BAE Systems San Diego Ship Repair, Inc.

San Diego Bay Sediment Matter
TCAO R9-2011-0001

Certification

May 26, 2011

I, Matthew B. Dart, certify that the May 26, 2011 electronic submittal is a true and accurate copy of the submitted signed original.

Sincerely,

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CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD

SAN DIEGO REGION

IN RE TENTATIVE CLEANUP AND ABATEMENT ORDER NO. R9-2011-0001 (formerly No. R9-2010-0002)	**BAE SYSTEMS SAN DIEGO SHIP REPAIR, INC.'S COMMENTS REGARDING TCAO/DTR NO. R9-2011-0001** Presiding Officer: Grant Destache

TABLE OF CONTENTS

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

TABLE OF CONTENTS
(continued)

Page

Pursuant to the May 12, 2011 Notice of Extended Comment Period and Revised Comment Format, and the Third Amended Order of Proceedings, dated May 18, 2011, Designated Party BAE Systems San Diego Ship Repair, Inc. ("BAE Systems") respectfully submits the following comments concerning the Tentative Cleanup and Abatement Order No. R9-2011-0001 ("TCAO") and its associated Draft Technical Report ("DTR") for the San Diego Bay Shipyard Sediment Site, San Diego County ("Shipyard Sediment Site" or "Site").

BAE Systems offers comments on selected issues consistent with the current procedural posture of this proceeding. BAE Systems expressly preserves, and does not waive, any and all objections to those technical issues, evidence or legal argument to which BAE Systems does not address herein, and further reserves the right to supplement, modify or withdraw its comments on any issue identified herein.

To the extent reasonably possible, BAE Systems' comments are organized to correspond to the findings of the TCAO and the discussion set forth in its accompanying DTR.

I. AQUATIC LIFE IMPAIRMENT (TCAO FINDINGS 14-20; DTR §§ 14-20)

A. The Site-Specific Bioavailability of Chemicals at the Shipyard Sediment Site is Not Adequately Addressed (TCAO Findings 14-20; DTR §§ 14–20)

In conducting the weight-of-evidence ("WOE") approach to evaluate potential impairment of benthic macroinvertebrate communities at the Site, the DTR fails to sufficiently account for the site-specific bioavailability of chemicals in sediment at the site, and erroneously directly relates the concentrations of chemicals in bulk sediment with their potential to cause sediment toxicity.

With respect to the WOE approach used in the DTR in general, Dr. Ginn[1] noted that:

> the WOE approach described in the DTR appears to be an unconventional assessment method developed specifically for this case, which bears little resemblance to the standards of practice for sediment quality assessments. Little or no scientific basis is provided by the Staff to justify their deviation from standard data interpretation methods, resulting ultimately in arbitrary cleanup levels with no risk basis.

(Ginn 3/11/11 Expert Report, at p. 13.)

[1] Expert Report of Thomas C. Ginn regarding Evaluation of Draft Technical Report for Tentative Cleanup and Abatement Order No, R9-2011-0001, dated and submitted to the Regional Board on March 11, 2011 (the "Ginn 3/11/11 Expert Report").

As stated above, one of the most severe flaws with the WOE approach used in the DTR is that it erroneously equates chemical exposure with chemical toxicity, and ignores the fact that the site-specific bioavailability of the chemicals may be limited. In such cases, exposure to elevated chemical concentrations would not necessarily result in sediment toxicity or adverse effects on benthic macroinvertebrate communities. Dr. Ginn noted that:

> A fundamental problem with the Staff's WOE approach is the framework that concludes that adverse effects on benthic macroinvertebrates are "possible" when there is no significant sediment toxicity and no adverse effects on benthic macroinvertebrates (see Table 18-14 of the DTR). In these cases, the conclusion of "possible" effects is driven by the characterization of "high" for sediment chemistry. In such cases where chemical and biological indicators disagree, rather than prematurely concluding that effects on benthic macroinvertebrates are "possible," the investigator should evaluate the reason for the difference between chemical and biological indicators of effect, especially because this situation may result from low bioavailability of sediment chemicals The Staff even recognizes this situation in Section 15.1 of the DTR: "For example, sediment chemistry provides unambiguous measurements of pollutant levels in marine sediment, but provides inadequate information to predict biological impact."

(Ginn 3/11/11 Expert Report, at p. 13.)

Therefore, despite the fact that the DTR acknowledges uncertainties related to chemical bioavailability, the benthic impairment assessment places an unwarranted emphasis on bulk sediment chemistry data in the WOE approach. Dr. Ginn concluded that:

> A significant error in the Staff's WOE approach is the absence of an evaluation of the chemical bioavailability information in their decision framework. This omission is unscientific and is inconsistent with the current standards of practice for sediment assessments that recognize the importance of bioavailability in determining whether a given concentration of a chemical substance will cause adverse effects.

(Ginn 3/11/11 Expert Report, at p. 15.)

In summary, the failure to explicitly consider chemical bioavailability in the WOE approach presented in the DTR results in an overly conservative analysis.

B. The Benthic Community Leg of the Triad is not Given the Appropriate Weight in the Triad Analysis (TCAO Finding 18; DTR §§ 18.4, 18.5)

As second major flaw with the WOE approach used in the DTR is the failure to give the

benthic community leg of the Triad more weight than the sediment chemistry and sediment toxicity legs, since the benthic evaluations at the Site directly addressed the potential effects of chemical contamination in in-place sediments on the native benthic macroinvertebrates that reside at the site. The benthic analyses are therefore the most relevant leg of the Triad for assessing effects on the *in situ* benthic macroinvertebrate communities at the Site.

With respect to the benthic leg of the Triad, Dr. Ginn noted that:

> "it is the one LOE that addresses the actual responses of organisms living in or on the sediments at the site. Alternatively, the chemistry data represent the potential exposures existing at the site and the laboratory toxicity tests represent potential responses of test organisms under laboratory conditions."

(Ginn 3/11/11 Expert Report, at p. 28.)

Dr. Ginn noted that Section 15.2 of the DTR recognizes that a WOE approach necessarily involves the use of best professional judgment ("BPJ") to integrate the lines of evidence and assess the quality, extent, and congruence of data. He then discussed a recent study of the consistency of BPJ in the interpretation of Triad data that was published by Bay et al. (2007b). In that study, the authors relied on a panel of six individuals, whom they considered to be sediment experts, to independently evaluate Triad data from 25 California embayment sites and categorize each site according to its environmental condition (likely unimpacted, possibly impacted, likely impacted, etc.). Dr. Ginn noted that:

> The results showed considerable inconsistencies in the categorical assignments of the various sites among panel members, and the differences among panel members were associated primarily with different approaches to weighting of the three lines of evidence. However, overall the panel members placed the greatest weight on the benthic community leg of the Triad.

(Ginn 3/11/11 Expert Report, at p. 14.)

Despite the fact the sediment quality experts gave the greatest weight to the benthic community leg of the Triad, the DTR WOE approach tends to place a greater weight on the sediment chemistry and sediment toxicity legs. Therefore the DTR is inconsistent with the evaluations conducted by the sediment quality experts in Bay et al. (2007b).

In discussing the variability in sediment quality categories that can arise from different

experts with considerable experience in sediment assessments, Bay et al. (2007b) noted that:

> …the expertise of personnel at state and local agencies responsible for conducting or interpreting sediment quality assessments is highly variable and can lead to different interpretations of the same data set.

As noted by Dr. Ginn, the identity or qualifications of any experts who exercised the BPJ that led to the WOE assessment presented in the DTR is unclear.

Inspection of the Sediment Quality Objectives ("SQOs") for enclosed bays and estuaries in California (CSWRCB (2009)) shows that more weight is given to the benthic community leg of the Triad than the sediment toxicity leg. For example, Table 9 of CSWRCB (2009) presents the Severity of Biological Effects Matrix. Inspection of that matrix shows that the low, moderate, or high benthic condition categories determine the overall effects designation for a station, regardless of the toxicity categories. For example, if a station is in the Low Disturbance Category for benthic condition, its overall biological severity designation is Low Effects, regardless of whether the toxicity condition is in the Low, Moderate, or High Toxicity Categories. Therefore, although the Site is explicitly exempt from regulation by the SQOs, it is instructive that the SQOs are consistent with the sediment quality experts in Bay et al. (2006b), by giving greater weight to the benthic community leg of the Triad than the sediment toxicity leg.

Therefore, the failure of the DTR to give the benthic community leg of the Triad more weight than the sediment chemistry and sediment toxicity legs, ignored the greater importance of that leg, as documented in Bay et al. (2007b) and CWSWRCB (2009), and led to an overly conservative assessment that gave unwarranted weight, in particular, to the sediment chemistry leg of the Triad.

C. The Results of the Bivalve Larvae Sediment Toxicity Test are Given an Inappropriate Amount of Weight in the Triad Analysis (TCAO Finding 18; DTR §§ 18.3, 18.5)

Dr. Ginn noted that that there were substantial discrepancies between the results for the bivalve larval development test, and the other two toxicity tests that were evaluated at all 30 Triad stations at the Site (i.e., the amphipod survival test and the sea urchin fertilization test). Table 18-8 of the DTR shows that significant toxicity was found at 12 of the 30 Triad stations for the

bivalve larvae test. By contrast, significant toxicity was found at only one of the 30 Triad stations for the amphipod test, and at none of the 30 stations for the sea urchin test. Moreover, no significant toxicity was found for the other two toxicity tests at any of the 12 stations at which significant toxicity was found for the bivalve larvae test. In light of these major discrepancies, Dr. Ginn stated that:

> Based on the low correspondence with other toxicity tests and with sediment chemistry, it is important to assess whether the bivalve larvae test is producing accurate and reliable results. Experience at other sites has shown that the bivalve larvae test does not have the same reliability as the amphipod test. For example, Thompson et al. (1997) found weak relationships between sediment contamination and the results of bivalve larvae tests in San Francisco Bay. In the same study, the authors reported significant relationships between mixtures of sediment contaminants and the results of the amphipod test using Eohaustorius, the same species used for the shipyard study. Bay et al. (2007a) note that the bivalve larvae sediment-water interface test has only fair reproducibility among laboratories and has a low relative precision of the response.

(Ginn 3/11/11 Expert Report, at p. 23.)

Inspection of the Quality Assurance and Quality Control Report ("QA/QC Report") for the bivalve larvae tests conducted at the 30 Triad stations at the Site (Appendix H of Exponent 2003) shows that problems were identified for this test, and that it was recommended that those problems be considered when the bivalve results were analyzed in the overall Triad analysis. Specifically, the QA/QC Report stated that:

> Test organism responses in the second test batch may have been more sensitive to the fine-grained sediment than the test organisms in the first batch.

(Appendix H of Exponent 2003)

In addition, The QA/QC Report for the bivalve test stated that:

> Examination of the abnormality results for each sample showed that results for several samples exhibited unusually high variability due primarily to a single outlier value.

(Appendix H of Exponent 2003)

Finally, the QA/QC Report for the bivalve test concluded that:

> Unusually high variability was observed in the abnormality results for several samples. This variability is not clearly attributable to any aspect of laboratory performance or to specific conditions within

> the unusual replicates…The variability in the test results may reflect varying sensitivity within the group of test organisms. In addition, modification of the standard bivalve test method…to isolate the larvae from the sediment…may have introduced physical variations within the test chamber that affect larval development. The lack of consistency among some bivalve test replicates may indicate problems with the bivalve test method or test conditions, and should be considered during data interpretation. Although the high variability does not appear to be a QA/QC issue, it could affect interpretation of the results, and should be considered during data analysis.

(Appendix H of Exponent 2003)

Therefore, the failure of the DTR to acknowledge or address the issues identified with the bivalve larvae test identified in the QA/QC Report, as well as the discrepancies in the toxicity designations based on the bivalve test compared with those based on the amphipod and sea urchin tests, resulted in an overly conservative analysis in which sediment toxicity was considered "Moderate" in Tables 18-1 and 18-9 of the DTR on the sole basis of the questionable results for the bivalve test.

D. Bioaccumulation Data is Incorrectly Interpreted (TCAO Finding 19; DTR § 19.1.)

Finding 19 of the TCAO states:

> The San Diego Water Board evaluated initial laboratory bioaccumulation test data to ascertain the bioaccumulation potential of the sediment chemical pollutants at the Shipyard Sediment Site. Examination of laboratory test data on the chemical pollutant concentrations in tissue of the clam *Macoma nasuta* relative to the pollutant concentrations in sediment indicates that bioaccumulation of chemical pollutants is occurring at the Shipyard Sediment Site.

However, expert opinion disagrees with the expressed findings. "The Board has inappropriately interpreted the bioaccumulation data by not fully evaluating the consequences of any bioaccumulation through an appropriate risk assessment." (Allen 3/11/11 Expert Report, at p. 18.)[2] More specifically, Dr. Allen opines:

> 5.2. Bioaccumulation at the Shipyard Sediment Site.
>
> The Tentative Cleanup and Abatement Order (California Regional Water Quality Control Board - San Diego Region. 2010a) evaluates

[2] Expert Report of Herbert E. Allen regarding Importance of Bioavailability for Risk Assessment of Sediment Contaminants at the NASSCO Site – San Diego Bay, dated and submitted to the Regional Board on March 11, 2011. (the "Allen 3/11/11 Expert Report).

> the laboratory bioaccumulation test data obtained for the clam, Macoma nasuta. It is correctly noted that concentrations of arsenic, copper, lead, mercury, zinc, TBT, total PCBs, and high molecular weight PAHs in the Macoma nasuta tissue increase with respect to their concentrations in the sediment. This leads to the conclusions that these compounds are bioavailable at the Shipyard Sediment Site and that bioaccumulation is occurring at the site.
>
> These conclusions regarding bioavailability and bioaccumulation are extended to further assessments regarding chemicals. For example, those chemicals that have been selected as Indicator Chemicals, arsenic, copper, lead, mercury, zinc, TBT, high molecular weight PAHs, and total PCB homologs were selected based solely on the results of Macoma tissue bioaccumulation. This is contrary to the narrative water quality objective for toxicity applicable to San Diego Bay and the Shipyard Sediment Site which provides that: "All waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal, or aquatic life." The Macoma tissue bioaccumulation testing does not assess the required toxicity or assessment of detrimental physiological responses that are specified in the water quality objective. It merely indicates that the chemicals are present in the exposed Macoma. To assess the responses specified in the water quality objective, an appropriate risk assessment must be carried out.
>
> 5.3 Conclusions.
>
> Bioaccumulation is a normal process for both metals and organic compounds. High levels of bioaccumulation can lead to detrimental responses either in the organism that has bioaccumulated the compound or in consumer organisms. An appropriate risk assessment must be carried out to evaluate if the bioaccumulation produces risk to consumer organisms.

(*Id.* at pp. 19-20.)

BAE Systems concurs and joins in the opinions of Dr. Allen with respect to bioaccumulation and bioavailability. Based on Dr. Allen's opinions, it is likely that the Regional Board's risk assessment conclusions have been overstated for risks that certain chemicals pose to various Bay organisms.

II. AQUATIC-DEPENDENT WILDLIFE IMPAIRMENT ANALYSIS' TIER II EXPOSURE PARAMETER ASSUMPTION REGARDING AREA USE FACTOR IS OVERLY CONSERVATIVE AND UNSUPPORTED (TCAO FINDING 24; DTR § 24.2.2, TABLE 24-6)

This "Tier II risk assessment objective was to more conclusively determine whether or not Shipyard Sediment Site conditions pose an unacceptable risk to aquatic-dependent wildlife

receptors of concern." (TCAO, Finding 24.) "Based on the Tier II results, as summarized in Table 24-1 and Table 24-2 [of the DTR], the San Diego Water Board determined that ingestion of prey caught within all four assessment units at the Shipyard Sediment Site poses a risk to all aquatic-dependent wildlife receptors of concern (excluding the sea lion)." (DTR, § 24.1.)

The DTR's aquatic-dependent wildlife Tier II impairment analysis includes an area-use factor ("AUF") assumption which is defined as the "fraction of the daily intake of a given dietary component or inert medium derived from the site (unitless area-use factor)." (DTR, § 24.2.2.) This Tier II analysis uses an AUF value of 1, which equate to an assumption that the receptors selected will catch and consume 100% of their prey from within the Shipyard Sediment Site. (Deposition of Tom Alo ("Alo Deposition"), Vol. II, at 329:7-12.)

With respect to Finding 24 and the associated sections of the DTR supporting that finding, expert opinions, as well as that of the Cleanup Team itself, are in accord: the DTR's use of a 100% AUF assumption in this Tier II analysis is overly conservative, unsupported by evidence or authority, and results in a significant overestimation of risk to aquatic-dependent wildlife.

Dr. Ginn addressed the 100% AUF assumption used by the DTR in this analysis:

> **Failure to Consider Actual Habitat Use**
>
> One of the primary risk-driving assumptions made by the Staff in their exposure assessment is selection of an area use factor (AUF) of 1.0 for all receptors. In other words, for purposes of risk evaluation, it is assumed by the Staff that all modeled receptors obtain 100 percent of their diet from within the confines of the [Shipyard Sediment Site][3], and that prey items sampled at [the Shipyard Sediment Site] stations are therefore representative of the entire diet for each receptor. This assumption is clearly unrealistic, and the resulting conclusions based on this model are an inaccurate representation of actual wildlife exposure and risk.

(Ginn 3/11/11 Expert Report, at p. 59.)

Dr. Ginn also explains that the aquatic-dependent wildlife ecological risk assessment ("ERA") set forth in the TCAO/DTR is "clearly not compliant with" federal or California regulatory guidance and standards for AUF application. (*Id.* at pp. 61-65.)

