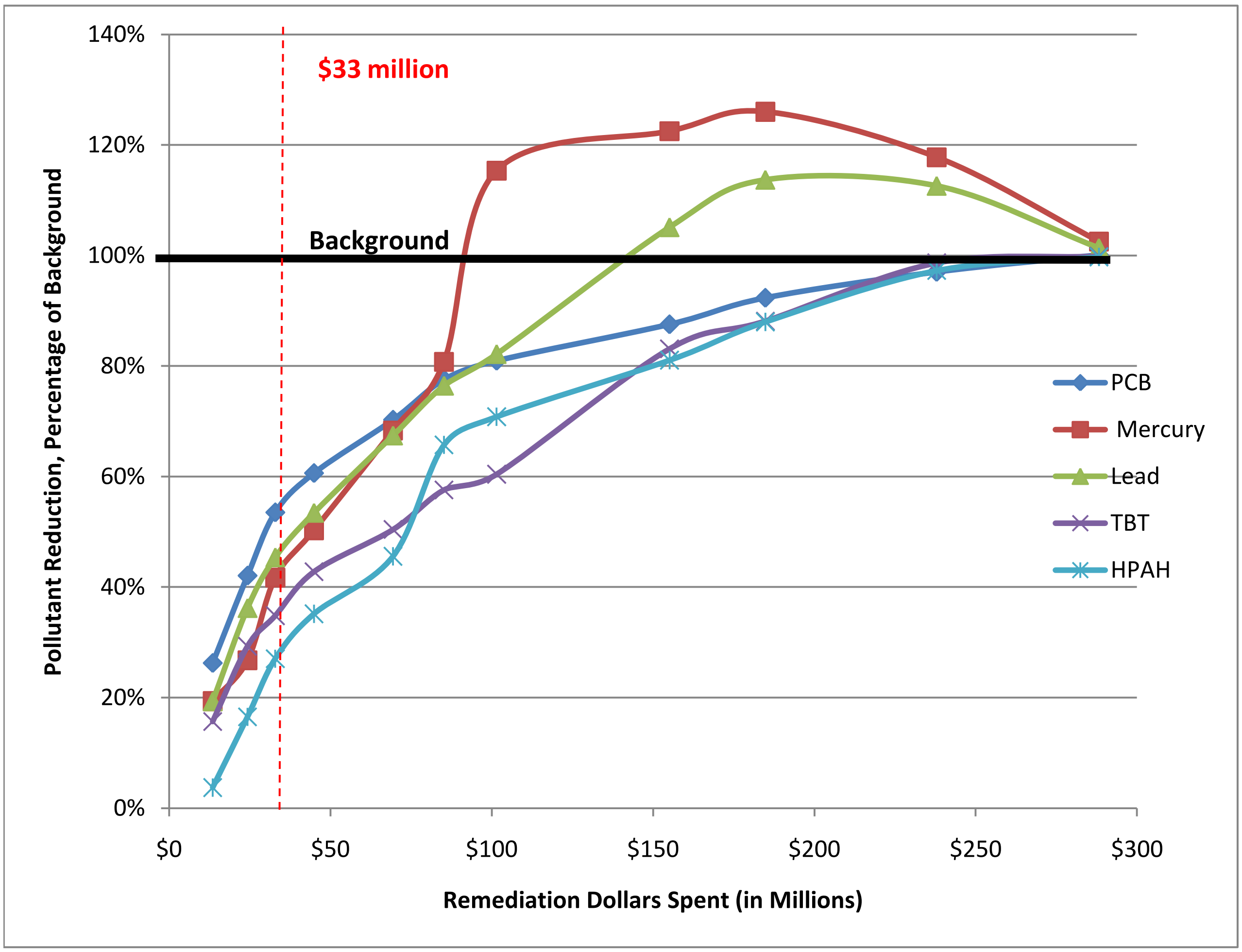


Exhibit H

San Diego Coastkeeper and Environmental Health Coalition

Predicted Post-Remedial SWAC Calculations

Station		Area (ft2)	Mercury (mg/kg)	Copper (mg/kg)	TBT (µg/kg)	HPAH (µg/kg)[c]	PCBs (µg/kg)	Concentration x Area Product Mercury (mg*ft²/kg)	Copper (mg*ft²/kg)	Tributyltin (µg*ft²/kg)	HPAH (µg*ft²/kg)	PCBs (µg*ft²/kg)
Areas To Be Remediated [a]												
NA01	b	7,450	0.67	144	25	795	100	4,992	1,072,866	186,262	5,923,116	745,046
NA06	b	41,012	0.67	144	25	795	100	27,478	5,905,679	1,025,292	32,604,270	4,101,166
NA09	b	27,339	0.67	144	25	795	100	18,317	3,936,826	683,477	21,734,561	2,733,907
NA12	b	4,925	0.67	144	25	795	100	3,300	709,239	123,132	3,915,590	492,527
NA15	b	46,309	0.67	144	25	795	100	31,027	6,668,431	1,157,714	36,815,297	4,630,855
NA16	b	436	0.67	144	25	795	100	292	62,810	10,905	346,763	43,618
NA17	b	34,490	0.67	144	25	795	100	23,108	4,966,576	862,253	27,419,637	3,449,011
NA18	b	8,707	0.67	144	25	795	100	5,834	1,253,798	217,673	6,922,009	870,693
NA19	b	27,444	0.67	144	25	795	100	18,387	3,951,891	686,092	21,817,734	2,744,369
NA23	b	4,229	0.67	144	25	795	100	2,834	609,021	105,733	3,362,301	422,931
NA27	b	175	0.67	144	25	795	100	117	25,250	4,384	139,403	17,535
SW01		33,394	0.67	144	25	795	100	22,374	4,808,694	834,843	26,547,999	3,339,371
SW02	b	39,162	0.67	144	25	795	100	26,238	5,639,266	979,039	31,133,448	3,916,157
SW03	b	197	0.67	144	25	795	100	132	28,418	4,934	156,893	19,735
SW04	b	15,943	0.67	144	25	795	100	10,682	2,295,816	398,579	12,674,820	1,594,317