Tom Alo was designated by the Cleanup Team as its "Person Most Knowledgeable"

[3] The same AUF value of 1 is assumed by the DTR for both shipyard leaseholds. (DTR, § 24.2.2.)

regarding aquatic-dependent wildlife impairment, and was deposed in that capacity. (Alo Deposition, Vol. II at 303:3-9.) Speaking on behalf of the Cleanup Team in that capacity, Mr. Alo agreed that the 100% AUF assumption is "very conservative." (*Id.* at 331:16-19.) Mr. Alo further conceded that the Cleanup Team was not relying upon any guidance document or agency policy in selecting a 100% AUF assumption (*id.* at 333: 21-23), and agreed that it is "actually probable" that the selected receptors consume some amount of their diet from outside the Site. (*Id.* at 334:16-19.) Indeed, several of the receptors used in this analysis are migratory, and thus by definition cannot be permanent residents of Site. (*Id.* at 334:20-23.) And, importantly, Mr. Alo recognized that Tier II analyses should use site-specific and species-specific AUF data:

> 15 Q. Mr. Alo, in light of both EPA and state
> 16 guidance on this subject, wouldn't you agree that it's
> 17 reasonable to use site-specific and species-specific
> 18 area use factors for Tier 2 aquatic dependent wildlife
> 19 risk assessment?
> 20 MR. CARRIGAN: Documents speak for themselves.
> 21 Calls for a legal conclusion.
> 22 You can answer.
> 23 THE WITNESS: Yes.

(*Id.* at 340:15-23.)

Exponent (2003) calculated site-specific and species-specific AUFs for the same identified receptors. That data was reflected in Table 28-6 of the DTR for TCAO No. R9-2010-0002, released in December, 2009. With respect to the area identified as "Inside SWM", the AUF for every receptor is less than 1%.[4] (*Id.*) The AUFs for "Inside NASSCO" are approximately the same. (*Id.*) Mr. Alo was questioned regarding the variance between the Exponent-calculated site-specific and species-specific AUFs, and the 100% AUF assumption used by the Regional Board in the DTR:

[4] .6% for the East Pacific Green Turtle, .2% for all other receptors.

Q. Other than being very or overly protective, is there any other reason why this site-specific data based on receptors in San Diego Bay, based on the characteristics of the NASSCO leasehold and based on the

344

scientific literature cited by Exponent in the development of this table, is there any reason why you would not use this in connection with your Tier 2 risk assessment?

A. Again, I would have to look into it further and consult with other experts such as the natural resource trustee agencies.

Q. Okay. Let's assume for a minute that the 1.1 percent is an accurate estimation of the area use factor of the East Pacific green turtle inside the NASSCO leasehold.

The DTR used a factor of a hundred percent, correct?

A. Correct.

Q. So that would be roughly a hundred times this area use factor?

MR. CARRIGAN: Vague. Excuse me.

THE WITNESS: Roughly. Correct.

BY MR. RICHARDSON:

Q. 99 percent, is that closer? 99 times more?

So if the risk assessment were adjusted to account for the one-percent area use factor calculated by Exponent, what would that do to the overall risks

24 calculated in the Tier 2 assessment?
25 A. That would likely lower the risk.

345

1 Q. By approximately a hundredfold. Correct?
2 A. (Witness nods head.)
3 Q. I'm sorry?
4 A. Yes.
5 Q. The reporter can't take down a head nod.
6 That difference can be significant, right? I
7 mean, it could be the difference between triggering a
8 threshold and not triggering a threshold?
9 A. That's correct.
10 Q. Did the Cleanup Team conduct any study of the
11 actual use of these receptors or other receptors at the
12 shipyard?
13 A. No, we did not.
14 Q. Did the Cleanup Team calculate any
15 site-specific area use factors for any species at the
16 shipyard?
17 A. No, we did not

(Alo Deposition, Vol. II at 344:22-346:17.)

With respect to BAE Systems' leasehold, if Exponent's site and species-specific data were used instead of the default 100% AUF assumption, then based on Mr. Alo's testimony the aquatic-dependent wildlife risk at the BAE Systems' leasehold is overstated by approximately 500% for five of the six receptors, and by approximately 167% for the East Pacific Green Turtle.

In conclusion, as stated by Dr. Ginn, "[t]he Tier II ERA in the DTR is unrealistically biased by the reliance on Tier I (screening level) assumptions about exposure (e.g., area use)." (Ginn 3/11/11 Expert Report, at p. 74.) "The ERA uses unrealistic and nonscientific estimates of

wildlife use of the shipyard as foraging habitat. The use of these values in the ERA results in dramatic overestimates of risk to wildlife." (*Id.*) BAE Systems concurs and joins in Dr. Ginn's expert opinions with respect to the aquatic-dependent wildlife impairment analysis. (*See id.*, at pp. 59-75.) Those opinions are directly supported by the testimony of the Cleanup Team's person most knowledgeable on this topic, Mr. Alo, as set forth above.

III. HUMAN HEALTH IMPAIRMENT (TCAO FINDINGS 25-28; DTR §§ 25-28)

A. Human Health Beneficial Uses REC-1 and REC-2 are Not Adversely Impacted by Concentrations of Pollutants Present in the Marine Sediment At the Site (TCAO Finding 25; DTR § 25.1)

Finding 25 of the TCAO concludes that four identified beneficial uses (REC-1, REC-2, SHELL, and COMM) are "impaired due to the elevated levels of pollutants present in the marine sediment at the Shipyard Sediment Site." Section 25.1 of the DTR identifies the same four beneficial uses, and states "concentrations of the pollutants present in the marine sediment within and adjacent to the Shipyard Sediment Site causes or threatens to cause a condition of pollution or contamination that adversely impacts these four beneficial uses and thereby constitutes a threat to the public health." (DTR, § 25.1) (emphasis added.

Tom Alo was designated by the Cleanup Team as its "Person Most Knowledgeable" regarding human health impairment, and was deposed in that capacity. (Alo Deposition, Vol. I at 23:7-17.) Speaking on behalf of the Cleanup Team in that capacity, Mr. Alo testified that beneficial uses REC-1 and REC-2 present minimal risk to human health:

> 15 Q. Mr. Alo, it's my understanding that in light of
> 16 U.S. EPA's position in an analysis conducted under the
> 17 DTR, that the cleanup team concluded that contact water
> 18 recreation and non-contact water recreation presented
> 19 minimal risk to human health; is that correct?
> 20 A. That's correct.
> 21 Q. So the focus of the human health impairment
> 22 section, as you stated previously, was on shellfish
> 23 harvesting and commercial and sportfishing, correct?

24 A. Correct.

(Alo Deposition, Vol. I, at 66:25-68:24.)

Thus, Finding 25 of the TCAO and § 25.1 of the DTR should be revised to clarify that the Cleanup Team did not find human health risks associated with the beneficial uses Contact Water Recreation (REC-1) and Non-Contract Water Recreation (REC-2) to be impaired by the pollutants present in the marine sediment within and adjacent to the Site.

B. Human Health Impairment Analysis' Tier II Exposure Parameter Assumptions Regarding Fractional Intake Are Overly Conservative (TCAO Findings 26, 28; DTR §§ 26.1, 28.2.2.1)

The DTR's human health impairment Tier II analysis defines Fractional Intake as: "fractional intake of seafood consumed that originates from the Site." (DTR at 28-4.) Key assumptions underlying the DTR's fractional intake analyses include, but are not limited to, (1) fractional intake value of 1 (100%), (2) complete exposure pathway for anglers at the site, (3) consumption rates of 21g/day for recreational anglers and 161g/day subsistence anglers, and (4) an exposure duration of 30 years. While leeway for overly conservative assumptions may be appropriate for a Tier I screening level assessment, they are entirely inappropriate for a Tier II assessment. (Ginn 3/11/11 Expert Report, at p. 79.)

The TCAO/DTR's human health Tier II analyses, and thus the resulting tentative decisions, are based on the stringing-together of overly conservative, implausible (if not impossible) assumptions that "an angler visits the leasehold on a daily basis (choosing not to fish at anywhere else in the bay), bypassing armed security, catches fish and lobster that contain the maximum arsenic and PCB concentrations, then takes his catch home and consumes the entire fish and lobster, entrails and all." (Finley 3/11/11 Expert Report, at p. 22.)[5]

Dr. Ginn succinctly summarizes the result of these compounding errors:

> [T]he overly-conservative assumptions used in the Tier II baseline risk assessment result in a meaningless and implausible assessment that is constructed under the guise of being "conservative." These overly-conservative and unsubstantiated assumptions have a

[5] Expert Report of Brent L. Finley Regarding the Draft Technical Report for Tentative Cleanup and Abatement Order No, R9-2011-0001 (San Diego Bay), dated and submitted to the Regional Board on March 11, 2011 (the "Finley 3/11/11 Expert Report").

> dramatic effect on the resultant risk calculations. In effect, the DTR is combining a series of extreme assumptions, which result in a multiplicative effect on the final risk calculations.

(Ginn 3/11/11 Expert Report, at p. 81.)

BAE Systems concurs and joins in these concerns as expressed by experts Dr. Ginn and Dr. Finley. Several of said assumptions are addressed in more detail below.

1. Tier II Fractional Intake Assumption Value of 1 is Overly Conservative and Unsupported (TCAO Findings 28; DTR § 28.2.2.1)

The DTR's Tier II analyses assume that 100% of the fish and shellfish caught by the hypothetical receptor anglers would be sourced from the Shipyard Sediment Site. However, expert opinions, as well as that of Mr. Alo, are in accord: this assumption is overly conservative, unsupported by evidence or authority, and results in an overestimation of risk to human health.

"This assumption greatly overestimates Site chemical exposure to anglers." (Environ 3/11/11 Human Health Report, at p. 7.)[6] And it "is not reasonable because there is a lack of a complete exposure pathway." (*Id.*) Environ concludes that the Regional Board's assumption of a fractional intake value of 1 "is not supported by applicable agency guidance or scientific evidence." (*Id*. at 8.)

Dr. Ginn is in accord:

> The most unrealistic assumption used in the DTR Tier II assessment is the FI. FI represents the portion of the seafood diet that an angler would receive directly from the assessment area. In the DTR, FI is set to 100 percent, the same value used in the Tier I screening-level assessment. In other words, the baseline risk assessment (and determination of need for remediation) is entirely based on the assumption that both recreational and subsistence anglers catch all of the fish or lobster that they consume within the boundaries of the Site. This assumption is clearly unrealistic and does not reflect actual or potential usage of the Site by recreational or subsistence anglers.

(Ginn 3/11/11 Expert Report, at pp. 81-82.)

The Regional Board actually concedes the same in the DTR: "Since it is likely that anglers catch at least a portion of their seafood from other locations in San Diego Bay and/or the

[6] Expert Report of Environ entitled Evaluation of CRWQCB Human Health Risk Assessment for the San Diego Shipyard Sediment Site, dated and submitted to the Regional Board on March 11, 2011 (the "Environ 3/11/11 Human Health Report").

fish caught from the Shipyard Sediment Site comes from elsewhere, the actual site fractional intake is likely to be less than 100 percent." (DTR, § 28.2.6.) The 100% assumption is used by the Regional Board despite the acknowledgment in the DTR that fishing is unlikely and currently prohibited at the Site, as detailed in section III-B-2 below. Based upon these factors and others, Exponent (2003) used a fractional intake assumption for inside the BAE Systems leasehold of 2.3%. (DTR, § 28.2.6.) Exponent's assumption was calculated by taking the length of the shoreline and piers of the shipyards, and comparing it to the length of the shoreline of San Diego Bay. (Alo Deposition, Vol. I at 98:9-99:16.) *That assumption itself was conservative* considering Exponent assumed fishing inside the heavily-secured Site, where fishing is prohibited, would be at least as attractive as fishing elsewhere in San Diego Bay. (*Id.*)

In comparison to the Exponent-calculated fractional intake assumption of 2.3% to the DTR's assumption of 100%, Mr. Alo agreed that 100% is an "extremely conservative assumption." (*Id.*, at 95:1-4.) And Mr. Alo does "not [dispute] the accuracy [of Exponent]. We just didn't agree with that fractional intake." (*Id.* at 97:18-21.) Mr. Alo defended the DTR's use of a 100% fractional intake assumption by reference to the considerations set forth in bullet point format in the DTR at pages 28-10 and 28-11, including (1) the possibility that despite the fishing prohibition, BAE Systems or Navy personnel may fish off of the piers, (2) although BAE Systems has a long term lease through 2034, it is possible BAE Systems may not occupy the site in the future and site usage may allow for fishing, and (3) the possibility that pollutants within the BAE leasehold may migrate to areas outside the leasehold where fishing is permitted. (*Id.* at 93:18-94:8.) As detailed in section III-B-2 below, those stated considerations should be disregarded in the human health impairment analysis, and consequently the DTR's AUF assumption is without justification.

2. Tier II Assumption of a Complete Exposure Pathway for Anglers at the Site is Overly Conservative and Unsupported (TCAO Findings 26, 28; DTR § 28.2.2.1)

Although it is recognized that "public fishing and shellfish harvesting are currently unlikely events at the Shipyard Sediment Site due to the current security measures," the TCAO/DTR nonetheless assumes a complete exposure pathway exists for human anglers to catch

shellfish and fish from within the Site. (DTR § 28.2.2.1.) In support of that assumption the Cleanup Team relied upon four recommended considerations provided by Mr. Brodberg of the Office of Environmental Health Hazard Assessment ("OEHHA"). (DTR, p. 27-5.)

The Environ 3/11/11 Human Health Report addressed, *inter alia*, the assumption in the TCAO/DTR of a complete exposure pathway for human anglers (see Section 2.1). For the reasons stated therein, and to conserve judicial and party resources by not re-stating the same here, BAE Systems joins in Environ's evaluation and criticism of this assumption as stated in Section 2.1, 2.1.1, and 2.1.2 of the Environ 3/11/11 Human Health Report, as well as the resulting relevant portion of the Conclusion stated in Section 3 of the same. In sum, the assumption of a complete exposure pathway for anglers at the site is invalid, unsupported, and speculative. (*Id.*)

The four recommended considerations from Mr. Brodberg/OEHHA, relied upon by the Cleanup Team in the TCAO/DTR, suffer the same defects, as detailed by Environ. (*Id.)*

The Finley 3/11/11 Expert Report echoes and expands upon the DTR's identified (but discarded) security measures precluding fishing at the Site. (Finley 3/11/11 Expert Report, at pp. 16-17). Dr. Finley also further undermines the recommended considerations relied upon by the Cleanup Team in discarding those security measures by noting the applicable regional governmental authorities' plans for the Site. (*Id.* at p. 16.) For example, the Port's Master Plan, dated January 2010, makes clear that the "Port Master Plan seeks to preserve and protect this unique coastal resource by limited uses to strictly marine oriented industrial ones." (Alo Deposition, at 104:15-20; Ex. 1107 to Alo Deposition at p. 70.) The "Belt Street Industrial" area (including BAE Systems' leasehold), a "heavy industrial district, south of the Tenth Avenue Marine Terminal, consists several well-established and highly important marine-related manufacturing, processing, and serving establishments." (*Id.*, at p. 72.) "The Precise Plan *calls for the continued operation of the existing marine related industries*." (*Id.* at 73) (emphasis added.) Similarly, the City of San Diego's General Plan, dated March 2008, mitigates against the land-use speculation contained in the DTR: "Land identified as prime industrial will undergo additional scrutiny if land use amendments are proposed that could diminish the potential role for base sector and related employment uses either before or after comprehensive community plan

updates." (Alo Deposition, at 105:12-106:20; Ex. 1108 to Alo Deposition at pp. EP-7.) The Shipyard Sediment Site is land identified as prime industrial. (*Id.*) Thus, the Site's heavy marine industrial use, including prohibition of and lack of access to angling, is extremely unlikely to change in the foreseeable future.

Moreover, the Regional Board is not aware of any literature or guidance that would instruct it to include speculative future land uses in calculating fractional intake assumptions:

> Q. Are you aware of any guidance or literature that would instruct the cleanup team to include speculative future land uses in calculating the fractional intake?
> MR. CARRIGAN: Vague.
> THE WITNESS: No.

(Alo Deposition, Vol. II, at 392:11-16.)

BAE Systems is aware of no evidence in the Administrative Record, or otherwise, supporting the possibility of fishing or lobstering at the Site despite the security measures and prohibition. The Regional Board is aware of no such evidence or authority either:

> Q. Mr. Alo, in light of your prior testimony that the administrative record is voluminous and that you are not aware of any CAO proceeding with a larger record, and because there is no evidence in this voluminous record that anyone has fished at the NASSCO site, and in light of the security measures that we just reviewed and the photographs that you saw and the discussion on page 28-10, wouldn't you agree that it's an unrealistic assumption to assume that someone fishes at the shipyard for 30 years and eats only fish caught at the shipyard?
> MR. CARRIGAN: I'm going to object as vague.
> But you can answer, if you understood the

17 question.
18 THE WITNESS: I agree.

(Alo Deposition, Vol. I, at 93:5-18; *see also* Cleanup Team's response to BAE System's Request for Admission Nos. 25-26.)

Finally, Mr. Alo confirmed that the Regional Board is aware of no evidence to support the speculative consideration stated in the DTR that "sediment chemical pollutants within the NASSCO and BAE Systems leaseholds may migrate to areas outside the leasehold where fishing by boat and fishing at a nearby public pier [] is accessible" (DTR, 28-11):

8 Q. Mr. Alo, on page 28-11 of the DTR, it states
9 that "Sediment chemical pollutants within the leasehold
10 may migrate to areas outside the leasehold where fishing
11 occurs."
12 Are you aware of any evidence to support that
13 statement?
14 A. I'm sorry. Where are you reading that?
15 Q. I knew you were going to ask that. It's the
16 second bullet at the top of the page.
17 A. The question again?
18 MR. RICHARDSON: Can you read back the
19 question.
20 (Record read.)
21 THE WITNESS: I do recall samples being
22 collected outside the leasehold and I don't remember
23 what the concentrations were.
24 BY MR. RICHARDSON:
25 Q. So as we sit here today, you are not aware of

109

1 any evidence that there is sediment that leaves the

2 shipyard and migrates out into the Bay, correct?

3 A. Correct.

(Alo Deposition, Vol. I, at 109:8-110:3.)

Without any evidence or authority to support them, the considerations identified in the first three bullet points on page 28-11 of the DTR do not provide a reasonable basis to discard the realities of the current and future site use and thereby assume a complete exposure pathway for the receptor anglers. Those identified considerations should thus carry no weight in the human health impairment analysis.