SW05	b	16,584	0.67	144	25	795	100	11,111	2,388,060	414,594	13,184,081	1,658,375
SW06	b	3,445	0.67	144	25	795	100	2,308	496,076	86,124	2,738,751	344,497
SW08	b	12,303	0.67	144	25	795	100	8,243	1,771,597	307,569	9,780,694	1,230,276
SW09	b	21,044	0.67	144	25	795	100	14,099	3,030,310	526,096	16,729,837	2,104,382
SW10	b	19,663	0.67	144	25	795	100	13,174	2,831,413	491,565	15,631,759	1,966,259
SW13	b	21,649	0.67	144	25	795	100	14,505	3,117,436	541,222	17,210,844	2,164,886
SW14		16,732	0.67	144	25	795	100	11,210	2,409,398	418,298	13,301,884	1,673,193
SW15	b	6,892	0.67	144	25	795	100	4,618	992,462	172,303	5,479,220	689,210
SW16	b	17,459	0.67	144	25	795	100	11,698	2,514,113	436,478	13,880,000	1,745,912
SW17	b	48,027	0.67	144	25	795	100	32,178	6,915,898	1,200,677	38,181,521	4,802,707
SW20	b	9,224	0.67	144	25	795	100	6,180	1,328,262	230,601	7,333,112	922,404
SW21		11,896	0.67	144	25	795	100	7,971	1,713,070	297,408	9,457,574	1,189,632
SW22		3,762	0.67	144	25	795	100	2,520	541,696	94,045	2,990,615	376,178
SW23	b	22,032	0.67	144	25	795	100	14,761	3,172,608	550,800	17,515,440	2,203,200
SW24	b	16,399	0.67	144	25	795	100	10,987	2,361,482	409,980	13,037,348	1,639,918
SW25	b	7,243	0.67	144	25	795	100	4,853	1,042,988	181,074	5,758,161	724,297
SW27	b	71,021	0.67	144	25	795	100	47,584	10,227,057	1,775,531	56,461,878	7,102,123
SW28	b	41,116	0.67	144	25	795	100	27,547	5,920,654	1,027,891	32,686,942	4,111,565
SW29	b	18,649	0.67	144	25	795	100	12,495	2,685,515	466,235	14,826,281	1,864,941
SW31	b	5,049	0.67	144	25	795	100	3,383	727,029	126,220	4,013,804	504,881

Areas Outside of Remediation Footprint

NA01	92,338	1.0625	252.5	157	6575	375	98,109	23,315,264	14,497,016	607,120,246	34,626,630
NA02	164,015	0.7	170	82	2800	208	114,811	27,882,596	13,449,252	459,242,756	34,115,176
NA03	118,384	1.1	220	180	6100	370	130,223	26,044,515	21,309,149	722,143,376	43,802,139
NA04	72,669	1.1	260	300	3500	250	79,936	18,893,982	21,800,748	254,342,060	18,167,290
NA05	112,824	0.61	170	110	2800	180	68,823	19,180,116	12,410,663	315,907,788	20,308,358
NA06	20,024	2.35	395	225	3800	640	47,056	7,909,369	4,505,337	76,090,136	12,815,181
NA07	30,298	1.45	225	110.5	15850	495	43,931	6,816,944	3,347,877	480,215,851	14,997,277
NA08	20,352	0.82	270	110	3500	310	16,689	5,495,056	2,238,727	71,232,210	6,309,139
NA09	2,182	1.2	260	120	2800	290	2,618	567,239	261,803	6,108,732	632,690
NA10	29,136	0.58	160	91	1800	160	16,899	4,661,755	2,651,373	52,444,746	4,661,755
NA11	37,813	0.85	180	38	2800	190	32,141	6,806,407	1,436,908	105,877,436	7,184,540
NA12	86,170	0.62	150	80	2000	150	53,426	12,925,547	6,893,625	172,340,620	12,925,547
NA13	255,727	0.645	185	68	1800	173	164,944	47,309,514	17,389,443	460,308,780	44,240,788
NA14	208,687	0.55	130	45	1100	128	114,778	27,129,365	9,390,934	229,556,162	26,711,990
NA15	1,324	0.98	250	670	3300	340	1,298	331,023	887,140	4,369,497	450,191
NA16	37,818	1.0925	252.5	175	3200	590	41,316	9,549,108	6,618,194	121,018,400	22,312,768
NA17	1,981	0.845	510	1350	2950	550	1,674	1,010,448	2,674,715	5,844,747	1,089,699
NA18	31,745	0.79	230	210	2400	350	25,079	7,301,442	6,666,534	76,188,960	11,110,890
NA19	4,600	0.78	270	570	3000	990	3,588	1,241,895	2,621,778	13,798,830	4,553,614
NA20	311,465	0.24	96	280	2900	120	74,752	29,900,659	87,210,256	903,249,080	37,375,824
NA21	476,122	0.51	150	410	2100	177	242,822	71,418,296	195,210,008	999,856,137	84,273,589
NA22	54,670	0.38	150	120	3600	180	20,775	8,200,502	6,560,401	196,812,036	9,840,602
NA23	63,770	1.1	350	120	3400	510	70,147	22,319,581	7,652,428	216,818,782	32,522,817
NA24	65,314	0.9	200	59	2100	290	58,783	13,062,864	3,853,545	137,160,072	18,941,153
NA25	521,664	0.42	85	25	1100	83	219,099	44,341,428	13,041,597	573,830,246	43,298,100
NA26	302,544	0.48	80	37	850	180	145,221	24,203,487	11,194,113	257,162,052	54,457,846
NA27	53,714	1.2	390	100	2800	210	64,457	20,948,437	5,371,394	150,399,032	11,279,927
NA28	54,262	0.89	290	90	3400	180	48,293	15,735,968	4,883,576	184,490,664	9,767,153
NA29	202,964	0.55	110	58	1900	190	111,630	22,326,022	11,771,903	385,631,296	38,563,130
NA30	240,838	0.71	140	22	1000	100	170,995	33,717,281	5,298,430	240,837,720	24,083,772
NA31	229,185	0.35	71	20	530	68	80,215	16,272,164	4,583,708	121,468,267	15,584,608
SW02	0.24	4.45	580	167	14500	5450	1.068	139	40.08	3,480	1,308
SW03	48,614	1.2	190	53	6800	410	58,336	9,236,575	2,576,518	330,572,140	19,931,556
SW04	6,739	1.75	1500	3250	14000	4000	11,792	10,107,795	21,900,223	94,339,420	26,954,120
SW05	7,579	0.96	230	170	13000	1200	7,276	1,743,113	1,288,388	98,523,750	9,094,500
SW06	22,306	0.75	170	100	12000	380	16,729	3,791,991	2,230,583	267,669,960	8,476,215
SW07	40,947	0.52	150	44	3800	170	21,293	6,142,122	1,801,689	155,600,424	6,961,072
SW08	4,526	2.25	920	1850	25500	2100	10,183	4,163,764	8,372,786	115,408,665	9,504,243
SW09	3,435	0.96	660	910	17000	710	3,297	2,267,001	3,125,714	58,392,450	2,438,744
SW10	1,946	0.58	160	250	16000	610	1,128	311,301	486,408	31,130,080	1,186,834