3. Tier II Consumption Rate Assumptions are Overly Conservative and Unsupported (TCAO Findings 26, 28; DTR § 28)

a. Expert Opinion Disagrees with the Assumed Consumption Rates (TCAO Findings 26, 28; DTR § 28)

The DTR assumes consumption rate assumptions of 21g and 161g per day for recreational and subsistence anglers, respectively. (*See, e.g.*, DTR, Table 28-7.) These exposure assumptions are overly conservative and unrealistic. As stated by Dr. Finley:

> o The RWQCB assumed that subsistence anglers would *always* consume the *entire* fish or shellfish (guts and all), which is completely unfounded and only serves to overestimate risk. It also runs counter to the information collected in a detailed study of anglers *in the San Diego Ba*y (County of San Diego 1990).
>
> o The RWQCB employed fish consumption rates from the anglers in the Santa Monica Bay. Considering the lack of access and industrial nature of the NASSCO shipyard, the use of fish consumption rates from the Santa Monica Bay, a highly accessible recreational area, is inappropriate and inconsistent with the practice of risk assessment in general and regulatory risk assessment guidance in particular.

(Finley 3/11/11 Expert Report, at p. 6) (emphasis in original.)

Dr. Finley further states:

> The "current default EPA assumption for recreational and subsistence anglers is 2 and 6.8 g/day of the *edible portions* of caught fish ((USEPA, 1997); Table 10-52)" However, in their assessment, the RWQCB assumed that the *subsistence angler would always consume the entire fish (sand bass) or shellfish (lobster), skin, guts, filter organs, and all,* and not just the filet or edible portion. This is a critical (yet baseless) assumption that serves to artificially inflate the RWQCB risk

(Finley 3/11/11 Expert Report, at p. 10) (emphasis in original.)

Dr. Finley concludes: "In summary, the RWQCB's assumption that subsistence anglers would consume entire fish and/or shellfish following each and every trip (instead of just eating the edible portion) has resulted in risk estimates for subsistence anglers that are too high by at least an order of magnitude." (*Id.* at 13.)

BAE Systems agrees and joins in the foregoing expert opinions, and the supporting data and rationale (*id.*, at § 2-a), with respect to the consumption rates assumed in the TCAO/DTR's Tier II human health impairment analysis.

b. **The EHC Fisher Survey Should be Disregarded Entirely (DTR § 1.5.3.3)**

The Regional Board cites to the Environmental Health Coalition ("EHC") having conducted an "Opportunity" sample survey in 2002 of people fishing from piers near the Shipyard Sediment Site (the "EHC Fisher Survey"). (DTR, § 1.5.3.3.) The Regional Board adopts the EHC description of the survey as a "…selected sample that is highly exposed to fish from near the shipyards, Naval Station San Diego, and the Southern portion of the San Diego Bay. (*Id.*)

EHC Fisher Survey was not designed or conducted in a manner consistent with appropriate standards of survey design. (U.S. EPA 1992, 1998.) As a consequence, the survey results are most likely biased, are not representative, and do not provide any useful estimates of fish consumption.

The EHC Fisher Survey is based on a limited number of questionnaires conducted at three fishing sites in the San Diego Bay. Interestingly, the fishing pier closest to the NASSCO and BAE shipyards, the Coronado Pier, was not surveyed. (Deposition of Laura Hunter ("Hunter Deposition"), at 92:2-7.)

The survey authors did not consult any standard protocol in designing their survey. Neither of the survey designers were trained or educated in preparing appropriating protocol and surveys. (*Id.* at 95:5-15; 96:15-17.) It is not clear if EHC accounted for repeated surveys of the same individual. In a properly conducted survey, one of the first questions asked is whether or

not the participant has been interviewed before. (U.S. EPA 1998; Finley 3/11/11 Expert Report, at p. 19.)

Certain methodological defects exist in the EHC Fisher Survey. The survey was introduced to participants in a way that likely biased responses. The scientific literature on survey techniques and validation documents that survey participants are susceptible to responding in a way that they believe the interviewer wants to hear. (U.S. EPA 1992.) The introduction of the questionnaire used by EHC here[7] makes it clear the interviewer believes that there are health issues associated with fish consumption. U.S. EPA (1992) guidance states, "The selection and phasing of questions to meet survey objections is critical." The narrative text raises alarms in survey participants leading to non-impartial data likely being collected.

The survey does not state the total number of anglers at any of the piers or the fraction of those anglers who participated in the survey. Without this information the results of the survey apply only to the pier anglers who were actually survey and not to generalized pier anglers as a whole. The study's authors acknowledge the lack of statistical validity by saying that "[t]he survey group represents an opportunity sample of fishers from South Bay piers, it is not a randomized sample," and, "[i]t is not a representative sample of all San Diego Bay fishers or all South Bay residents." (Hunter Deposition, Ex. 603.)

EPA's *Guidance for Conducting Fish and Wildlife Consumption Surveys* (U.S. EPA 1998) includes nearly 70 references describing various issues related to survey design. This guidance document (U.S. EPA 1998) recommends that any one of five different statistical approaches be employed for interviews of anglers at their fishing site; these approaches are simple random sampling without replacement, stratified random sampling, systematic random sampling, two-stage sampling, and non-uniform probability sampling. EHC did not use any of these recommended approaches for selecting survey participants. EPA guidance (U.S. EPA 1998) provides further recommendations regarding the development of fish consumption rate data adequate for use in policy decisions stating:

[7] "Our goal as an organization is to help communities resolve health issues and the contaminating toxins in the San Diego bay." (Ex. 604 to Hunter Deposition.)

> Since consumptions rates will "have a significant impact on the risk estimates and on the selection of fish consumption limits" (U.S. EPA 1992), it is important to consider carefully how the consumption rate will be determined from the questions asked. For example, consumption rates will be calculated fro species-specific estimates of the frequency of fish consumption ("1 meal per week from May through July"). …Insufficient delineation on the timing or details of consumption patterns will result in poor estimates of the consumption rate and consequently inaccurate estimates of risk.

Because of EHC's non-random selection of survey participants and poor questionnaire design, bias is almost certainly present in the survey results. The survey's conclusions regarding the frequencies of angling habits and ethnicity are therefore not verifiable indicators of the pier fishing community as a whole.

No actual consumption rates were determined or discussed. There are no measures or estimations of how frequently the fish caught are consumed. No questioning regarding the species or size of fish or sampling to determine concentrations of contaminants was performed in the fish that were consumed.

EHC results include some estimations of fishing frequency, but preparation habits are extrapolated from common cultural practices in Filipino and Asian cultures, not individual responses. (Finley 3/11/11 Expert Report, at p. 19.)

The EHC Fisher Survey emphasizes the risks associated with consumption of whole fish or fish organs. However, the survey did not ask survey participants if they consumed whole fish or fish organs. Similarly, the report emphasizes that not all anglers eat only the filet of fish, yet they never asked the participants if they filet the fish prior to consumption. EHC equated "eating fish skins" with "eating an entire fish," which is clearly not appropriate since many filets are eaten with the skin on. (Deposition of Joy Williams ("Williams Deposition"), at 100:16-24, 103:21-24, 107:13-16; Hunter Deposition, at 137:3-6, 138:13-15.) The survey does not provide any data on subsistence fishing because it did not ask survey participants how much of the fish they caught they also consumed and because no information exists regarding concentration of contaminants contained in the fish eaten.

Thus, it is inappropriate to conclude that subsistence fishing or significance exposures occurred via the information obtained through the EHC surveys. The EHC Fisher Survey should

be disregarded entirely for purposes of the human health impairment analyses.

4. Tier II Exposure Duration Assumption of 30 Years is Overly Conservative and Unsupported (TCAO Finding 28; DTR §§ 28.2.2, 28.2.2.1; DTR Table 28-7)

The DTR's human health impairment Tier II analyses utilizes an exposure duration assumption as one component of the model used to estimate human exposure to contaminants in fish and shellfish collected at the Site. (DTR, p. 28-12.) The DTR assumes an exposure duration of 30 years for both types of receptor anglers. (DTR, Table 28-7.)

Expert Dr. Finley succinctly criticizes this exposure duration assumption:

> The RWQCB used the highest EPA default point estimate for exposure duration with no discussion, no explanation, and no justification. The RWQCB could have reviewed local census or creel angler data to develop a more accurate and site-specific estimate. They also could have explored alternative (and lower) default EPA estimates or used a distribution of estimates. Current EPA guidance recommends using an estimate of 9 years, which represents the 50th percentile (USEPA 1997a). The studies that this value are derived from reported average exposure duration times ranging from 4.6 years to 12 years (Israeli and Nelson 1992; Johnson and Capel 1992; U.S. Bureau of the Census 1993). It should be noted that the EPA is currently proposing that the default average duration be lowered to 8 years (USEPA 2009). It does not appear that the RWQCB reviewed or considered any of this information.

(Finley 3/11/11 Expert Report, at p. 21) (emphasis added.)

Although that EPA-recommended 9 year period was posed to Mr. Alo during his deposition, he indicated he was not aware of that guidance, and defended (without explanation) the use of a 30 year period as a "reasonable duration rate." (Alo Deposition, Vol. I, at 145:21-147:11.) Moreover, Mr. Alo confirmed that the Cleanup Team lacks any site-specific data that would justify the use of a 30 year exposure duration period:

> 22 Q. Do you have any site-specific data that they
> 23 would consume a whole fish and a whole lobster daily for
> 24 30 years?
> 25 A. No.

(Alo Deposition, Vol. I, at 121:22-25.)

9 Q. So with this site-specific study on San Diego
10 Bay, is it unrealistic or overly conservative to assume
11 that someone fishes every day at the shipyard for 30
12 years?
13 MR. CARRIGAN: Incomplete hypothetical.
14 THE WITNESS: Yes.

(Alo Deposition, Vol. I, at 144:9-14.)

In sum, there is no reasonable or justifiable basis for the DTR's use of a 30 year exposure duration assumption in the Tier II human health impairment analysis. The DTR's resulting risk assessment for the Site is significantly overstated.

IV. NATURAL RECOVERY IS NOT PROPERLY ACCOUNTED FOR IN REMEDY SELECTION (TCAO FINDINGS 30, 35; DTR §§ 30.1, 30.2, 35.3)

Finding 32 acknowledges that natural recovery has been a successful component of cleanup actions in San Diego Bay, yet the preliminary remedial design described in Finding 35 fails to allow for the effect of natural recovery at the Site. Currently available data from the BAE shipyard demonstrates that natural recovery is occurring, and its rate should be incorporated into remedy selection.

A. Source Control Issues Affect All Potential Primary Remedies (TCAO Findings 30, 32, 34; DTR §§ 4.3, 4.7, 30, 32.7, 34.4)

David Barker was designated as and deposed in his capacity as the "person most knowledgeable" for the Cleanup Team regarding alternative remedies analyses, including monitored natural attenuation. (Barker Deposition, Vol. II, at 255:19-256:1.) The DTR states that natural recovery is one of the "readily employable and proven remediation strategies." (DTR, § 30.1.) Mr. Barker agrees with that statement. (Barker Deposition, Vol. II, at 262:23-263:1.) Natural recovery was not selected as the primary remedy for the Site because "[c]omplete control of site sources has not been fully demonstrated to a level that would assure adequate rates of recovery." (DTR, at p. 30-3.) However, Mr. Barker testified that recontamination from off-site sources would affects *all* potential remedies:

Q. If we have off-site sources that are continuing to contaminate a site, it will continue to contaminate the site whether we do natural recovery, dredging, capping, or any other remedy; right?
A. Right. That's correct. Yeah.
Q. I'm having trouble understanding how that could influence a decision on which remedy to select.
A. Oh, you're having trouble where there are off-site sources?
Q. Why that would favor any type of dredging. For example -- I'll give you an example. If you dredge the site and there's recontamination, then you may simply have to dredge it again.
A. Yes.
Q. So that would be an ineffective remedy and you'd have remedy failure.
A. Yeah.
Q. So if you choose capping, as is the case with Convair Lagoon, where sources weren't controlled and there's additional pollution on top of the cap, there's

278

further remediation necessary.
A. Yes.

(Barker Deposition, Vol. II, at 278:6-279:2.)

Thus, the perceived source control issue is not a factor that should favor one potential remedy over another. And, as discussed below, available recent data indicates natural attenuation is actively occurring at the site.

B. 2009 NOW Data Evidences Natural Attenuation is Actively Occurring (TCAO Findings 30, 35; DTR §§ 30.1, 30.2, 35.3)

In July of 2009, a supplemental triad study was conducted at the site evaluating five stations that had previously been sampled during the 2001/2002 period by Exponent. This supplemental study is often referred to as the "NOW" testing. The NOW results are shown in DTR Table 32-22.

At his deposition Mr. Barker was shown tables summarizing and comparing the data from the 2001/2002 investigation to the NOW data for the five primary constituents of concern ("COC"). (Barker Deposition, at 318-333; Exs. 1227, 1228.) Comparison of these two data sets shows that the concentrations of all such COCs have decreased over the period between 2001/2002 and the July 2009 NOW testing. Concentrations of copper have decreased from 183.3 to 167.8 mg/kg, corresponding to a rate of 1.1% per year (8.5% total decrease). Concentrations of mercury have decreased from 1.5 to 0.8 mg/kg, corresponding to a rate of 7.9% per year (49% total decrease). Concentrations of total PCB congeners have decreased from 247 to 188.7 µg/kg, corresponding to a rate of 3.4% per year (23.6% total decrease). Concentrations of HPAH have decreased from 2,823.4 to 2,293.3 µg/kg, corresponding to a rate of 2.6% per year (18.8% total decrease). Concentrations of TBT have decreased from 82.1 to 23.3 µg/kg, corresponding to a rate of 16.7% per year (71.6% total decrease). (*Id.*)

C. 2010 AMEC Data Evidences Natural Attenuation is Actively Occurring (TCAO Findings 30, 35; DTR §§ 30.1, 30.2, 35.3)

Data from the surface sediment sampling conducted by AMEC[8] prior to the dredging of the Pride of San Diego dry dock sump can be compared to the data presented by Exponent (2003) in the same area. The spatial coverage of the two data sets is not identical, but the data sets can be compared using only data from the spatial extent common to the two data sets. Specifically, data from Exponent stations SW03, SW06, SW07, SW10, SW11, SW12, SW15, SW18, SW19, SW25, SW26, SW27, SW30, SW31, SW32, SW33, SW34, and SW36 are in the same area as the

[8] The Cleanup Team is in the process of adding to the administrative record the AMEC Earth and Environmental Final Technical Report, Pre- and Post-Dredge Sediment Survey for BAE Systems San Diego Ship Repair, Inc., San Diego Bay, San Diego, California, March 2011.

locations sampled by AMEC.

PCBs were measured as Aroclors, homologs, and a subset of congeners in the 2001 data set, but only a more limited subset of PCB data, namely congeners, was measured in 2010. Therefore changes in PCB concentrations can only be evaluated using the sum of congeners. The list of congeners analyzed in the two studies is almost identical, however, so use of the sum of congeners is appropriate for evaluating the rate of natural recovery.

Comparison of these two data sets shows that the median concentrations of all COCs have decreased over the period between 2001 and 2010 (the median is used for this comparison because it is a more stable measure of central tendency than the mean). Concentrations of copper have decreased from 170 to 160 mg/kg, corresponding to a rate of 0.7% per year (5.9% total decrease). Concentrations of mercury have decreased from 0.75 to 0.66 mg/kg, corresponding to a rate of 1.4% per year (12% total decrease). Concentrations of total PCB congeners have decreased from 200 to 44.5 µg/kg, corresponding to a rate of 17% per year (77.7% total decrease). Concentrations of HPAH have decreased from 4,450 to 1,843 µg/kg, corresponding to a rate of 9.8% per year (58.6% total decrease). Concentrations of TBT have decreased from 51 to 12 µg/kg, corresponding to a rate of 16 percent per year (76.5% total decrease).

The consistent decreases in concentrations of COCs in surface sediment, and the relatively high rate of decrease of PCBs, indicate that natural recovery is occurring in sediment of the Site. The CAO should therefore take natural recovery into account when establishing the cleanup footprint and during remedy selection. Given sufficient time, natural attenuation could be an appropriate remedy to reach the alternative cleanup levels set forth in the TCAO. Furthermore, given the decreased median concentrations of all COCs that have occurred over the last nine years, the risks to the beneficial uses of the Bay now are less than the risks calculated using the earlier 2001 gathered data than those expressed in the TCAO and DTR. Therefore, the remedial cleanup levels and resultant remedial footprint as expressed in the TCAO and DTR are more conservative than necessary to adequately protect the Bay's beneficial uses.

D. Natural Attenuation Is Likely to Achieve The TCAO's Proposed Cleanup Levels in a Reasonable Time Without Active Dredging (TCAO Findings 30, 32, 35; DTR §§ 30, 32, 25)

Pursuant to State Water Board Resolution 92-49, the Regional Board has prescribed alternative cleanup levels for the Site to protect aquatic life, aquatic-dependent wildlife, and human health beneficial uses. (TCAO, Finding 32.) Those levels are set forth in Table 2. (TCAO, at p. 15.) On a SWAC basis, comparison of the alternative cleanup levels for the five primary COCs to the levels reflected by the recent AMEC data reflects the results of natural attenuation at the Site:

COC	Alt. Cleanup Level	AMEC Data
Copper	159 mg/kg	160 mg/kg
Mercury	0.68 mg/kg	0.66 mg/kg
HPAH	2,451 µg/kg	1,843 µg/kg
PCBs	194 µg/kg	44.5 µg/kg
TBT	110 µg/kg	12 µg/kg

The data from AMEC reflects significant decreases since the 2001/2002 timeframe. For the stations sampled by AMEC, four of the five primary COCs are below the post-remedial SWAC levels, while copper is negligibly above. This data suggests that the alternative cleanup levels prescribed by the Regional Board will be achieved within a reasonable time without active dredging.

That conclusion is in accord with recent expert opinion presented by Environ.[9] Analyzing grab-samples obtained by AMEC at the BAE leasehold, Environ concludes that

> concentrations of the five primary COCs in surface sediment have decreased 24 to 76%. Extrapolation of the proportionate decreases to the entire Site suggests that current (2011) Site-wide SWACs are below Site-specific risk-based sediment management criteria set by [the Regional Board] (2010) for restoration of aquatic dependent

[9] Expert Report of Environ entitled Comparison of 2001-2002 and 2011 Chemical Conditions in Surface Sediment at the San Diego Shipyard Sediment Site, dated and submitted to the Regional Board on March 11, 2011 (the "Environ 3/11/11 SWAC Expert Report").

> wildlife and human health Beneficial Uses. Thus, active remediation via dredging to meet chemical risk-based goals to address aquatic dependent wildlife and human health Beneficial Use Impairment is not required. Furthermore, 2011 results indicate natural recovery processes and/or source control may be sufficient to support a Monitored Natural Recovery management approach for addressing aquatic dependent wildlife and human health BUIs at the Site.

(Environ 3/11/11 SWAC Expert Report, at p. 5.)

While the only data available to evaluate whether natural attenuation is occurring is for samples outside the remedial footprint, it can be reasonably extrapolated that the same or greater natural attenuation is occurring within the shipyard areas designated for remediation. At a minimum, natural attenuation should be considered in evaluating the robustness of the remediation required. The remedial footprint as set forth in the TCAO and DTR does not adequately take into account the natural attenuation that has occurred. Furthermore, the evidence of natural attenuation demonstrates that, given the technical and economic feasibility factors of State Water Board Resolution 92-49, natural attenuation is an appropriate remedy for the Site.

V. RESPONSES TO COMMENTS AND CONCLUSIONS IN SECTION C OF THE MARCH 11, 2011 MACDONALD EXPERT REPORT FOR THE SAN DIEGO SITE (TCAO FINDING 33; DTR § 33)

On March 11, 2011, San Diego Coastkeeper submitted the Expert Report of Donald D. MacDonald, of MacDonald Environmental Sciences, Ltd., 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 (the "MacDonald 3/11/11 Expert Report"). BAE Systems responds to the comments and conclusions of said report contained in Section "C" entitled "Expert Opinion #1: Proposed Remedial Footprint" which states:

> 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.

The responses to comments that are provided in the following sections show that, contrary to the assertion by MacDonald, the remedial footprint identified in the TCAO does meet the requirements of cleanup according to the methods described in the DTR. Therefore, there is no

technical justification for expanding the footprint to include additional polygons.

A. Responses to MacDonald's Evaluation of the Methodology Used (TCAO Finding 33; DTR § 33)

1. Comment C.2.1 that "The sampling density is insufficient to accurately characterize the nature and extent of contamination at this type of site" Is Incorrect (DTR § 33; DTR Appendix for Section 33, Table A33-3)

The DTR presents analyses of information collected at 60 stations at the Site in 2001/2002 by Exponent (2003). Comment C.2.1 of MacDonald 3/11/11 Expert Report states "The sampling density is insufficient to accurately characterize the nature and extent of contamination at this type of site."

MacDonald states that "sediment sampling conducted at the Shipyards Sediment Site was inadequate to accurately characterize the nature and extent of sediment contamination." This assertion is incorrect. The station distribution scheme was consistent with the manner in which most schemes are designed at contaminated sediment sites. Stations are distributed with the highest density near sources where the highest COC concentrations are expected (especially in depositional environments), and with lower densities in areas removed from the sources, where contaminants are expected to be more widely dispersed by waves and currents. In fact, MacDonald described such a station distribution scheme when he stated that "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 the Shipyard Sediment Site, it was expected that most contaminant sources would be located near the shoreline, and that the piers would create depositional environments that would facilitate deposition of contaminants near the sources, resulting in patchy distributions with elevated concentrations. In contrast, contaminant sources were not expected to be found outside the pier lines, and in those locations, contaminants would be expected to be dispersed by waves and currents in San Diego Bay, and their concentrations in sediments would be lower and more evenly distributed. Therefore, 43 of the 65 stations sampled at the Site in 2001/2002 were located within the pier line of the site, as estimated by the property boundaries presented in Attachment 1

of the TCAO. This area encompasses approximately 63 acres (See Sections 2.3.1 and 3.3.1 of the DTR). The station density within the pier line (i.e., where contaminant deposition would be expected to be greatest) was therefore 0.69 stations per acre, which is approximately 2.7 time greater than the station density outside the pier line (i.e., 0.26 stations per acre), where contaminants would be expected to be dispersed by waves and currents in San Diego Bay. Therefore, the station distribution scheme used at the Site was consistent with the scheme commonly used at contaminated sediment sites.

The sediment chemistry results of the 2001/2002 sampling at the Site confirmed the assumptions used to design the station distribution scheme. The chemical concentrations presented in Table A33-3 of the DTR and the concentration contours presented in Figures 4-3 to 4-21 of Exponent (2003) show that in general, the highest concentrations were found within the pier line and lower, more evenly distributed concentrations were found outside the pier line. Therefore, the station distribution scheme used at the Site is sufficient to characterize the nature and extent of sediment contamination.

There are no firm rules or agency guidance on the number of stations that should be sampled at a contaminated sediment site, because each site is unique. The number used to characterize a particular site is usually determined using the best professional judgment of the scientists, regulatory staff, and responsible parties involved with the site. These decisions take into account the site-specific nature of sources and transport mechanisms, and the effort and costs involved in both the site investigation and potential cleanup actions. This was the process used to develop the station distribution scheme for the Site. Therefore, the station densities used at the Site are considered sufficient to characterize the nature and extent of sediment contamination, and to develop a remedial footprint.

2. **Comment C.2.2 that "The Composite SWAC Ranking Value provides a consistent, but incomplete, basis for ranking polygons for inclusion in the Proposed Remedial Footprint" is Incorrect (DTR § 33.1.2, DTR Table 33-1; DTR Appendix for Section 33, Tables A33-1, A33-2 and A33-3)**

The DTR used Composite SWAC Ranking Values as one line of evidence for identifying polygons to include in the remedial footprint at the Site. Comment C.2.2 of MacDonald 3/11/11

Expert Report states that "The Composite SWAC Ranking Value provides a consistent, but incomplete, basis for ranking polygons for inclusion in the Proposed Remedial Footprint."

MacDonald states that "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." MacDonald then refers the reader to Table A33-3 of the DTR. Because LPAH is not addressed in Table A33-3, the basis of his assertion with respect to that group of chemicals is unclear. Also, MacDonald does not identify which toxicity thresholds he is referring to when he states that they were exceeded, so the basis of that assertion is also unclear. However, if 60% LAETs are calculated from the LAETs for lead and zinc presented in Table 9-10 of Exponent (2003), the resulting values of 150 and 720 mg/kg, respectively, are not exceeded for any of the polygons that are not included within the remedial footprint, as documented in Table 33-3 of the DTR. Therefore, MacDonald's assertion that lead and zinc exceed toxicity thresholds outside of the remediation footprint is untrue based upon site-specific thresholds calculated in a manner consistent with how the thresholds for the primary COCs were calculated.

In addition to the fact that lead and zinc did not exceed their estimated 60% LAET values outside the remedial footprint, Section 29.3 of the DTR describes how it was verified that secondary COCs, such as lead and zinc, were highly correlated with the primary COCs, to ensure that they would be addressed in a common remedial footprint. Table 29-4 of the DTR shows that both lead and zinc exhibited strong positive correlations with several of the primary COCs. The highest correlations for lead and zinc were found with copper, for which both correlations coefficients were $\geq$0.90 (i.e., 0.90 and 0.94, respectively). Therefore, the co-occurrence evaluation conducted in the DTR ensured that the secondary COCs were accounted for in the remedial footprint.

3. **Comment C.2.3 that "The Composite SWAC Ranking Value was not applied consistently to identify polygons for inclusion in the Proposed Remedial Footprint" is Invalid (DTR Tables 33-1 and 33-6; DTR Appendix for Section 33, Tables A33-1, A33-2 and A33-3)**

The DTR used Composite SWAC Ranking Values as one line of evidence for identifying

polygons to include in the remedial footprint at the Site. Comment C.2.3 of MacDonald 3/11/11 Expert Report states that "The Composite SWAC Ranking Value was not applied consistently to identify polygons for inclusion in the Proposed Remedial Footprint."

MacDonald states the "a total of 15 stations with Composite SWAC Ranking Values higher than 5.5 were not included in the Proposed Remediation Footprint", and that "Table 33-6 fails to provide an explanation for excluding ten polygons with Composite SWAC Ranking Values greater than 5.5 from the Proposed Remediation Footprint." The DTR clearly states on Page 33-1 that "The polygons were ranked based on a number of factors including likely impaired stations, composite surface-area weighted average concentrations for the five primary COCs, site-specific median effects quotient (SS-MEQ) for non-Triad stations, and highest concentration of individual primary COCs." Therefore the selection of the polygons to include in the remedial footprint was based on multiple lines of evidence, as opposed to a single line of evidence such as the Composite SWAC Ranking Values. The use of a weight-of-evidence approach based on multiple lines of evidence is consistent with the manner in which most sediment quality evaluations are currently conducted in the U.S. by sediment quality practitioners (e.g., Burton et al. 2002a,b; Chapman and Anderson 2005; Chapman et al. 2002; Forbes et al. 2004, SFF 2007; Weisberg and Bay 2011), and therefore was considered appropriate for use at the Site (see Section 15 of the DTR).

As shown in Table 33-1 of the DTR, the 23 polygons with the highest Composite SWAC Ranking Values were included in the remedial footprint (see third column of the table), and all of those polygons had values of 7.6 or greater. As an example, Polygon NA09 was added to this group primarily because it had the 10th highest concentration of mercury (i.e., a primary COC) of all the polygons (see Table 33-4 of the DTR). Therefore, the SWAC Value of 5.5 was not the primary line of evidence used to include NA09 in the remedial footprint, and a SWAC Value of 5.5 was not used as a standalone justification for including any polygon in the remedial footprint, as MacDonald's assertion implies. MacDonald's assertion is therefore invalid.

MacDonald also states that the HPAH concentration of Polygon NA07 was listed as 15.85 mg/kg in Table A33-3 of the DTR, that this value exceeds the 60% LAET value of 15.3 mg/kg,

and that, as a consequence, the rationale for excluding that polygon from the remedial footprint is based on all COCs being less that 60% LAET values (Table 33-6 of the DTR) is incorrect. McDonald's statement that the HPAH value for Polygon NA07 is 15.85 mg/kg is correct, and Table 33-6 is, therefore, in error. Nevertheless, the Triad results indicate that NA07 is not likely impaired, with low sediment toxicity and low benthic community effects being found (see Table 33-6 of the DTR). Therefore, it is likely that the bioavailability of the HPAHs are reduced at this location, and the empirical biological results should be given more weight than the bulk sediment chemistry results when deciding whether to include this polygon in the remedial footprint. The decision to not include this polygon in the footprint is therefore justified.

Although MacDonald states that benthic macroinvertebrate data for Polygon NA07 was not included in the database he was provided, benthic data are available for this polygon (see Table 18-1 of the DTR).

4. **Comment C.2.4 that "There is insufficient evidence to demonstrate that the SS-MEQ threshold (0.9) provides a reliable basis for identifying polygons that are 'Likely' impacted" is Incorrect (DTR § 32.5.2; DTR Table 32-21; DTR § 33.1.3; DTR Table 33-2)**

The DTR identifies a SS-MEQ threshold value of 0.9 for the five primary COCs as one line of evidence for evaluating potential benthic impairment at the Site. Comment C.2.4 of MacDonald 3/11/11 Expert Report states that "There is insufficient evidence to demonstrate that the SS-MEQ threshold (0.9) provides a reliable basis for identifying polygons that are 'Likely' impacted."

MacDonald states that the technical basis for selecting the 0.9 threshold is not presented in Section 32.5.2 of the DTR and that the underlying data with which the reliability calculations were made are not provided. However, the methods used to develop and evaluate the SS-MEQ are clearly described in the text of Section 32.5.2 of the DTR, and all of the related underlying data are presented in Table A32-11 of the DTR. As McDonald correctly noted, the data presented in Table 32-21 of the DTR show that a threshold value of 0.9 has an overall reliability of 70 percent, which was erroneously stated as 73 percent in the text of Section 32.5.2 of the DTR. The reduction in reliability of 3 percent is not statistically meaningful nor does the reduction diminish

the SS-MEQ as a reliable basis for identifying polygons that are "likely" impacted.

The other measures of predictive reliability of the SS-MEQ threshold of 0.9 presented in Tables 32-21 and A32-11 of the DTR show that the threshold is biased toward being environmentally protective. Its ability to accurately predict locations that are not "likely impaired" (referred to as non-likely efficiency in Table A32-11 of the DTR) was 94 percent (i.e., 16 of 17 predictions). The only polygon erroneously predicted not to be likely impaired was NA22, which had a SS-MEQ value of only 0.35. However, as stated in Section 32.5.2 of the DTR, there is substantial evidence of non-COC related impairment from physical disturbance in that polygon. The ability of the threshold SS-MEQ of 0.9 to accurately predict "likely impairment" (referred to as likely efficiency in Table A32-11 of the DTR) was only 38 percent (i.e., 5 of 13 predictions). That is, the SS-MEQ threshold of 0.9 predicted impairment at a substantial number of locations without actual impairment (i.e., 62 percent of the stations), as well as stations with impairment.

The predictive reliability results for the SS-MEQ value of 0.9 indicate that there is a very high degree of confidence that polygons with SS-MEQ values less than 0.9 are not likely to be impaired. Therefore, the decision to exclude all polygons with SS-MEQ values less than 0.9 in the remedial footprint is environmentally protective. In contrast, there is much less confidence that polygons with SS-MEQ values greater than 0.9 are likely to be impaired. Therefore, the conservative decision to include all polygons with SS-MEQ values greater than 0.9 in the remedial footprint is also environmentally protective, because over half of those polygons may not be impaired.

Contrary to the assertion of MacDonald that there is insufficient evidence to demonstrate that the threshold SS-MEQ is reliable, the information presented above indicates that the threshold SS-MEQ of 0.9 is an environmentally protective predictor of both the presence and absence of impairment at the Site.

5. **Comment C.2.5 that "There is insufficient evidence to demonstrate that the 60% LAET values provide a reliable basis for identifying polygons that are 'Likely' impacted" is Invalid (DTR § 32.5.2; DTR Tables 32-19. 32-20, 32-21 and 32-22)**

The DTR uses 60% LAET values for the five primary COCs as one line of evidence for evaluating potential benthic impairment at the Site. Comment C.2.5 of MacDonald 3/11/11 Expert Report states that "There is insufficient evidence to demonstrate that the 60% LAET values provide a reliable basis for identifying polygons that are "Likely" impacted."

MacDonald states that "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." He then presents a table that compares the 60% LAET values with the ERM values of Long et al. (1995). (It should be noted that McDonald is a co-author of the Long article and as such the reference point is suspect.)

The statement and comparisons made by MacDonald are flawed, because the 60% LAET values were derived as site-specific sediment quality values that reflect the mixtures of chemicals at the Site, in addition to other important factors such as the site-specific bioavailability of those chemicals. By contrast, the ERM values were derived from sediment chemistry and toxicity data collected throughout the U.S., without any consideration of bioavailability. They are therefore more suitable as initial screening values for a site, rather than values that can reliably predict the presence or absence of sediment toxicity on a site-specific basis. In fact, Long et al. (1995) recognized the limited usefulness of the ERM values when they concluded that the values "should be used as informal screening tools in environmental assessments", and "they are not intended to preclude the use of toxicity tests or other measures of biological effects."

Because the ERM values are generic screening values that do not consider bioavailability, it is not surprising that the 60% LAET values are greater than the ERM values, as the former values reflect the site-specific conditions that occur at the Site. Therefore, MacDonald's statement described above has no bearing on the usefulness of the site-specific 60% LAET values for identifying polygons that are likely impaired at the site.

The development of LAET values for the Site in Exponent (2003) provided conservative site-specific effects levels with which potential sediment toxicity can be evaluated. As described in Exponent (2003), the LAET values represented the lowest of the AET values calculated for the four biological tests evaluated at the Site: 10-d amphipod survival test, 48-h bivalve normality test, 15-min echinoderm fertilization test, and alterations of *in situ* benthic macroinvertebrate communities. All four of these tests are considered sensitive indicators of sediment toxicity, and three of the tests (i.e., all except the echinoderm test) are identified as the preferred tests for the use as part of the California Sediment Quality Objectives (SQOs, CSWRCB 2009) although, as described in the DTR, the Site is explicitly exempt from regulation by the SQOs. Therefore, as discussed in Exponent (2003), selection of the lowest AET of the four tests as the site-specific effects level for each COC, is a conservative and protective method for evaluating potential sediment toxicity. There is strong precedent for using LAETs as conservative effects levels, as they form the basis of the Sediment Management Standards for Washington State (Ecology 1995), and have been successfully used to manage contaminated sediments in that state for over 15 years. In addition, the approach used to develop the LAETs, has been reviewed and approved for site-specific use by EPA's Science Advisory Board (EPA 1989).

Given that the LAETs can be considered conservative and protective effects levels for evaluating potential sediment toxicity at the Site, the selection of the 60% LAET values for use in the DTR and TCAO provides an even greater layer of protectiveness for the sediment quality evaluations conducted at the site. MacDonald's assertion that there is insufficient evidence to demonstrate that the 60% LAET values provide a reliable basis for evaluating sediment toxicity at the Site is, therefore, invalid.

With respect to the supplemental Triad analysis conducted in 2009 at five stations outside the remedial footprint at the Site (and described in Section 35.5.2 of the DTR), MacDonald states that the conclusions resulting from that analysis are invalid because too few stations were evaluated, and the maximum COC concentrations were substantially below both the 60% LAET values and the SS-MEQ threshold value of 0.9. As described in Section 35.5.2 of the DTR, the five stations evaluated for the supplemental Triad analysis were selected because they had not

been sampled for sediment toxicity or benthic community alterations in 2001/2002, were outside the remedial footprint, and had among the highest primary COC concentrations of all stations outside the footprint. The supplemental Triad analysis, therefore, provided valuable new information on whether adverse biological effects would potentially be found in unremediated areas after remediation was completed.