SW11	36,689	0.75	170	140	8000	200	27,517	6,237,188	5,136,508	293,514,720	7,337,868
SW12	112,942	0.525	119.5	36	3000	155	59,294	13,496,546	4,065,905	338,825,430	17,505,981
SW13	16,608	0.86	800	790	12000	490	14,283	13,286,200	13,120,123	199,293,000	8,137,798
SW15	48,874	0.9	230	170	7700	380	43,986	11,240,967	8,308,541	376,328,029	18,572,033
SW16	376	1	430	1100	5700	430	376	161,508	413,160	2,140,920	161,508
SW17	7,871	0.98	270	440	10000	540	7,714	2,125,235	3,463,346	78,712,400	4,250,470
SW18	52,601	0.75	220	130	8100	440	39,451	11,572,326	6,838,192	426,071,988	23,144,651
SW19	214,747	2.1	110	37	1100	94	450,968	23,622,121	7,945,622	236,221,205	20,186,176
SW20	18,951	0.99	290	130	11000	1600	18,761	5,495,738	2,463,607	208,459,020	30,321,312
SW23	8,045	1	280	210	11000	1000	8,045	2,252,670	1,689,503	88,497,750	8,045,250
SW24	4,780	1.9	300	165	52000	950	9,082	1,434,012	788,707	248,562,080	4,541,038
SW25	62,447	0.775	230	230.5	8150	350	48,396	14,362,773	14,393,997	508,941,746	21,856,394
SW26	86,923	0.43	120	49	1600	293	37,377	10,430,809	4,259,247	139,077,456	25,468,559
SW27	7,867	0.68	210	250	12000	200	5,350	1,652,141	1,966,835	94,408,080	1,573,468
SW28	10,438	0.875	265	150	17000	2100	9,133	2,766,144	1,565,742	177,450,760	21,920,388
SW29	43,848	0.93	220	190	4600	820	40,778	9,646,468	8,331,040	201,698,868	35,955,016
SW30	72,231	1.1	240	200	4900	380	79,454	17,335,430	14,446,192	353,931,704	27,447,765
SW31	78,450	0.23	54	36	1200	66	18,043	4,236,274	2,824,182	94,139,412	5,177,668
SW32	78,477	0.51	92	30	820	160	40,023	7,219,867	2,354,305	64,350,992	12,556,291
SW33	151,872	0.53	100	19	1000	100	80,492	15,187,214	2,885,571	151,872,140	15,187,214
SW34	304,572	0.75	320	38	1400	130	228,429	97,463,046	11,573,737	426,400,828	39,594,363
SW36	90,730	0.75	240	49	4000	200	68,047	21,775,106	4,445,751	362,918,440	18,145,922
Total	6,232,430						4,286,102	1,005,703,562	689,779,748	15,367,037,642	1,220,779,977
Max		2.1	320	410	15850	495					
							Mercury (mg/kg)	Copper (mg/kg)	Tributyltin (µg/kg)	HPAH (µg/kg)	PCBs (µg/kg)
SWAC							**0.69**	**161**	**111**	**2,466**	**196**

[a] Concentration in areas to be remediated is set to just below 120% of background.

[b] Only portion of the polygon to be remediated.

[c] The following stations includes HPAHs from the the sediment fraction of porewater samples: NA01, NA06, NA13, NA16, NA17 SW01, SW02, SW04, SW08, SW24, SW25, and SW28.