MacDonald states that more than five stations are needed to conduct a reliability analysis. However, he fails to recognize that the five supplemental Triad stations are supplemental to the 30 original Triad stations, and that there are a total of 35 stations with which the reliability of the 60% LAET and SS-MEQ evaluations can be determined. That is, the five supplemental stations provide additional information to that provided by the 30 original stations. MacDonald states that for the Tri-State Mining District and Calcasieu Estuary sites (MESL 2002, MacDonald et al. 2009) he used 70-100 stations to evaluate the reliability of toxicity thresholds. This statement is misleading because inspection of those reports shows that he actually used those stations and the reliability calculations to develop the site-specific toxicity thresholds, rather than to independently evaluate them. This is analogous to the manner in which the original 30 Triad stations were used to develop the site-specific thresholds for the Site. MacDonald did not conduct reliability evaluations of the site-specific thresholds using independent data that were not included in the development of the thresholds, as was done with the supplemental Triad stations for the Site. In addition, the Tri-State Mining District study addressed water bodies within a geographic area of over 3,500 square miles (i.e., 2,176,000 acres), and the Calcasieu Estuary study addressed water bodies within a geographic area of over 19 square miles (i.e., 12,400 acres). Given that those sites are vastly larger than the Site (i.e., approximately 144 acres), it is not surprising that larger numbers of sediment samples were collected to develop and validate the site-specific effects thresholds.

Because none of the stations located outside the remedial footprint at the Site had exceedances of the 60% LAETs for one or more of the primary COCs (see Table A33-2 of the DTR), it was not possible to sample sediments with such elevated COC concentrations, given the station selection criteria described above. In addition, the only station outside the remedial

footprint where the threshold SS-MEQ value of 0.9 was exceeded was NA07 (i.e., 0.91), which was found to be not likely impaired based upon the original Triad evaluations for both sediment toxicity and benthic community effects. Therefore, it also was not possible to sample sediments outside the remedial footprint with SS-MEQ values greater than 0.9 for the supplemental Triad analysis.

Given the information presented above, the five stations selected for the supplemental Triad analysis had some of the highest concentrations of one or more of the primary COCs found outside the remedial footprint (see Table A33-2 of the DTR). The COCs for which concentrations were considered elevated for the five stations are as follows:

SW06: HPAH, PCBs, TBT

SW19: Hg

SW30: Cu, Hg, HPAH, PCBs, TBT

NA23: Cu, Hg, HPAH, PCBs, TBT

NA24: Cu, Hg, PCBs.

As stated in Section 32.5.2 of the DTR with respect to the results of the supplemental Triad analysis, "at all five stations, the SS-MEQ/60% LAET thresholds successfully predicted the absence of "Likely" benthic community impacts." This statement confirms that these thresholds are environmentally protective, and is consistent with the conclusions described above in the response to Comment C.2.4, that the SS-MEQ threshold of 0.9 is biased to be environmentally protective. Its ability to accurately predict the absence of impairment (referred to as non-likely efficiency in Table A32-11) was 94 percent (i.e., 16 of 17 predictions). If the results for the five supplemental Triad stations are added to those of the original Triad stations, the accuracy of the SS-MEQ in predicting the absence of impairment would increase to 95.5 percent (i.e., 21 of 22 predictions).

MacDonald states that "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 compared to the threshold of 0.9. Therefore, lower values than the selected SS-MEQ would also have provided a reliable basis

for classifying these sediment samples as not "Likely" impacted." Considering that the SS-MEQ values ranged from 0.34 to 4.22 for the 30 original Triad stations (see Table A32-11 of the DTR), it is misleading to state that the difference between 0.9 and 0.69 is "substantial." In addition, three of the original Triad stations with non-likely effects had an SS-MEQ value of 0.69 and an additional four original Triad stations with non-likely effects had SS-MEQ values of 0.66 to 0.68. Those results provide considerable support that the threshold SS-MEQ should be greater than 0.69, and it is highly unlikely that the results of the sediment quality evaluations would differ if the threshold SS-MEQ was adjusted to be another value within the narrow window between 0.69 and 0.9.

Based on all of the information presented above, MacDonald's assertion that the 60% LAET/SS-MEQ values are not reliable for evaluating sediment toxicity at the Site is invalid.

6. **Comment C.2.6 that "The procedures that were used to designate sediment samples from the Shipyard Sediment Site as 'Likely' impacted are not protective" is Misleading and Unsupported (DTR § 18.3; DTR Table 18-7)**

The methods used in the DTR to evaluate sediment at the Site were selected in large part to be consistent with those recommended by EPA, as well as those commonly used to evaluate contaminated sediment sites in the U.S. by sediment quality practitioners. Comment C.2.6 of MacDonald 3/11/11 Expert Report states that "The procedures that were used to designate sediment samples from the Shipyard Sediment Site as "Likely" impacted are not protective."

MacDonald states that "the 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", and cites Sustainable Fisheries Foundation (2007) as the basis for that assertion. This statement is highly misleading because it provides the impression that there exists a formal science advisory group (potentially with governmental agency endorsement), and that the citation is a substantive document. In his October 2010 deposition, MacDonald stated that this advisory group was "an informal group of individuals who have a common interest in sediment quality assessments, that share information, meet from time to time to discuss technical issues." (MacDonald Deposition, at pp. 82-85.) He also stated that

"all of the participants fund their own participation", "there is no headquarters", and "there is no website." (*Id.*) MacDonald further acknowledged that there is no formal group structure, no president, and no official list of members other than an email list. The citation provided by MacDonald is the unpublished proceedings of a workshop convened in British Columbia by the Sustainable Fisheries Foundation, a non-profit environmental organization of which MacDonald is one of the two Executive Directors. The purpose of the workshop was to advise the British Columbia Ministry of the Environment on sediment quality issues.

The "Science Advisory Group" referred to by MacDonald is simply an informal group of people with a common interest in sediment quality that has no formal charter, no endorsement or support by a governmental resource agency, no independent funding, no regulatory authority, and no formal advisory role. In addition, the citation referred to by MacDonald above is an unpublished summary of a workshop designed to advise a Canadian governmental agency, and sponsored by a non-profit environmental organization of which MacDonald is an Executive Director. It is clear that there is little independent and substantive support for MacDonald's assertion that the methods used for the Site are inconsistent with the common practice.

In contrast to MacDonald's assertion and citation discussed above, EPA has provided clear guidance on the selection of reference areas for environmental assessments (e.g., U.S. EPA 1994, 1997, 1999, 2000, 2005, 2006). A number of these EPA guidance documents are summarized in Section 17.2 of the DTR. Briefly, the EPA guidance recommends that reference areas reflect the habitat conditions and background levels of chemical contamination that would exist at a study site in the absence of site-related sediment contamination. The background conditions can incorporate levels of chemical contamination or biological responses that are considered representative of the general conditions in a water body removed from major contaminant sources. Therefore, consistent with EPA guidance (and stated Section 17.2 of the DTR), the selection of the reference areas for the Site was "consistent with the San Diego Water Board's goal of establishing a reference condition that represents contemporary bay-wide ambient background contaminant levels that could be expected to exist in the absence of the Shipyard Sediment Site discharges and some level of natural variability in toxicity and benthic

communities that could exist due to factors other than sediment contamination." MacDonald's assertion that the selection of reference areas for the Site was inconsistent with current guidance is therefore incorrect, because the selection process was consistent with EPA guidance.

MacDonald states that the inclusion of reference stations with values of amphipod survival less than 80 percent is inappropriate. However, if such a selection criterion was used at the Site, it could potentially ignore the full range of amphipod responses that may occur in valid reference areas of San Diego Bay, and bias the reference envelope to fit a pre-conceived notion of what the minimum level of survival in a reference area should be. In contrast, the Washington State Sediment Management Standards (Ecology 1995), recognize that survival in the 10-d amphipod test based on *Rhepoxynius abronius* from reference areas can be as low as 75 percent, based on a survey conducted in multiple reference areas of Puget Sound, Washington. In addition, Phillips et al. (2001) identified control-adjusted survival thresholds as low as 75 and 77 percent for amphipod tests based on *Eohaustorius estuarius* and *Rhepoxynius abronius*, respectively.

In addition to MacDonald's unwarranted definition of the acceptable levels of amphipod survival in reference areas, his focus only on the sediment toxicity results for the reference stations is inappropriate because it ignores the additional information on sediment chemistry and benthic macroinvertebrate communities that was used to identify the reference stations for the Site. As documented in Table 17-2 of the DTR, each reference station was carefully evaluated using multiple lines of evidence before it was selected for use. MacDonald's focus on a single line of evidence (i.e., sediment toxicity) is therefore inconsistent with a weight-of-evidence evaluation and therefore inappropriate.

7. Comment C.2.7 that "The rationale for excluding polygon NA22 from the Proposed Remedial Footprint is inappropriate" is Invalid and Unsupported (DTR § 33.1.1)

The DTR stated the Polygon NA22 will be evaluated as part of a separate TMDL process and therefore was not considered part of the Shipyards Site for the TCAO. Comment C.2.7 of MacDonald 3/11/11 Expert Report states that "The rationale for excluding polygon NA22 from the Proposed Remedial Footprint is inappropriate."

MacDonald states that "NA22 should be remediated because COCs in sediments are likely adversely affecting benthic invertebrates within this polygon", and that "the suggestion that the TMDL process will provide a more effective basis for making a decision on NA22 is invalid." However, these statements are invalid. As stated in Section 33 of the TCAO, "portions of polygons NA20, NA21, and NA22 as shown in Attachment 2 were omitted from this analysis because it falls 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 purposes of the CAO." The decision to remove these polygons from the Site was therefore an administrative one, rather than a technical one, and therefore does not require technical justification as MacDonald implies. In addition, because MacDonald is not participating in the design of the TMDL process for these polygons he has no direct knowledge of what the process will include. Therefore, MacDonald's assertion regarding the manner in which NA22 will be addressed is unsupported.

8. **Comment C.2.8 that "The rationale provided in Table 33-6 of the DTR for excluding certain polygons from the Remedial Footprint is not sufficient" is Misleading and Invalid (DTR Table 33-6; DTR §33.1.4)**

The DTR provides substantial information on why various polygons at the Site were or were not included in the remedial footprint. Comment C.2.8 of MacDonald 3/11/11 Expert Report states that "The rationale provided in Table 33-6 of the DTR for excluding certain polygons from the Remedial Footprint is not sufficient."

MacDonald states that "the polygon SW03 was excluded from the Proposed Remedial Footprint, even though sediments within this polygon had elevated levels of cadmium." This statement is misleading because it implies that decisions about whether a polygon should be included in the remedial footprint are based solely on a single line of evidence. However, in considering the multiple lines of evidence collected at SW03, including direct measures of biological effects, this polygon was found to have a low potential for both sediment toxicity and benthic community effects and was therefore determined not to be likely impaired (see Table 18-1 of the DTR). Therefore, although cadmium concentrations may have been elevated in Polygon SW03, they did not result in moderate or high levels of biological effects, potentially due to

reduced bioavailability. Because the weight-of-evidence scheme used at the Site identified SW03 as not likely impaired, that polygon was appropriately excluded from the remedial footprint. MacDonald's assertion is therefore invalid.

MacDonald also states that "technical infeasibility was identified as the rationale for excluding NA07, NA08, NA23, and NA27 from the Remedial Footprint", and that this was "not supported by evidence in the record, such as engineering assessments, that would render these conclusions scientifically valid." MacDonald's assertion regarding the determinations of technical infeasibility are invalid, because those determinations were made by a group comprised of multiple parties with a range of backgrounds and expertise, including resource agencies and shipyard operations personnel. Furthermore, there is no formal requirement that engineering studies be conducted to make a determination of technical infeasibility. In addition, NA07 and NA23 were found not to be likely impaired based on the original or supplemental Triad analyses (see Tables 18-1 and 32-22 of the DTR, respectively). In addition, all primary COCs were below their 60% LAET values and SS-MEQs were less than the threshold value of 0.9 at NA08 and NA27. Therefore none of these four polygons warrant inclusion in the remedial footprint, regardless of concerns related to technical feasibility. MacDonald's statement regarding technical infeasibility is therefore inappropriate, and ultimately irrelevant based on the chemical and biological indicators measured in the four polygons.

MacDonald also states that "no rationale was provided for excluding NA01, NA04, NA06, NA16, NA16 [sic], NA21, SW25, or SW29 from the Remedial Footprint." This statement was apparently derived largely from MacDonald's erroneous assumption that polygons should be included in the remedial footprint based solely on Composite SWAC Ranking Values higher than 5.5. As discussed in the response to Comment C.2.3 above, the selection of the polygons to include in the remedial footprint was based on multiple lines of evidence, as opposed to a single line of evidence such as the Composite SWAC Ranking Values. In addition, the SWAC Value of 5.5 was not intended to be a threshold value. MacDonald's assertion is therefore an artifact of his misunderstanding of how the Composite SWAC Ranking Values were used along with other lines of evidence, and is therefore invalid.

There are two discrepancies in MacDonald's list. He erroneously identified Polygon NA06 as being excluded from the remedial footprint when, in fact, it is included in the footprint (see Attachment 4 of the TCAO). In addition, MacDonald erroneously listed Polygon NA16 twice. The reasons why the remaining six polygons in the above list were not included in the remedial footprint are found in various sections of the DTR and are summarized below:

- **NA01:** Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.
- **NA04:** Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.
- **NA16:** Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.
- **NA21:** No primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.50) was less than the threshold value of 0.9.
- **SW25:** Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.67) was less than the threshold value of 0.9.
- **SW29:** No primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.71) was less than the threshold value of 0.9.

MacDonald's assertion that the rationale for excluding the above six polygons was not provided in the DTR is therefore invalid.

9. Comment C.2.9 that "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" is Inaccurate (DTR § 33)

The DTR provided a detailed evaluation of potential effects of sediment contamination of fish at the Site. Comment C.2.9 of MacDonald 3/11/11 Expert Report states that "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."

MacDonald states that "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." MacDonald also states that "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)."

MacDonald's assertions are both inaccurate. As part of the 2001/2002 sampling at the Site, an extensive effort was made to capture gobies at the site in addition to other fish species. As stated on Page 2-7 of Exponent (2003), "attempts were also made to collect gobies, without success at either site." Representatives from the California Department of Fish and Game observed the fish collection effort, and agreed that gobies were absent or rare at the Site. During his deposition, MacDonald was asked if he was aware that gobies were searched for at the Site without success and he responded that "I am not aware of that." (MacDonald Deposition at 414.) During his deposition, MacDonald also conceded that he had not cited Exponent (2003) in his remediation footprint report (MacDonald 2009), and that he had conducted only a limited review of that document. (*Id.*) MacDonald also did not cite Exponent (2003) in his more recent MacDonald 3/11/11 Expert Report, and provided no indication in that report that he had reviewed Exponent (2003). Therefore, MacDonald failed to adequately review the foundational technical document for the Site (i.e., Exponent 2003), and has provided no other evidence to support his assertion that gobies are known to utilize the Site.

In MacDonald's statements described above, he identified seven polygons that he asserts should be included in the remediation footprint at the Site based on hazard quotients calculated for PCBs, as summarized in Table 1 of his expert report. However, inspection of his Table 1 shows that the hazard quotients for the first five of the seven polygons did not match the results presented in MacDonald (2009). Closer inspection of MacDonald (2009) showed that the

erroneous results in Table 1 were due to the absence of the numeral 1 in front of the hazard quotients presented for the first five polygons.

Despite the fact that the corrected hazard quotients in Table 1 range from 1.0 to 2.59, there is no appropriate technical basis for including those polygons in the remediation footprint, because the analyses conducted by MacDonald (2009) to develop those hazard quotients are flawed. Many of the problems with the hazard quotient determinations conducted by MacDonald (2009) were identified in his October 2010 deposition, and are discussed below.

A fundamental flaw in the fish analyses conducted by MacDonald (2009) was the assumption that gobies represent an appropriate indicator species for evaluating risks to benthic fish at the Site. As discussed above, gobies were not found at the Site after an extensive sampling effort conducted as part of the 2001/2002 sampling events. Therefore, the use of gobies as an appropriate indicator species for the site by MacDonald was inappropriate. Also discussed above was the fact that MacDonald provided no documentation that gobies occur at the Site, and that he admitted that he had not reviewed Exponent (2003) in sufficient detail to know the results of the fish survey conducted at the Site.

The species selected for detailed evaluation at the Site was the spotted sand bass (*Paralabrax maculatofasciatus*) because, as stated in Exponent (2003), this species preys primarily on benthic macroinvertebrates, exhibits limited spatial movements, and is abundant in numerous kinds of habitats within San Diego Bay, including the Site (i.e., as documented during the fish sampling effort prior to the 2001/2001 sampling events). These characteristics of the spotted sand bass make it an appropriate species for assessing contaminant exposure at the Site. This determination is reinforced by the results of tissue chemistry analyses. Spotted sand bass were collected at four locations, inside and outside the leaseholds of both shipyards, and the results showed that chemical concentrations in fish tissue from inside the leaseholds were greater than concentrations in fish collected immediately outside the leaseholds (Exponent 2003). The data therefore clearly indicate that spotted sand bass are sensitive to spatial differences in sediment chemistry concentrations at the Site. Despite the evidence that spotted sand bass should be, and are, responsive to sediment chemistry at the Site, MacDonald ignored this information

and inappropriately asserts that gobies should be used as the indicator species for fish at the Site.

During MacDonald's October 2010 deposition, numerous methodological flaws in his analysis of PCBs in gobies were identified, all of which add considerable uncertainty to the results of the analysis, and call into question many of his conclusions. Each of those methodological flaws is briefly summarized below:

- **Indicators Species:** As discussed above, the selection of gobies as the indicator species for fish at the Site was inappropriate because they are not found at the site, and because the spotted sand bass was shown to be an effective indicator species for the site.
- **Toxicity Reference Value (TRV):** MacDonald (2009) used a study by Orn et al. (1998) to develop the TRV of 1.95 mg/kg wet weight for PCBs in fish. The study was based on zebrafish (*Danio rerio*) which, as a tropical freshwater species, does not occur in San Diego Bay, and therefore has questionable relevance to the marine fish species that reside in the bay. MacDonald first calculated a NOAEL[10] and LOAEL[11] for PCBs of 0.7 and 5.5 mg/kg dry weight, which spans a large range. He then calculated the TRV as the geometric mean of the NOAEL and LOAEL as 1.95 mg/kg. However, the mean value (i.e., 3.1 mg/kg) would have been considerably greater. In addition, in his October 2010 deposition, MacDonald stated that the TRV should have been 1.96 mg/kg (Page 236). Using a TRV of 1.96, the hazard quotient of 1.0 in Table 1 of MacDonald's expert report would decline to 0.99, which would remove the affected polygon from the high risk category defined by MacDonald (2009).
- **Toxicity Endpoint:** MacDonald selected reproduction as the endpoint for developing the TRV for PCBs, and developed the TRV based on ovary weight and the gonad somatic index (GSI). However, he ignored the fact that other reproductive endpoints (i.e., percentage a spawning females, mean number of eggs per female, and median hatching time) showed no significant reductions in response to exposure to PCBs.
- **Biota Sediment Accumulation Factor (BSAF):** MacDonald used the BSAF of 1.61 determined for spotted sand bass at the Site in a memorandum by Zeeman (2004) that has not been published in the peer-reviewed literature.
- **Lipid Content:** MacDonald assumed that the lipid content of the gobies was 4 percent, based on the naked goby (*Gobiosona bosc*), and presented in an unpublished presentation by Lederhouse et al. (2007).
- **Moisture Content:** MacDonald assumed a whole-body moisture content of 80 percent for fish, to convert the wet-weight PCB concentrations presented in Orn et al. (1998) to dry-weight concentrations.