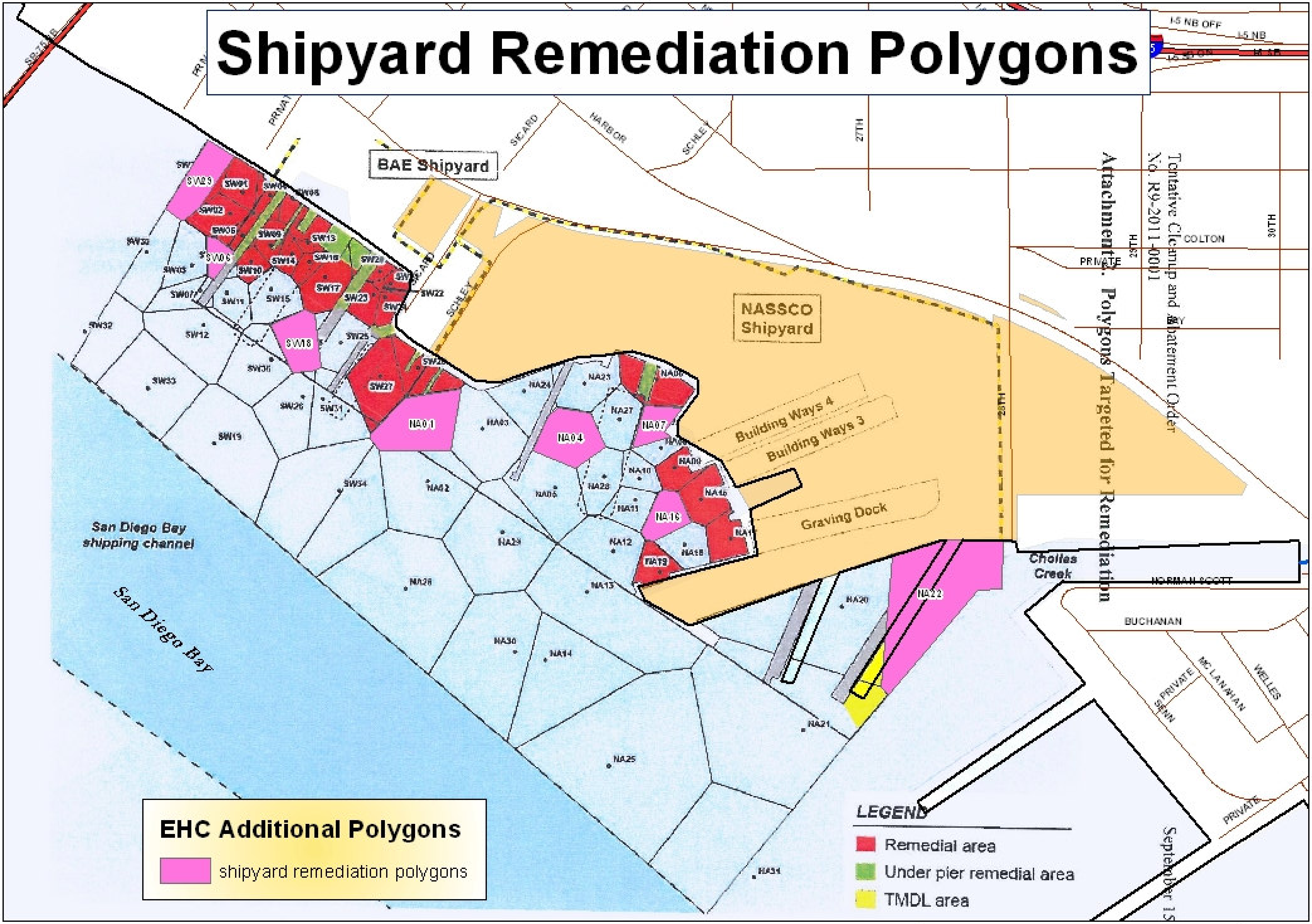
Exhibit I

San Diego Coastkeeper and Environmental Health Coalition

Tentative Cleanup and Abatement Order No. R9-2011-0001

Attachment 2. Polygons Targeted for Remediation

Shipyard Remediation Polygons



0 0.25 0.5 Miles

EHC: Barrio Logan Land Use 2009.mxd
Sources: RWQCB CAO
SanGIS

Exhibit J

San Diego Coastkeeper and Environmental Health Coalition

Polygon	Total Area (9-11-10)	Dredging Area - inside (sf)[1]	Dredging Area - outside (sf)[1]	Dredging volume (inside) (cy)	Dredging volume (outside) (cy)	Total Dredging Volume	Cost for inside dredging ($13 cu yd)	Cost for outside dredging ($7 cu yd)
NA07	32,593	32,593	0	4,829			62771	
SW29	66,095	0	66,095		9792		0	68542.53
NA04	81,308	74,178	0	27473			357154	
NA01	100,720	99,946	0	25912			336856	
NA16	36,736	36,736	0	10885			141501	
SW06	26,105	20,429	0	3026			39344	
SW18	61,364	50,318	0	7454			96908	
		314,200	66,095	**79580**	**9792**	89371	**1034535**	**68542.53**
NA22	235,799	206,207	0	30,549			397139	
TOTAL		520,407	6,095	**110,129**	**9792**	119,921	**1431674**	**68542.53**
							1500216	
		380,295						