In summary, MacDonald predicted PCB concentrations in gobies, a species that does not occur at the Site, using a TRV developed from a freshwater zebrafish, an unpublished BSAF based on sand bass, a lipid content based on the naked goby, and an assumed 80 percent moisture

[10] No-Adverse-Effects-Levels. (DTR, at p. ix.)
[11] Low-Adverse-Effects-Levels. (DTR, at p. vii.)

content in whole bodies of fish. Each one of the above items has uncertainties attached to it, which MacDonald (2009) did not acknowledge or attempt to quantify. If all the uncertainties are combined, it is clear that hazard quotients only marginally greater than 1.0 cannot be considered indicative of high risk to fish with any degree of confidence.

Inspection of Table 1 of the MacDonald 3/11/11 Expert Report shows that all of the hazard quotients were relatively low (i.e., less than 2.6), with SW18 being less than 1.0 (i.e., using the corrected TRV of 1.96 mg/kg), four polygons being less that 1.3 (i.e., NA01, NA07, NA16, SW06), one polygon being less than 1.8 (i.e., NA04), and the final polygon being less than 2.6 (i.e., SW29). Given the multiple uncertainties that were not acknowledged or quantified in the hazard quotient analysis conducted by MacDonald (2009), none of these observed hazard quotients can be considered high enough to indicate a high risk to fish at the Site with any statistically meaningful certainty. In addition, the results for the spotted sand bass that were evaluated at the Site by Exponent (2003) provide additional support for the conclusion that none of these polygons require remediation based on risks to fish. Therefore, MacDonald's assertion that the six polygons pose high risks to fish and should be included in the remedial footprint at the Site is based on hypothetical and technically questionable analyses, and is inconsistent with the empirical data on fish collected from the site. His assertion is therefore invalid.

B. Responses to MacDonald's Conclusions Regarding the Proposed Remedial Footprint (DTR § 33)

1. Conclusion C.3.1 that "Developing the Proposed Remedial Footprint using Thiessen Polygons…is a scientifically valid method….However, the polygons developed at the Shipyard Sediment Site using this method are unusually large" is Invalid (DTR § 33; DTR Appendix for Section 33, Table A33-3)

The DTR developed polygons for the Site based on the 60 stations sampled in 2001/2002. Conclusion C.3.1 of MacDonald 3/11/11 Expert Report states that "Developing the Proposed Remedial Footprint using Thiessen Polygons…is a scientifically valid method." "However, the polygons developed at the Shipyard Sediment Site using this method are unusually large."

This conclusion is invalid, as described in detail in the response to Comment C.2.1. That is, the station distribution scheme was consistent with the manner in which sampling is

commonly conducted at most contaminated sediment sites, with the highest density of stations located near sources where the highest COC concentrations are expected, and with lower densities in areas removed from the sources, where contaminants are expected to be more widely dispersed by waves and currents.

2. **Conclusion C.3.2 that "SWACs do not provide a basis for accurately assessing the impacts on benthic invertebrates or benthic fish" is Invalid (DTR § 33.1.2)**

The DTR used SWACs to evaluate risks to fish and wildlife that may utilize the Shipyards Site. Conclusion C.3.2 of the MacDonald 3/11/11 Expert Report states that "SWACs do not provide a basis for accurately assessing the impacts on benthic invertebrates or benthic fish."

This conclusion is invalid because SWACs are commonly used to evaluate risks to benthic fish at contaminated sediment sites, as they were at the Site. Contrary to MacDonald's assertion, other tools were used to evaluate risks to benthic invertebrates at the Site, including evaluations of sediment chemistry, sediment toxicity, *in situ* benthic macroinvertebrate communities, measures of chemical bioavailability, contaminant breakdown products in fish bile, and fish histopathology.

3. **Conclusion C.3.3 that "Evaluating risks to benthic invertebrates using a sediment quality triad (SQT) approach is a scientifically valid approach" and "the procedures described in the DTR for interpreting such data are not always consistent with the best current guidance" is Invalid (DTR §§ 32.5, 32.5.1, and 32.5.2; DTR Tables 32-17 through 32-22; DTR § 33.1.3; Table 33-2)**

The methods used in the DTR to evaluate sediment at the Site were selected in large part to be consistent with those recommended by EPA, as well as those commonly used to evaluate contaminated sediment sites in the U.S. by sediment quality practitioners. Conclusion C.3.3 of MacDonald 3/11/11 Expert Report states that "Evaluating risks to benthic invertebrates using a sediment quality triad (SQT) approach is a scientifically valid approach." "The procedures described in the DTR for interpreting such data are not always consistent with the best current guidance."

This conclusion is invalid, as described in detail in the responses to Comments C.2.4, C.2.5, and C.2.6. The methods used for the Site are consistent with EPA guidance and with the

methods commonly used at contaminated sediment sites. In addition, they are both conservative and protective of benthic macroinvertebrate communities at the site.

4. Conclusion C.3.4 that "Virtually all of the SQT stations evaluated had concentrations of contaminants that indicated the benthic invertebrates receive moderate to high exposure to contaminants at the Shipyard Sediment Site" is Invalid (DTR §§ 32.5, 32.5.1, and 32.5.2; DTR Tables 32-17 through 32-22; DTR § 33.1.3; Table 33-2)

The DTR used multiple lines of chemical and biological evidence to evaluate potential benthic impairment at the Site. Conclusion C.3.4 of MacDonald 3/11/11 Expert Report states that "Virtually all of the SQT stations evaluated had concentrations of contaminants that indicated the benthic invertebrates receive moderate to high exposure to contaminants at the Shipyard Sediment Site."

This conclusion is invalid because exposure of benthic macroinvertebrates to certain contaminant concentrations at a site does not necessarily imply that ecological effects will result, as MacDonald implies. A major reason for this lack of direct relationship between exposure and effects is that the bioavailability of contaminants at a site often is less than 100 percent. Despite the fact that consideration of contaminant bioavailability is a fundamental concept in sediment quality assessments (e.g., Ankley et al. 1996; Di Toro et al. 1991, 2001, 2005; Maruya et al. 2011), MacDonald failed to adequately consider it in the present expert report, as well as in his independent assessment of the remedial footprint for the Site (MacDonald 2009). During his October 2010 deposition, MacDonald was asked if he considered contaminant bioavailability in preparing his footprint report and he replied: "I have not done an evaluation to determine whether or not one or more of the chemicals of potential concern or contaminants of concern at the Shipyard Sediment Site are more or less bioavailable than they are in other locations in San Diego Bay." Therefore, although it is considered essential by many sediment quality practitioners to evaluate chemical bioavailability when assessing sediment quality, MacDonald (2009) ignored this important consideration for the Site. This is a fundamental flaw in MacDonald (2009), and is contrary to the emphasis placed on evaluations of contaminant bioavailability at the site by Exponent (2003).

The fact that the SQT relies on two kinds of biological indicators, in addition to sediment

chemistry, is related largely to uncertainties regarding contaminant bioavailability. A major use of the two kinds of biological indicators (i.e., sediment toxicity tests and evaluations of in situ benthic macroinvertebrate communities) is to determine whether the measured chemical concentrations in bulk sediment are sufficiently bioavailable to result in adverse ecological effects. Therefore, because the use of sediment contaminant concentrations as standalone indicators of sediment toxicity is invalid for definitive assessments of sediment quality, MacDonald's assertion is incorrect.

5. **Conclusion C.3.5 that "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" is Invalid (DTR § 18.3; DTR Tables 18-7, 18-8 and 18-9)**

The DTR describes how the reference stations for the sediment toxicity tests were carefully selected to represent the range of chemical concentrations and biological responses found in areas removed from contaminant sources in San Diego Bay. Conclusion C.3.5 of MacDonald 3/11/11 Expert Report states that "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."

These conclusions are invalid, as described in detail in the response to Comments C.2.6. The methods used for the Site are consistent with EPA guidance, as well as the methods commonly used to assess sediment toxicity at contaminated sediment sites in the U.S. In addition, as described in Section 17.2 of the DTR, the methods are "consistent with the San Diego Water Board's goal of establishing a reference condition that represents contemporary bay-wide ambient background contaminant levels that could be expected to exist in the absence of the Shipyard Sediment Site discharges and some level of natural variability in toxicity and benthic communities that could exist due to factors other than sediment contamination." MacDonald's assertion regarding the reference area data is therefore invalid.

6. Conclusion C.3.6 that "The DTR switched assessment methods from the SQG1 to SS-MEQ to assess impacts on the benthic invertebrate community", and "SS-MEQ does not provide an effects-based tool for predicting adverse effects on the benthic community" is Invalid (DTR § 32.5.2; DTR Table 32-21; DTR § 33.1.3; DTR Table 33-2; DTR Table 18-6)

The DTR describes how the SS-MEQ was developed to be an effects-based, site-specific indicator of potential benthic impairment at the Shipyards Site. Conclusion C.3.6 of MacDonald 3/11/11 Expert Report states that "The DTR switched assessment methods from the SQG1 to SS-MEQ to assess impacts on the benthic invertebrate community", and "SS-MEQ does not provide an effects-based tool for predicting adverse effects on the benthic community."

This conclusion is invalid, as described in detail in the response to Comments C.2.4, in which it was shown that the SS-MEQ is an environmentally protective predictor of both non-likely and likely impairment at the Site. The switch from the SQG1 to the SS-MEQ was justified because the SQG1 is based on generic sediment quality values that do not explicitly consider the site-specific conditions at the Site. By contrast, the SS-MEQ was based exclusively on chemical and biological data collected at the site and, therefore is a more appropriate site-specific sediment assessment tool than the SQG1.

MacDonald's assertion that the SS-MEQ does not provide an effects-based tool for predicting adverse effects on benthic macroinvertebrate communities is incorrect, as the SS-MEQ was specifically developed to be a site-specific effects-based assessment tool. As described in Section 32.5.2 of the DTR, the SS-MEQ was developed using the median sediment concentrations of the primary COCs at Stations NA19, NA22, SW04, SW13, SW22, and SW23. Inspection of Table 18-1 of the DTR shows that this set of stations included all six of the likely impaired stations found at the Site. Therefore, calculation of the median COC concentrations from the six likely impaired stations at the Site was directly analogous to the manner in which Long et al. (1995) developed the ERM values. In addition, the predictive reliability of the SS-MEQ was evaluated, and the threshold value of 0.9 was selected, using the site-specific effects determinations for the 30 Triad stations, as well as the 5 supplemental Triad stations sampled at the Site. MacDonald's assertion that the SS-MEQ is not effects-based is, therefore, invalid.

7. **Conclusion C.3.7 that "The Proposed Remedial Footprint excludes polygons with composite SWAC Ranking Values greater than 5.5" is Invalid (DTR Tables 33-1 and 33-6; DTR Appendix for Section 33, Tables A33-1, A33-2 and A33-3)**

The DTR describes how the selection of polygons to include in the remedial footprint was based on multiple lines of evidence. Conclusion C.3.7 of MacDonald 3/11/11 Expert Report states that "The Proposed Remedial Footprint excludes polygons with composite SWAC Ranking Values greater than 5.5."

This conclusion is invalid, as described in detail in the response to Comments C.2.3. The DTR clearly states on Page 33-1 that "The polygons were ranked based on a number of factors including likely impaired stations, composite surface-area weighted average concentrations for the five primary COCs, site-specific median effects quotient (SS-MEQ) for non-Triad stations, and highest concentration of individual primary COCs." Therefore the selection of the polygons to include in the remedial footprint was based on multiple lines of evidence, as opposed to a single line of evidence such as the Composite SWAC Ranking Values. MacDonald's assertion is, therefore, invalid.

8. **Conclusion C.3.8 that "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" is Unsupported (DTR Tables 33-1 and 33-6; DTR Appendix for Section 33, Tables A33-1, A33-2 and A33-3)**

Conclusion C.3.8 of MacDonald 3/11/11 Expert Report states that "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." However, MacDonald provided no technical basis for this assertion in Section C.2.

9. **Conclusion C.3.9 that "Proposed Remedial Footprint excludes polygons with concentrations of contaminants in sediment that likely pose high risks to benthic fish" is Invalid (DTR § 33)**

The DTR describes how the remedial footprint was developed to be protective of fish, in addition to other ecological receptors. Conclusion C.3.9 of MacDonald 3/11/11 Expert Report

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

This conclusion is invalid, as described in detail in the response to Comments C.2.9. The fish species selected for detailed evaluation at the Site (i.e., spotted sand bass) was appropriate because it preys primarily on benthic macroinvertebrates, exhibits limited spatial movements, and is abundant in numerous kinds of habitats within San Diego Bay. By contrast, MacDonald conducted a hypothetical evaluation of a species (i.e., goby) that was not found at the Site during fish collection efforts, using a TRV developed from a freshwater zebrafish, an unpublished BSAF based on sand bass, a lipid content based on the naked goby, and an assumed 80 percent moisture content in whole bodies of fish. Because each of the above items has uncertainties attached to it, which MacDonald did not acknowledge or attempt to quantify, the results of MacDonald's hypothetical evaluation are highly questionable, and cannot be interpreted with any degree of confidence. MacDonald's assertion that the remedial footprint does not include polygons that likely pose a high risk to benthic fish is therefore invalid.

10. **Conclusion C.3.10 that "The Proposed Remedial Footprint excludes polygons of portions of polygons, like NA20, NA21, and NA22, which are being considered in the Mouth of Chollas Creek TMDL" and "The TMDL process will not provide a vehicle for remediating contaminated sediment" is Invalid (DTR § 33.1.1)**

The DTR describes how portions of the Site were removed from the site because they will be addressed in a separate TMDL evaluation. Conclusion C.3.10 of MacDonald 3/11/11 Expert Report states that "The Proposed Remedial Footprint excludes polygons of portions of polygons, like NA20, NA21, and NA22, which are being considered in the Mouth of Chollas Creek TMDL." "The TMDL process will not provide a vehicle for remediating contaminated sediment."

This conclusion is invalid, as described in detail in the response to Comments C.2.7. The decision to remove these polygons from the Site was an administrative decision, rather than a technical decision, and therefore does not require technical justification as MacDonald implies. In addition, because MacDonald is not participating in the design of the TMDL process for these polygons he has no direct knowledge of what the process will include. Therefore, MacDonald's

assertion that the manner in which these polygons will be addressed is both invalid and uniformed.

11. **Conclusion C.3.11 that "In order to be scientifically valid, these conclusions of technical infeasibility must be supported by detailed engineering studies" is Invalid (DTR Table 33-6; DTR § 33.1.4)**

The DTR describes how potential remediation of several polygons was considered technically infeasible. Conclusion C.3.11 of MacDonald 3/11/11 Expert Report states that "In order to be scientifically valid, these conclusions of technical infeasibility must be supported by detailed engineering studies."

This conclusion is invalid, as described in detail in the response to Comments C.2.8. MacDonald's assertion regarding the determinations of technical infeasibility are invalid, because those determinations were made by a group comprised of multiple parties with a range of backgrounds and expertise, including resource agencies and shipyard operations personnel. In addition, there is no formal requirement that engineering studies be conducted to make a determination of technical infeasibility. In addition, none of the affected polygons warranted inclusion in the remedial footprint, regardless of concerns related to technical feasibility. MacDonald's statement regarding technical infeasibility is therefore invalid, and ultimately irrelevant based on the chemical and biological indicators measured in the affected polygons.

12. **General Conclusion #1 that "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)" is Invalid (DTR § 33)**

The DTR provides detailed justification as to why each polygon at the Site was or was not included in the remedial footprint. General Conclusion #1 of MacDonald 3/11/11 Expert Report states that "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).

This conclusion is invalid, because the methods, results, and conclusions of MacDonald (2009) have come under severe technical criticism both at his October 2010 deposition, and in follow-up expert reports. The use of that report to justify that additional polygons should be

included in the remedial footprint is therefore inappropriate from a technical standpoint.

13. **General Conclusion #2 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" and "In addition, polygon NA22 should be included in the Remedial Footprint because it…is not valid to exclude it based on its consideration in the TMDL process for the Mouth of Chollas Creek" is Invalid (DTR §§ 33.1 through 33.1.4; DTR Tables 33-1 through 33-6).**

The DTR provides detailed justification as to why each polygon at the Site was or was not included in the remedial footprint. General Conclusion #2 of MacDonald 3/11/11 Expert Report states 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…is not valid to exclude it based on its consideration in the TMDL process for the Mouth of Chollas Creek."

This conclusion is invalid with respect to fish, as described in detail in the response to Comment C.2.9, and also in abbreviated form in the response to Conclusion C.3.9. With respect to benthic macroinvertebrate communities, the comment is invalid because multiple site-specific indicators of sediment quality showed that the polygons do not pose risks to benthic macroinvertebrate communities, as follows:

- **NA01:** Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.
- **NA04:** Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ values (0.69) was less than the threshold value of 0.9.
- **NA07:** Not likely impaired based on Triad analysis.
- **SW06**: Not likely impaired based on the supplemental Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ values (0.63) was less than the threshold value of 0.9.
- **SW18**: Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.62) was less than the threshold value of 0.9.
- **SW29:** No primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.71) was less than the threshold value of 0.9

Based on the information presented above, MacDonald's assertions that the six polygons pose risks to fish, and potentially risks to benthic macroinvertebrate communities, are both

invalid.

VI. RESPONSES TO COMMENTS AND CONCLUSIONS IN SECTION D OF THE MARCH 11, 2011 MACDONALD EXPERT REPORT FOR THE SAN DIEGO SITE (TCAO FINDING 32; DTR § 32)

BAE Systems responds to the comments and conclusions of the MacDonald 3/11/11 Expert Report contained in Section "D" entitled "Expert Opinion #2: Alternative Cleanup Levels which states:

> 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.