Exhibit K

San Diego Coastkeeper and Environmental Health Coalition

Predicted Post-Remedial SWAC Calculations

Station		Area (ft2)	Mercury (mg/kg)	Copper (mg/kg)	TBT (µg/kg)	HPAH (µg/kg)[c]	PCBs (µg/kg)	Concentration x Area Product: Mercury ($mg*ft^2/kg$)	Copper ($mg*ft^2/kg$)	Tributyltin ($\mu g*ft^2/kg$)	HPAH ($\mu g*ft^2/kg$)	PCBs ($\mu g*ft^2/kg$)
Areas To Be Remediated [a]												
NA01	b	7,450	0.67	144	25	795	100	4,992	1,072,866	186,262	5,923,116	745,046
NA06	b	41,012	0.67	144	25	795	100	27,478	5,905,679	1,025,292	32,604,270	4,101,166
NA09	b	27,339	0.67	144	25	795	100	18,317	3,936,826	683,477	21,734,561	2,733,907
NA12	b	4,925	0.67	144	25	795	100	3,300	709,239	123,132	3,915,590	492,527
NA15	b	46,309	0.67	144	25	795	100	31,027	6,668,431	1,157,714	36,815,297	4,630,855
NA16	b	436	0.67	144	25	795	100	292	62,810	10,905	346,763	43,618
NA17	b	34,490	0.67	144	25	795	100	23,108	4,966,576	862,253	27,419,637	3,449,011
NA18	b	8,707	0.67	144	25	795	100	5,834	1,253,798	217,673	6,922,009	870,693
NA19	b	27,444	0.67	144	25	795	100	18,387	3,951,891	686,092	21,817,734	2,744,369
NA23	b	4,229	0.67	144	25	795	100	2,834	609,021	105,733	3,362,301	422,931
NA27	b	175	0.67	144	25	795	100	117	25,250	4,384	139,403	17,535
SW01		33,394	0.67	144	25	795	100	22,374	4,808,694	834,843	26,547,999	3,339,371
SW02	b	39,162	0.67	144	25	795	100	26,238	5,639,266	979,039	31,133,448	3,916,157
SW03	b	197	0.67	144	25	795	100	132	28,418	4,934	156,893	19,735
SW04	b	15,943	0.67	144	25	795	100	10,682	2,295,816	398,579	12,674,820	1,594,317
SW05	b	16,584	0.67	144	25	795	100	11,111	2,388,060	414,594	13,184,081	1,658,375
SW06	b	3,445	0.67	144	25	795	100	2,308	496,076	86,124	2,738,751	344,497
SW08	b	12,303	0.67	144	25	795	100	8,243	1,771,597	307,569	9,780,694	1,230,276
SW09	b	21,044	0.67	144	25	795	100	14,099	3,030,310	526,096	16,729,837	2,104,382
SW10	b	19,663	0.67	144	25	795	100	13,174	2,831,413	491,565	15,631,759	1,966,259
SW13	b	21,649	0.67	144	25	795	100	14,505	3,117,436	541,222	17,210,844	2,164,886
SW14		16,732	0.67	144	25	795	100	11,210	2,409,398	418,298	13,301,884	1,673,193
SW15	b	6,892	0.67	144	25	795	100	4,618	992,462	172,303	5,479,220	689,210
SW16	b	17,459	0.67	144	25	795	100	11,698	2,514,113	436,478	13,880,000	1,745,912
SW17	b	48,027	0.67	144	25	795	100	32,178	6,915,898	1,200,677	38,181,521	4,802,707
SW20	b	9,224	0.67	144	25	795	100	6,180	1,328,262	230,601	7,333,112	922,404
SW21		11,896	0.67	144	25	795	100	7,971	1,713,070	297,408	9,457,574	1,189,632
SW22		3,762	0.67	144	25	795	100	2,520	541,696	94,045	2,990,615	376,178
SW23	b	22,032	0.67	144	25	795	100	14,761	3,172,608	550,800	17,515,440	2,203,200
SW24	b	16,399	0.67	144	25	795	100	10,987	2,361,482	409,980	13,037,348	1,639,918
SW25	b	7,243	0.67	144	25	795	100	4,853	1,042,988	181,074	5,758,161	724,297
SW27	b	71,021	0.67	144	25	795	100	47,584	10,227,057	1,775,531	56,461,878	7,102,123
SW28	b	41,116	0.67	144	25	795	100	27,547	5,920,654	1,027,891	32,686,942	4,111,565

SW29 [b]	18,649	0.67	144	25	795	100	12,495	2,685,515	466,235	14,826,281	1,864,941
SW31 [b]	5,049	0.67	144	25	795	100	3,383	727,029	126,220	4,013,804	504,881
Areas Outside of Remediation Footprint											
NA01	92,338	**0.67**	**144**	**25**	**795**	**100**	61,866	13,296,626	2,308,442	73,408,456	9,233,768
NA02	164,015	0.7	170	82	2800	208	114,811	27,882,596	13,449,252	459,242,756	34,115,176
NA03	118,384	1.1	220	180	6100	370	130,223	26,044,515	21,309,149	722,143,376	43,802,139
NA04	72,669	**0.67**	**144**	**25**	**795**	**100**	48,688	10,464,359	1,816,729	57,771,982	7,266,916
NA05	112,824	0.61	170	110	2800	180	68,823	19,180,116	12,410,663	315,907,788	20,308,358
NA06	20,024	2.35	395	225	3800	640	47,056	7,909,369	4,505,337	76,090,136	12,815,181
NA07	30,298	**0.67**	**144**	**25**	**795**	**100**	20,299	4,362,844	757,438	24,086,536	3,029,753
NA08	20,352	0.82	270	110	3500	310	16,689	5,495,056	2,238,727	71,232,210	6,309,139
NA09	2,182	1.2	260	120	2800	290	2,618	567,239	261,803	6,108,732	632,690
NA10	29,136	0.58	160	91	1800	160	16,899	4,661,755	2,651,373	52,444,746	4,661,755
NA11	37,813	0.85	180	38	2800	190	32,141	6,806,407	1,436,908	105,877,436	7,184,540
NA12	86,170	0.62	150	80	2000	150	53,426	12,925,547	6,893,625	172,340,620	12,925,547
NA13	255,727	0.645	185	68	1800	173	164,944	47,309,514	17,389,443	460,308,780	44,240,788
NA14	208,687	0.55	130	45	1100	128	114,778	27,129,365	9,390,934	229,556,162	26,711,990
NA15	1,324	0.98	250	670	3300	340	1,298	331,023	887,140	4,369,497	450,191
NA16	37,818	**0.67**	**144**	**25**	**795**	**100**	25,338	5,445,828	945,456	30,065,509	3,781,825
NA17	1,981	0.845	510	1350	2950	550	1,674	1,010,448	2,674,715	5,844,747	1,089,699
NA18	31,745	0.79	230	210	2400	350	25,079	7,301,442	6,666,534	76,188,960	11,110,890
NA19	4,600	0.78	270	570	3000	990	3,588	1,241,895	2,621,778	13,798,830	4,553,614
NA20	311,465	0.24	96	280	2900	120	74,752	29,900,659	87,210,256	903,249,080	37,375,824
NA21	476,122	0.51	150	410	2100	177	242,822	71,418,296	195,210,008	999,856,137	84,273,589
NA22	54,670	**0.67**	**144**	**25**	**795**	**100**	36,629	7,872,481	1,366,750	43,462,658	5,467,001
NA23	63,770	1.1	350	120	3400	510	70,147	22,319,581	7,652,428	216,818,782	32,522,817
NA24	65,314	0.9	200	59	2100	290	58,783	13,062,864	3,853,545	137,160,072	18,941,153
NA25	521,664	0.42	85	25	1100	83	219,099	44,341,428	13,041,597	573,830,246	43,298,100
NA26	302,544	0.48	80	37	850	180	145,221	24,203,487	11,194,113	257,162,052	54,457,846
NA27	53,714	1.2	390	100	2800	210	64,457	20,948,437	5,371,394	150,399,032	11,279,927
NA28	54,262	0.89	290	90	3400	180	48,293	15,735,968	4,883,576	184,490,664	9,767,153
NA29	202,964	0.55	110	58	1900	190	111,630	22,326,022	11,771,903	385,631,296	38,563,130
NA30	240,838	0.71	140	22	1000	100	170,995	33,717,281	5,298,430	240,837,720	24,083,772
NA31	229,185	0.35	71	20	530	68	80,215	16,272,164	4,583,708	121,468,267	15,584,608
SW02	0.24	4.45	580	167	14500	5450	1.068	139	40.08	3,480	1,308
SW03	48,614	1.2	190	53	6800	410	58,336	9,236,575	2,576,518	330,572,140	19,931,556
SW04	6,739	1.75	1500	3250	14000	4000	11,792	10,107,795	21,900,223	94,339,420	26,954,120
SW05	7,579	0.96	230	170	13000	1200	7,276	1,743,113	1,288,388	98,523,750	9,094,500
SW06	22,306	**0.67**	**144**	**25**	**795**	**100**	14,945	3,212,040	557,646	17,733,135	2,230,583