(MacDonald 3/11/11 Expert Report, at p. 18.)

A. Responses to MacDonald's Comments Regarding "Uncertainties Associated with the Alternative Clean-Up Levels" (TCAO Finding 32; DTR § 32)

MacDonald argues 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" and proceeds to set forth comments. (*Id.*) BAE Systems responds to each comment.

1. Comment D.2.1 that "The Alternative Clean-Up Levels are substantially higher than background levels of the primary COCs in San Diego Bay" is Unsupported and Invalid (TCAO Finding 32; DTR § 32)

MacDonald states that "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." However, because he fails to evaluate or even define his term "practically achievable", he provides no support for his assertion. By contrast the DTR provided extensive evaluations of both the protectiveness of the Alternative Cleanup Levels, as well as the technical and economic feasibility of cleaning up the entire site to background levels.

As stated in Section 32.2.3 of the DTR, "Protectiveness of the beneficial uses represented by aquatic-dependent wildlife and human health was assessed via estimation of post-remedial

SWAC values of the remedial footprint. Post-remedial SWAC calculations were completed with the assumption that the SWAC inside the footprint would be remediated to background concentrations." The protectiveness of this approach for aquatic dependent wildlife was then evaluated, and it was concluded that "HQs for all receptors evaluated at the Site had a value less than 1.0 (Table 32-8), indicating that the COCs are unlikely to cause adverse ecological effects and that the post-remedial sediment chemistry conditions are protective of aquatic dependent wildlife and their associated beneficial uses." In addition, in Section 31 of the DTR, it was determined that "Based on these incremental costs versus incremental benefit comparisons, cleanup to background sediment quality levels is not economically feasible." Based on the considerations discussed above, the SWAC values identified in Section 32 of the DTR were selected as the Alternative Cleanup Levels for the Site (see Table 2 of the TCAO). It therefore is appropriate that the Alternative Cleanup Levels exceed background values, and MacDonald's assertion is invalid.

2. **Comment D.2.2 that "Neither the TCAO nor the DTR explicitly identify numerical Alternative Clean-Up Levels for the protection of aquatic life" is Invalid (TCAO Finding 32; DTR § 32)**

MacDonald states that "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." This assertion is invalid since extensive evaluations of risks to fish were evaluated at the Site, using the abundant and benthic-feeding spotted sand bass as the key indicator species (Exponent 2003). MacDonald's assertion is therefore invalid.

3. **Comment D.2.3 that "The Alternative Clean-Up Levels fail to include numerical limits to protect benthic macroinvertebrates" is Invalid (TCAO Finding 32; DTR § 32; DTR Table 18-7)**

MacDonald states that "The metric for evaluating sediment chemistry data in the non-Triad samples is not effects based." He then identifies the SS-MEQ as the metric he is referring too. However, as discussed in detail in the previous response to MacDonald's Conclusion C.3.6, the SS-MEQ was developed in the DTR to be a site-specific, effects-based, protective tool for evaluating benthic impairment. MacDonald's assertion is therefore invalid.

MacDonald also states the reference pool used to evaluate the results of the 10-d amphipod test was invalid because it included several survival values less than 80 percent. However, as discussed in detail in the previous response to MacDonald's Comment C.2.6, the group of stations included in the reference pool was appropriate, because they were relatively uncontaminated and represented the range of sediment chemical concentrations and biological responses found in areas located away from contaminant sources in San Diego Bay. MacDonald's assertion is therefore invalid.

MacDonald also states that the reference pools for the bivalve and echinoderm sediment toxicity tests were invalid because the bivalve reference pool included only four stations, and the echinoderm reference pool included two samples with fertilization rates of less than 70 percent. Aside from the justifications identified for the amphipod test above, the results for the bivalve and echinoderm tests identified in the DTR were identical to those found by Exponent (2003), using a different reference pool for the echinoderm test and a different statistical procedure for both tests (i.e., analysis of variance in the Exponent report and a reference-envelope approach in the DTR). That is, both studies found no significant effects for the echinoderm test, and significant effects at the same 12 stations for the bivalve tests. These results show that the statistical results for both of these tests were robust, since they were the same using two methods of analysis. MacDonald's assertion that the results for those two tests were invalid is therefore incorrect.

4. **Comment D.2.4 that "The Alternative Clean-Up Levels fail to include numerical limits to protect fish" is Invalid (TCAO Finding 32; DTR § 32)**

MacDonald states the "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)." However, as describe in detail in the previous response to MacDonald's Comment C.2.9, his analysis of risk to fish suffered from numerous flaws and uncertainties. Briefly, MacDonald predicted PCB concentrations in gobies, a species that does not occur at the Site, using a TRV developed from a freshwater zebrafish, an unpublished BSAF based on sand bass, a lipid content based on the naked goby, and an assumed 80 percent moisture content in whole bodies of fish.

Each one of the above "assumptions" has uncertainties attached to it, which MacDonald (2009) did not acknowledge or attempt to quantify. By contrast with MacDonald's hypothetical analysis of risk to fish, empirical data collected at the Site were evaluated for the spotted sand bass by Exponent (2003) and unacceptable risks were not found. MacDonald's assertion regarding risks to fish at the Site is therefore invalid.

5. **Comment D.2.5 that "The shortcomings of the Alternative Clean-Up Levels lead to uncertainties in the protectiveness of the remediation. This problem can be addressed, at least in part, by setting stringent Remediation and Post Remedial Monitoring requirements" is Invalid (TCAO Findings 32 and 34; DTR §§ 32 and 34).**

The TCAO and DTR presently include detailed and extensive remediation and post remedial monitoring requirements. In addition, additional monitoring details will be proposed and reviewed in the Remedial Monitoring Plan, which will be prepared within 90 days from adoption of the CAO. MacDonald's concern with respect to the monitoring requirements is therefore invalid.

6. **Comment D.2.6 that "The TCAO provides no evidence that the clean-up of the remedial footprint will restore any injury, destruction or loss of natural resources" is Unwarranted and Invalid (TCAO Finding 32; DTR § 32)**

MacDonald states that 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", and that the Regional Board "has not conducted a natural resource damage assessment at the Shipyard Sediment Site and, hence, has no basis for making this assertion." MacDonald also states that the Regional Board "does not have authority for conducting natural resource damage assessments", and that "all statements regarding the injury to natural resources, natural resource service losses, and associated damages must be removed from the TCAO and DTR."

MacDonald's assertions are an unwarranted extrapolation of a single mention of "natural resources" in the TCAO, in which it is simply states that "Cleanup of the remedial footprint will restore any injury, destruction, or loss of natural resources." The statement in no way addresses service losses, monetary damages, or any of the other parameters unique to natural resource

damage assessments. The statement simply articulates that the cleanup of the remedial footprint at the Site will improve environmental conditions such that natural resources like those evaluated in detail at the Site (i.e., benthic macroinvertebrates, fish, and aquatic dependent wildlife) will benefit. Contrary to MacDonald's statements, the DTR and TCAO have extensively evaluated many of the adverse effects that are defined as injuries in a natural resource damage assessment, such as exceedances of sediment quality guidelines, sediment toxicity, bioaccumulation, fish histopathology, and risks to wildlife from contaminated prey. It should also be noted a number of the items present in the DTR and TCAO were developed in cooperation with Natural Resource Trustees, including U.S. Fish and Wildlife Service, California Department of Game, and the National Oceanographic and Atmospheric Administration. Many of MacDonald's assertions are administrative jurisdictional comments. MacDonald lacks the qualifications to render comments regarding jurisdictional issues. MacDonald's assertions are therefore unwarranted and invalid.

B. Responses to MacDonald's Conclusions Regarding the Alternative Clean-Up Levels (TCAO Findings 32, 34; DTR §§ 32, 34)

1. Conclusion D.3.1 that "It is essential that the Remediation Monitoring program provide a reliable basis for documenting the water quality standards have been violated outside the construction area during remedial activities" is Unsupported and Invalid (TCAO Findings 32, 34; DTR §§ 32, 34)

As described in more detail in responses related to MacDonald's Section E (infra), the remedial monitoring program for the Site provides a reliable basis for monitoring water quality during remediation, and will be further developed and enhanced after the Remediation Monitoring Plan is submitted within 90 days after the CAO is adopted.

2. Conclusion D.3.2 that "It is essential that the Remediation Monitoring program…provide a reliable basis for documenting that the target clean-up levels for sediment have been reached within the remedial footprint and that the remedial activities have not further contaminated areas located outside the remedial footprint" Is Unsupported and Invalid (TCAO Findings 32, 34; DTR §§ 32, 34)

As described in more detail in responses related to MacDonald's Section E (infra), the remedial monitoring program for the Site provides a reliable basis for monitoring sediment quality during remediation, and will be further developed and enhanced after the Remediation

Monitoring Plan is submitted within 90 days after the CAO is adopted.

3. **Conclusion D.3.3 that "It is essential that the Remediation Monitoring program provide data 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" is Unsupported and Invalid (TCAO Findings 32, 34; DTR §§ 32, 34)**

As described in more detail in responses related to MacDonald's Section F, the post remedial monitoring program for the Site provides a reliable basis for ensuring that the Alternative Cleanup Levels are met following remediation.

4. **Conclusion D.3.4 that "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" is Unsupported and Premature (TCAO Findings 32, 34; DTR §§ 32, 34)**

The Regional Board will be able to use the extensive of amount information provided by the post remedial monitoring program to evaluate the success of the remediation, and to determine what, if any, addition actions may be warranted.

5. **Conclusion D.3.5 that "The Natural Resource Trustees may conduct a natural resource damage assessment to evaluate injuries to natural resources" is Inappropriate and Unsupported.**

MacDonald lacks the qualification to render any opinions regarding what the Natural Resource Trustees may or may not do, and, therefore, his conclusion is inappropriate.

VII. RESPONSES TO COMMENTS AND CONCLUSIONS IN SECTION E OF THE MARCH 11, 2011 MACDONALD EXPERT REPORT FOR THE SAN DIEGO SITE (TCAO FINDING 34; DTR § 34)

BAE Systems responds to the comments and conclusions of the MacDonald 3/11/11 Expert Report contained in Section "E" entitled "Expert Opinion #3: Remediation Monitoring", which states:

> 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..

(MacDonald 3/11/11 Expert Report, at p. 21.)

A. Responses to MacDonald's Comments Regarding Deficiencies of the Remediation Monitoring Requirements – Water Quality (TCAO Finding 34; DTR § 34)

1. Comment E.2.1 that "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" is Invalid (TCAO Finding 34; DTR § 34)

The DTR specifies that real-time monitoring of turbidity and dissolved oxygen will be conducted within 250 and 500 ft of construction area, with the 250-ft samples representing an early warning of potential problems and the 500-ft samples representing the point of compliance. In addition, prior to monitoring, a model of turbidity and synoptic water quality measures will be developed for ambient conditions to ensure that turbidity is an appropriate parameter for evaluating water quality. Contaminants of concern will not be sampled directly because, in part, real-time measurements would not be possible. Instead, turbidity and dissolved oxygen concentrations will be used as surrogate measurements to determine whether water quality standards are likely to be violated in real time. This monitoring scheme is considered both appropriate and effective.

2. Comment E.2.2 that "The DTR allows Dischargers to take all water quality samples from up-current locations which would mask true water quality impacts" is Premature and Unsupported (DTR § 34.1.1)

The locations of the water quality monitoring stations will be determined during preparation of the Remedial Action Plan (RAP), which will be prepared within 90 days from adoption of the CAO. The Remediation Monitoring Plan will be part of the RAP, and the detailed locations of the water quality monitoring stations will be proposed and reviewed for technical adequacy as part of that submittal. The details and justification of the proposed locations will be provided in that document.

3. Comment E.2.3 that "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" is Premature and Unsupported (DTR § 34.1.1)

The detailed locations of the water quality monitoring stations will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan. Details such as the definition of the construction area will be provided in that submittal.

4. **Comment E.2.4 that "The DTR fails to provide the rationale for collecting water samples at a depth of 10 feet" is Premature and Unsupported (DTR § 34.1.1)**

The final specification for sampling depth(s) for water quality monitoring will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

5. **Comment E.2.5 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" is Premature and Unsupported (DTR § 34.1.1)**

The time of day at which samples will be collected for water quality monitoring will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

6. **Comment E.2.6 that "The DTR's fails to require collection of water samples on at least a daily basis" is Premature and Unsupported (DTR § 34.1.1)**

The final temporal sampling frequency and strategy will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

7. **Comment E.2.7 that "The DTR's fails to define best management practices for dredging activities" is Premature and Unsupported (DTR § 34.1.1)**

The best management practices for dredging activities at the Site will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

B. <u>Responses to MacDonald's Comments Regarding Deficiencies of the Remediation Monitoring Requirements – Sediment (DTR § 34.1.2)</u>

1. **Comment E.3.1 that "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" is Premature and Unsupported (DTR § 34.1.2)**

The final sampling scheme for sediment monitoring will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

2. **Comment E.3.2 that "The DTR fails to identify the locations that must be sampled to confirm that clean-up goals have been met" is Premature and Unsupported (DTR § 34.1.2)**

The final sampling scheme for sediment monitoring will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

3. **Comment E.3.3 that "The TCAO and the DTR provide inconsistent requirements on sampling depth" is Premature and Unsupported (DTR § 34.1.2)**

Any inconsistencies regarding sampling depth will be resolved when the in the Remediation Monitoring Plan is prepared.

4. **Comment E.3.4 that "The DTR should specifically require that samples be collected within the top 10 cm" is Premature and Unsupported (DTR § 34.1.2)**

The sediment sampling depth for remediation monitoring will be finalized when the Remediation Monitoring Plan is prepared and reviewed by the Regional Board.

5. **Comment E.3.5 that "The DTR's 120% of background trigger level for additional dredging is ambiguous and arbitrary" is Premature and Unsupported (DTR § 34.1.2)**

The 120% of background trigger levels recognizes natural variability in sediment chemical concentrations. As stated in Section 34 of the DTR, **"**Environmental data has natural variability which does not represent a true difference from expected values. Therefore, if remedial monitoring results are within an acceptable range of the expected outcome, the remedial actions will be considered successful." The details of how this trigger level will be applied will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

6. **Comment E.3.7 that "The DTR fails to specify the criteria when a sand cap would be necessary and who would make such a determination" is Premature and Unsupported (DTR § 34.1.2)**

The details of how and when the application of sand caps will be made will be will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan. In addition, the Regional Board will oversee any decisions regarding application of sand caps.

C. <u>Responses to MacDonald's Conclusions Regarding the Remediation Monitoring Program (DTR § 34)</u>

1. **Comment E.4.1 that "The DTR must include detailed requirements for surface-water sampling" is Premature and Unsupported (DTR § 34)**

The details of the surface-water monitoring program will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

2. **Comment E.4.2 that "The DTR must make…changes to the sediment portion of the Remediation Monitoring program" is Premature and Unsupported (DTR § 34)**

The details of the sediment monitoring program will be proposed and reviewed for technical adequacy as part of the Remediation Monitoring Plan.

VIII. RESPONSES TO COMMENTS AND CONCLUSIONS IN SECTION F OF THE MARCH 11, 2011 MACDONALD EXPERT REPORT FOR THE SAN DIEGO SITE (TCAO FINDING 34; DTR § 34)

BAE Systems responds to the comments and conclusions of the MacDonald 3/11/11 Expert Report contained in Section "F" entitled "Expert Opinion #4: Post Remedial Monitoring", which states:

> 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.

(MacDonald 3/11/11 Expert Report, at p. 28.)

A. Responses to MacDonald's Comments Regarding Deficiencies of the Post Remedial Monitoring Requirements (TCAO Finding 34; DTR § 34)

1. **Comment F.2.1 that "Neither the TCAO nor the DTR establish narrative remedial action objectives (RAOs) for each San Diego Bay beneficial use" is Untrue (DTR § 34.2)**

The remedial action objectives are stated as the Alternative Cleanup Levels in Section 32 of the TCAO. For the protection of aquatic life, the objective is to "remediate all areas determined to have sediment pollutant levels likely to adversely affect the health of the benthic community" (see Table 2 of the TCAO). To protect aquatic dependent wildlife and human health, the objective is to achieve the site-wide sediment SWACs for the five primary COCs that are specified in Table 2 of the TCAO.

2. **Comment F.2.2 that "It is not clear that attainment of the Remedial Goals…ensure that San Diego Bay beneficial uses will not be unreasonably affected by sediment-associated contaminants at the Shipyard Sediment Site" is Invalid (TCAO § D.3.c.1)**

The specifications described in Section D of the TCAO on how the monitoring results for sediment chemistry, sediment toxicity, and bioaccumulation will be evaluated are objective, quantitative, and environmentally protective. They will therefore ensure that beneficial uses in San Diego Bay will be protected in the future.

3. **Comment F.2.3 that "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" is Incorrect (TCAO § D)**

As stated in Section D of the TCAO, sediment chemistry and sediment toxicity will be evaluated at five stations distributed throughout the remedial footprint to evaluate the success of the remediation with respect to benthic macroinvertebrates. In addition, subsamples of sediment from the 65 stations used for the compositing analysis will be archived for potential future analysis. Therefore, the SWAC results based on the compositing of sediments will not be the only method by which the effectiveness of the remediation will be assessed.

4. **Comment F.2.4 that "Compositing surface sediment into six polygon groups is inappropriate because it will mask the true extent of contamination remaining at the Shipyard Sediment Site" is Invalid (DTR §§ 32.2.1, 34.2)**

The stratification scheme described in Section 32.2.1 of the DTR will subdivide the overall Site into six polygon groups, thereby allowing SWACs to be calculated for those different subsections of the site, as well as for the overall site. This stratification scheme will provide valuable interpretive information on the spatial distribution of COC concentrations throughout the site, that would not be available if only a single site-wide SWAC was evaluated. The six polygon groups include three polygons in each of the northern and southern halves of the overall site, and the three polygons within each half of the overall site represent the remedial footprint, the polygons adjacent to or proximal to the remedial footprint, and the polygons distant from the footprint. Therefore, contrary to MacDonald's assertion, the stratification and compositing scheme specified in the DTR will document the true spatial extent of COC concentrations

throughout the Site, rather than mask that distribution. MacDonald's assertion is therefore invalid.

5. **Comment F.2.5 that "The 0-2 cm horizon is not the appropriate sediment depth to sample to evaluate attainment of conditions that support beneficial uses" is Incorrect (DTR § 34.2)**

The 0-2 cm sediment horizon is appropriate because it will allow direct comparisons of chemical concentrations and sediment toxicity results with pre-remediation sediment data, because the latter data was also generated using the 0-2 cm horizon. In addition, the 0-2 cm sediment horizon will provide a more sensitive indicator of potential re-contamination of the remediated areas, as the chemical concentrations in any newly deposited sediment will be minimally diluted by concentrations in the underlying sediment.

6. **Comment F.2.6 that "Collecting replicate sub-samples of composite sediment samples is not an appropriate method of evaluating the effectiveness of remedial monitoring" is Incorrect (DTR § 34.2.1)**

The subsampling and replication scheme described in Section D of the TCAO is appropriate to meet the stated objective as follows: "the three replicate sub-samples of composite samples provide an estimate of variances in the compositing process." This kind of information is very useful, because homogenizing a solid matrix such as sediment is difficult, and sometimes incomplete. The subsampling scheme will therefore improve the estimates of the COC concentrations in each of the polygon groups and thereby facilitate the evaluations of remedy effectiveness.

7. **Comment F.2.7 that "Trigger Concentrations for Primary COCs…will not effectively identify conditions at the Shipyard Sediment Site that unreasonably affect San Diego Bay beneficial uses" is Invalid (TCAO § D.1.c.6; DTR § 34.2.2; DTR Table 34-1)**

MacDonald states that "The Trigger Concentrations are likely to be relatively unhelpful…because they are not based on the concentrations of COCs that need to be achieved to support attainment of the beneficial uses." However, in Section 34.2.2 of the DTR it is stated that "These concentrations represent the surface-area weighted average concentration expected after cleanup, accounting for the variability in measured concentrations throughout the area", and that "it is critical to account for the natural variability of the predicted post-remedial SWAC."

Therefore, the Trigger Concentrations were developed appropriately with the realistic recognition that measurements of sediment chemical concentrations always are associated with some degree of error. MacDonald's assertion is therefore invalid.

8. **Comment F.2.8 that "Neither the TCAO nor the DTR provided the rationale for collecting sediment samples at nine sampling stations…to support bioaccumulation testing" is Incorrect (TCAO, Attachments 3 and 4)**

Inspection of Attachments 3 and 4 of the TCAO show that the nine stations selected for bioaccumulation analysis are distributed along the entire length of the remedial footprint, and thereby will provide a relatively complete assessment of potential bioaccumulation throughout the site.

9. **Comment F.2.9 that "The criteria presented in the TCAO for interpreting the results of the bioaccumulation tests…are not effects-based" is Irrelevant (TCAO § D)**

The bioaccumulation criteria specified in Section D of the TCAO were designed to document that bioaccumulation levels are responding the sediment remediation and are showing a decreasing trend in Year 2, relative to post-remediation levels, and decreasing or continuous trends in Years 5 and 10. The bioaccumulation evaluations were therefore designed appropriately for their intended use.

10. **Comment F.2.10 that "The requirements for collecting and analyzing sediment samples for evaluating sediment chemistry for benthic exposure and sediment toxicity are inadequate" is Invalid (DTR § 34)**

The five stations selected for evaluations of sediment chemistry and toxicity were the only five stations in the remedial footprint found to have likely impairment based on the Triad analyses described in the DTR (see Section 18 of the DTR). Therefore they represent the highest priority areas for remediation and are appropriately identified for monitoring of sediment chemistry and toxicity to evaluate benthic exposure. It should also be recognized that subsamples of sediment from all 65 polygons will be archived as part of the sediment compositing analysis, and will therefore be available for future chemical analysis if necessary.

11. **Comment F.2.11 that "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" is Incorrect (TCAO § D)**

In Section D of the TCAO, the decision rule for sediment chemistry is identified as "sediment chemistry below SS-MEQ and the 60% LAET thresholds." If these criteria are not achieved, the Regional Board will then evaluate whether further actions at the site are warranted.

12. **Comment F.2.12 that "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" is Incorrect (TCAO § D)**

In Section D of the TCAO, the decision rule for sediment toxicity is identified as "toxicity not significantly different from conditions at the reference stations described in Finding 17." If this criterion is not achieved, the Regional Board will then evaluate whether further actions at the site are warranted.

B. Responses to MacDonald's Conclusions Regarding the Post Remedial Monitoring Requirements (TCAO Finding 34. TCAO § D; DTR § 34)

1. **Conclusion F.3.1 that "Narrative remedial action objectives and specific indicators of attainment of those objectives…should be included in the TCAO" is Incorrect (TCAO Finding 34; TCAO § D; DTR § 34)**

The remedial action objectives are stated as the Alternative Cleanup Levels in Section 32 of the TCAO, and the indicators of attainment are presented in Table 2 and Section D of the TCAO.

2. **Conclusion F.3.2 that "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" is Invalid (TCAO Finding 34; TCAO § D; DTR § 34)**

Subsamples of sediment from all 65 polygons will be archived as part of the sediment compositing analysis, and will therefore be available for future chemical analysis if necessary. In addition the five stations selected for evaluations of sediment chemistry and toxicity were the only five stations in the remedial footprint found to have likely impairment based on the Triad analyses, and therefore represent the highest priority areas for monitoring of sediment chemistry

and toxicity to evaluate benthic exposure.

3. **Conclusion F.3.3 that "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" is Unsupported (TCAO Findings 32, 34; DTR §§ 32, 34)**

The 0-2 cm sediment horizon was selected for monitoring because it will allow direct comparisons of chemical concentrations and sediment toxicity results with pre-remediation sediment data. In addition, the 0-2 cm sediment horizon will provide a more sensitive indicator of potential re-contamination of the remediated areas than would the 0-10 cm horizon.

4. **Conclusion F.3.4 that "Trigger concentrations should be revised to correspond to the post-remedy SWACs for the five primary COCs" is Invalid (DTR § 34.2.2; DTR Table 34-1)**

As discussed in the response to Comment F.2.7, the Trigger Concentrations were developed appropriately with the realistic recognition that measurements of sediment chemical concentrations always are associated with some degree of error. MacDonald's assertion is therefore invalid

5. **Conclusion F.3.5 that "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" is Unsupported (TCAO Findings 19, 32, 34; DTR §§ 19, 32, 34)**

The nine stations selected for bioaccumulation analysis are distributed along the entire length of the remedial footprint, and thereby will provide a relatively complete assessment of potential bioaccumulation throughout the site. In addition, the 28-day bioaccumulation test with *Macoma nasuta* proved to be an effective tool for evaluating bioaccumulation in the DTR, so there is no need for the 56-day test.

6. **Conclusion F.3.6 that "Biological-effects based criteria should be established for interpreting the results of the bioaccumulation tests" is Incorrect (TCAO § D)**

The bioaccumulation criteria specified in Section D of the TCAO were designed to document that bioaccumulation levels are responding the sediment remediation and were therefore designed appropriately for their intended use.

7. **Conclusion F.3.7 that "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" is Unsupported (TCAO Findings 34; DTR § 34)**

The five stations selected for evaluations of sediment chemistry and toxicity were the only five stations in the remedial footprint found to have likely impairment based on the Triad analyses, represent the highest priority areas for remediation, and are therefore appropriately identified for monitoring of sediment chemistry and toxicity to evaluate benthic exposure. In addition, subsamples of sediment from all 65 polygons will be archived as part of the sediment compositing analysis, and will therefore be available for future chemical analysis if necessary.

8. **Conclusion F.3.8 that "The decision rules that will be used to determine the need for further action…must be clarified" is Unsupported (TCAO § D)**

In Section D of the TCAO, the decision rule for sediment chemistry is identified as "sediment chemistry below SS-MEQ and the 60% LAET thresholds", and the decision rule for sediment toxicity is identified as "toxicity not significantly different from conditions at the reference stations described in Finding 17." If these criteria are not achieved, the Regional Board will then evaluate whether further actions at the site are warranted.

IX. RESPONSES TO COMMENTS AND CONCLUSIONS IN SECTION G OF THE MARCH 11, 2011 MACDONALD EXPERT REPORT FOR THE SAN DIEGO SITE (TCAO § D.4)

BAE Systems responds to the comments and conclusions of the MacDonald 3/11/11 Expert Report contained in Section "G" entitled "Expert Opinion #5: Trigger Exceedance Investigation" which states:

> 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.

(MacDonald 3/11/11 Expert Report, at p. 33.)

A. Responses to MacDonald's Comments Regarding Deficiencies of the Trigger Exceedance Investigation and Characterization Process (TCAO § D.4)

1. Comment G.2.1 that "Exceedance of the Trigger Concentrations does not trigger further remedial actions" is Invalid (TCAO § D.4).

MacDonald states that exceedance of one or more Trigger Concentrations leads to an investigation of the exceedance rather than "automatically triggering additional clean-up", and that "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." MacDonald's "deduction" to an exceedance of a Trigger Concentration is unfounded and amounts to supposition. As stated in Section D of the TCAO, the purpose of the Trigger Exceedance Investigation and Characterization is "to determine the cause(s) of the exceedance" and to recommend "an approach, or combination of approaches, for addressing the exceedance(s)." The TCAO therefore lays out a rational approach with numerous details to evaluate the underlying cause of any exceedance of a Trigger Concentration, so that it can be addressed in the present, and prevented in the future. The Regional Board will review all of this information and determine the best path forward. MacDonald's assertion that the process is flawed is invalid.

2. Comment G.2.2 that "The DTR and TCAO fail to establish Trigger Concentrations based on the Alternative Clean-Up Levels for aquatic life" is Invalid (TCAO § D.4)

MacDonald states that Trigger Exceedance Investigation and Characterization process "ignores exceedances of the effect threshold for benthic invertebrates and the potential effects on fish." MacDonald fails to recognize that, as described in Section D of the TCAO, post remedial monitoring will be conducted using a variety of other indicators not directly related to the SWAC trigger concentrations. Those indicators are bioaccumulation evaluations using Macoma nasuta, sediment chemistry, sediment toxicity using both the amphipod and bivalve tests, and evaluation of in situ benthic macroinvertebrates communities. All of these indicators will be measured at multiple stations throughout the remedial footprint and all of them will provide information related to potential effects on benthic macroinvertebrates and benthic-feeding fish. MacDonald's assertion is therefore invalid.

3. **Comment G.2.3 of MacDonald (2011) states that "Trigger Concentrations have been established for five COCs only" is Invalid (TCAO § D.4)**

MacDonald states that the Trigger Exceedance Investigation and Characterization process focuses on the five primary COCs, and "ignores exceedances of toxicity thresholds for other chemicals." However, MacDonald fails to recognize that, as documented in the DTR, the five primary COCs were the primary risk drivers at the Site because they exhibited the highest exceedances with respect to toxicity thresholds. In addition the secondary COCs were highly correlated with the primary COCs, such that they are addressed in a common remedial footprint. In addition, as documented in Section D of the TCAO, the evaluations of sediment chemistry to assess benthic exposure will determine concentrations of arsenic, cadmium, chromium, lead, nickel, silver, zinc, and LPAHs, in addition to the five primary COCs. MacDonald's assertion is therefore invalid.

4. **Comment G.2.4 of MacDonald (2011) states that "The Trigger Concentrations…may not provide an effective basis for evaluating the potential for adverse effect…because they are statistically based values, rather than effect-based values" is Invalid (TCAO § D.4)**

As previously discussed in the response to Comment F.2.7, the Trigger Concentrations were developed appropriately with the realistic recognition that measurements of sediment chemical concentrations always are associated with some degree of error. MacDonald's assertion is therefore invalid.

B. <u>Responses to MacDonald's Conclusions Regarding the Trigger Exceedance Investigation and Characterization Process (TCAO § D.4)</u>

1. **Conclusion G.3.1 that "The Dischargers should not be given authority to make recommendations regarding the actions that will be taken to address exceedances of the Trigger Concentrations" but "Rather, the San Diego Regional Board must retain the authority to review the data and make such decisions" is Invalid (TCAO § D.4)**

The TCAO lays out a rational approach with numerous details for evaluating the cause of any exceedances of the Trigger Concentrations, so that it can be addressed in the present, and prevented in the future. The Regional Board will review all of this information and determine the best path forward. MacDonald's conclusion is therefore invalid.

2. **Conclusion G.3.2 that "The TCAO should clearly identify the actions that need to be taken if the Trigger Concentrations are exceeded" is Invalid (TCAO § D.4)**

As stated above, the TCAO lays out a rational approach for evaluating the cause of any exceedances of the Trigger Concentrations, and for determining the best path forward. Because it is not possible to *a priori* anticipate and address all possible contingencies with respect to exceedances of Trigger Concentrations and their possible causes, as MacDonald acknowledges in his conclusion, it is unrealistic to *a priori* identify the actions that need to be taken if the Trigger Concentrations are exceeded. MacDonald's conclusion is therefore invalid.

X. RESPONSES TO THE RECOMMENDATIONS IN SECTION H OF THE MARCH 11, 2011 MACDONALD EXPERT REPORT FOR THE SAN DIEGO SITE (TCAO § D.4)

BAE Systems responds to the recommendations of the MacDonald 3/11/11 Expert Report contained in Section "H" entitled "Summary of Recommendations" which states:

> 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.

(MacDonald 3/11/11 Expert Report, at p. 35.)

1. **Recommendation H.1 that polygons NA01, NA04, NA07, NA16, NA22, SW06, SW18, and SW29 be included in the remedial footprint is Invalid and Should Not be Adopted (TCAO Finding 33, Attachments 2, 3, 4; DTR § 33)**

As discussed previously, none of the eight polygons identified by MacDonald warrants inclusion in the remedial footprint. He erroneously identified Polygon NA06 as being excluded from the remedial footprint when, in fact, it is included in the footprint (see Attachment 4 of the TCAO). In addition, MacDonald erroneously listed Polygon NA16 twice. The reasons why the remaining six polygons in the above list were not included in the remedial footprint are found in various sections of the DTR and are summarized below:

NA01: Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.

NA04: Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.

NA07: Not likely impaired based on Triad analysis.

NA16: Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.69) was less than the threshold value of 0.9.

NA22: Addressed in a separate process for the Mouth of Chollas Creek TMDL.

SW06: Not likely impaired based on the supplemental Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ values (0.63) was less than the threshold value of 0.9.

SW18: Not likely impaired based on Triad analysis, no primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.62) was less than the threshold value of 0.9.

SW29: No primary COCs exceeded their 60% LAET values, the SS-MEQ value (0.71) was less than the threshold value of 0.9.

MacDonald's recommendation to include any of the above eight polygons is therefore invalid.

2. **Recommendation H.2 that the Remediation Monitoring requirements for surface water should be revised in include a variety of additional details is Unnecessary and Should Not be Adopted (TCAO Findings 34, 35; DTR §§ 34, 35)**

As discussed previously, the TCAO specifies that a Remedial Action Plan (RAP) will be prepared within 90 days from adoption of the CAO, and that the Remediation Monitoring Plan will be part of the RAP. The Remediation Monitoring Plan will include numerous additional details on the water quality monitoring program that will be reviewed for technical adequacy by the Regional Board. Because these additional details will be provided in the Remediation Monitoring Plan, MacDonald's recommendation that they be provided in the TCAO is unnecessary.

3. **Recommendation H.4 that the Remediation Monitoring requirements for sediment should be revised in include a variety of addition details is Unnecessary and Should Not be Adopted (TCAO Findings 34, 35; DTR §§ 34, 35)**

As discussed above, the TCAO specifies that the Remediation Monitoring Plan will be

prepared after adoption of the CAO. The Remediation Monitoring Plan will include numerous additional details on the sediment monitoring program that will be reviewed for technical adequacy by the Regional Board. Therefore, MacDonald's recommendation that they be provided in the TCAO is unnecessary.

4. **Recommendation H.5 that the Remediation Monitoring should be revised to include decision rules for evaluating the dredging results is Unnecessary and Should Not be Adopted (TCAO Findings 34, 35; DTR §§ 34, 35)**

The decision rules for evaluating the dredging results will be proposed in the Remedial Monitoring Plan and reviewed for technical adequacy by the Regional Board. Therefore, MacDonald's recommendation that they be provided in the TCAO is unnecessary.

5. **Recommendation H.6 that the Post Remediation Monitoring requirements should be revised as described in Section F of the MacDonald expert report is Unwarranted and Should Not be Adopted (TCAO Findings 34, 35; DTR §§ 34, 35).**

As discussed above in the responses to MacDonald's detailed comments and conclusions for Section F of his expert report, his suggested changes to the Post Remediation Monitoring requirements are unwarranted.

6. **Recommendation H.7 that the Trigger Exceedance Investigation and Characterization process should be revised as described in Section G of the MacDonald expert report is Unwarranted and Should Not be Adopted (TCAO § D.4)**

As discussed above in the responses to MacDonald's detailed comments and conclusions for Section G of his expert report, his suggested changes to the Trigger Exceedance Investigation and Characterization process are unwarranted.

Dated: May 26, 2011

DLA PIPER LLP (US)

By _____
MICHAEL S. TRACY
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PROOF OF SERVICE

I am a resident of the State of California, over the age of eighteen years, and not a party to the within action. My business address is DLA Piper LLP (US), 401 B Street, Suite 1700, San Diego, California 92101-4297. On May 26, 2011, I served the within documents:

BAE SYSTEMS SAN DIEGO SHIP REPAIR, INC.'S COMMENTS REGARDING TCAO/DTR NO. R9-2011-0001

by transmitting via e-mail the document(s) listed above to the recipient(s) set forth below on the attached Service List.

I am readily familiar with the firm's practice of collection and processing correspondence for mailing. Under that practice it would be deposited with the U.S. Postal Service on that same day with postage thereon fully prepaid in the ordinary course of business. I am aware that on motion of the party served, service is presumed invalid if postal cancellation date or postage meter date is more than one day after date of deposit for mailing in affidavit.

I declare under penalty of perjury under the laws of the State of California that the above is true and correct.

Executed on May 26, 2011, at San Diego, California.

Bonnie K. Lott

BONNIE K. LOTT

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