SW07	40,947	0.52	150	44	3800	170	21,293	6,142,122	1,801,689	155,600,424	6,961,072
SW08	4,526	2.25	920	1850	25500	2100	10,183	4,163,764	8,372,786	115,408,665	9,504,243
SW09	3,435	0.96	660	910	17000	710	3,297	2,267,001	3,125,714	58,392,450	2,438,744
SW10	1,946	0.58	160	250	16000	610	1,128	311,301	486,408	31,130,080	1,186,834
SW11	36,689	0.75	170	140	8000	200	27,517	6,237,188	5,136,508	293,514,720	7,337,868
SW12	112,942	0.525	119.5	36	3000	155	59,294	13,496,546	4,065,905	338,825,430	17,505,981
SW13	16,608	0.86	800	790	12000	490	14,283	13,286,200	13,120,123	199,293,000	8,137,798
SW15	48,874	0.9	230	170	7700	380	43,986	11,240,967	8,308,541	376,328,029	18,572,033
SW16	376	1	430	1100	5700	430	376	161,508	413,160	2,140,920	161,508
SW17	7,871	0.98	270	440	10000	540	7,714	2,125,235	3,463,346	78,712,400	4,250,470
SW18	52,601	**0.67**	**144**	**25**	**795**	**100**	35,243	7,574,613	1,315,037	41,818,177	5,260,148
SW19	214,747	2.1	110	37	1100	94	450,968	23,622,121	7,945,622	236,221,205	20,186,176
SW20	18,951	0.99	290	130	11000	1600	18,761	5,495,738	2,463,607	208,459,020	30,321,312
SW23	8,045	1	280	210	11000	1000	8,045	2,252,670	1,689,503	88,497,750	8,045,250
SW24	4,780	1.9	300	165	52000	950	9,082	1,434,012	788,707	248,562,080	4,541,038
SW25	62,447	0.775	230	230.5	8150	350	48,396	14,362,773	14,393,997	508,941,746	21,856,394
SW26	86,923	0.43	120	49	1600	293	37,377	10,430,809	4,259,247	139,077,456	25,468,559
SW27	7,867	0.68	210	250	12000	200	5,350	1,652,141	1,966,835	94,408,080	1,573,468
SW28	10,438	0.875	265	150	17000	2100	9,133	2,766,144	1,565,742	177,450,760	21,920,388
SW29	43,848	**0.67**	**144**	**25**	**795**	**100**	29,378	6,314,052	1,096,190	34,858,826	4,384,758
SW30	72,231	1.1	240	200	4900	380	79,454	17,335,430	14,446,192	353,931,704	27,447,765
SW31	78,450	0.23	54	36	1200	66	18,043	4,236,274	2,824,182	94,139,412	5,177,668
SW32	78,477	0.51	92	30	820	160	40,023	7,219,867	2,354,305	64,350,992	12,556,291
SW33	151,872	0.53	100	19	1000	100	80,492	15,187,214	2,885,571	151,872,140	15,187,214
SW34	304,572	0.75	320	38	1400	130	228,429	97,463,046	11,573,737	426,400,828	39,594,363
SW36	90,730	0.75	240	49	4000	200	68,047	21,775,106	4,445,751	362,918,440	18,145,922
Total	6,232,430						4,177,463	972,459,820	629,719,385	13,135,293,511	1,093,914,280
Max		2.1	320	410	8000	380					
							Mercury (mg/kg)	Copper (mg/kg)	Tributyltin (µg/kg)	HPAH (µg/kg)	PCBs (µg/kg)
SWAC							**0.67**	**156**	**101**	**2,108**	**176**

[a] Concentration in areas to be remediated is set to 120% background for SWAC calculations.

[b] Only portion of the polygon to be remediated.

[c] The following stations includes HPAHs from the the sediment fraction of porewater samples: NA01, NA06, NA13, NA16, NA17 SW01, SW02, SW04, SW08, SW24, SW25, and SW28.