Amphipod Toxicity

- ***90th Percentile Minimum Significant Difference (MSD).*** MSD threshold values were calculated from the BPTCP database by Phillips et. al. (2001) to determine a critical threshold for statistically significant sample toxicity. These MSD values were calculated similar to the method used by Thursby et. al. (1997) to calculate the most common amphipod threshold used in sediment investigations (80% of control). Samples are defined as toxic if the following two criteria are met: (1) There is a significant difference ($p < 0.05$) in mean organism response between a sample and the negative laboratory control, as determined using a separate-variance t-test, and (2) The difference in organism response between the sample and control was greater than the protocol-specific 90th-percentile MSD value. The MSD threshold for the amphipod *Eohaustorius estuarius* (test species used in the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations) is 75% of the control (Table 1 of Phillips et. al. 2001).

Benthic Community

- ***Benthic Response Index for Embayments (BRI-E).*** The BRI and BRI-E was developed by Ana Ranasinghe et. al. (2003) as screening tools that discriminate disturbed from undisturbed benthic communities. The BRI and BRI-E specifically assess Southern California coastal and embayment environments, respectively. These indices remove much of the subjectivity associated with interpreting benthic community data and also provide a means of communicating complex information to managers. The following thresholds were developed for the BRI-E:

Table 5. Threshold Values Established for the Benthic Response Index – Embayments (BRI-E).

Threshold	Index Value	
Reference	< 31	Reference threshold defined as a value toward the upper end of the range of index values for sites that had minimal known anthropogenic influence.
Response Level 1	31 to 42	> 5% of reference species lost
Response Level 2	42 to 53	> 25% of reference species lost
Response Level 3	53 to 73	> 50% of reference species lost
Response Level 4	> 73	> 80% of reference species lost

The Regional Board accepted stations in the final reference pool based on the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure) and best professional judgement, as mentioned above. In evaluating the benthic community, we accepted stations that had BRI scores in the Reference threshold (< 31) and Response Level 1 (31 to 42) classifications. The Regional Board extended the BRI-E cutoff score into Response Level 1 because:

- Benthic species respond to natural and anthropogenic disturbances similarly as recognized by those that developed the BRI-E (Ranasinghe et. al., 2003). Thus, for stations with BRI scores within Response Level 1 it cannot be determined if benthic community variations are due to natural factors (e.g., seasonal effects), pollution, or physical disturbances (e.g., propeller wash and dredging).
- The difference between the stations with a benthic community classified as meeting the Reference threshold versus those with Response level 1 is very slight and cannot be attributed to pollution (RWQCB, 2003c).
- Accepting stations with Response Level 1 allows the Regional Board to account for natural variability in the bay with respect to benthic community changes.

Of the 22 reference stations in the final pool, 10 stations have BRI-scores in the Reference threshold classification (< 31) and 10 stations have BRI-E scores in Response Level 1 (31 to 42). The remaining two stations (CP 2238 and SY 2243) in the final pool have BRI-scores greater than Response Level 1 (60.3 and 45.1, respectively). These two stations were accepted into the final pool based on their respective sediment chemistry and amphipod toxicity results (for details see Appendix 5 of Attachment C). The weight-of-evidence suggests that the high BRI-scores for CP 2238 and SY 2243 may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. As such, the Regional Board instructed NASSCO and Southwest Marine to not use the benthic community data including the BRI scores for CP 2238 and SY 2243 in the final reference pool.

In summary, all of the stations in the Regional Board's final reference pool meet the screening criteria used to evaluate sediment chemistry, amphipod toxicity, and benthic community structure. The weight-of-evidence, therefore, concludes that each station included in the Regional Board's final reference pool is not impacted by sediment contamination (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and is supportive of aquatic life beneficial uses.

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APPENDIX 6
OF ATTACHMENT C

Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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Gray Davis
Governor

June 9, 2003

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Mr. Steve Bay
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Dear Messrs. Chee, Halvax, Chadwick, and Bay:

REGIONAL BOARD FINAL POSITION ON A REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

The Regional Board's final decision on a reference pool is provided below and should be used to determine statistically significant differences between site sediment quality conditions (at NASSCO, Southwest Marine, mouth of Chollas Creek, and 7th Street Channel) and reference sediment quality conditions. The final pool is based on a modified version of Reference Pool #2b.

We considered all stakeholder input received during the technical meetings held on December 12, 2002 and January 22-23, 2003, and have also considered all additional stakeholder input provided via written comments and conference calls subsequent to the technical meetings. The

following descriptive statistics should be calculated on the final reference pool lines-of-evidence (sediment chemistry, toxicity, and benthic community structure):

General

- Calculate one-tailed 95% prediction limits (PL) on each line-of-evidence.
- Each reference pool line-of-evidence should be tested for normality and be transformed accordingly prior to calculating the 95% PL.

Sediment Chemistry

- Calculate upper 95% PL for organic and inorganic chemicals of concern (COCs).
- Use un-normalized data for organics.
- Perform two separate site-versus-reference evaluations using non-normalized data and normalized data for metals. The metals data should be normalized to percent fines and the upper 95% PL should be determined by graphing the metals concentrations against percent fines and then calculating an upper PL on the slope of the metals-to-fines regression line. The coefficients of determination (R-squared values) and p-values should be determined for each regression line and the strength and significance of each correlation should be assessed to determine the applicability of the metals-to-fines normalization. Recommendations concerning the applicability of normalization for each metal should be made based on the results.

Toxicity

- Calculate lower 95% PL for the amphipod survival test.
- Calculate lower 95% PL for the fertilization test.
- Calculate lower 95% PL for the development test.

Benthic Community Structure

- Calculate upper 95% PL using the Benthic Response Index (BRI) scores.
- Other benthic metrics may be considered in addition to the BRI to evaluate the health of the benthic community.

FINAL REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2441	2231
2238*	2433	2233
	2243*	2238
		2240
		2241
		2242
		2243
		2244
		2247
		2252
		2256
		2257
		2265
		2433
		2435
		2436
		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 should not be used in this final reference pool.

If you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

[Original Signed]

David Barker, P.E.
Supervising Water Resource Control Engineer

DTB:clc:tca

cc: Dreas Nielsen, Exponent
Tom Ginn, Exponent
Chuck Katz, SPAWAR Systems Center San Diego
Michael Martin, Department of Fish and Game
Denise Klimas, National Oceanic and Atmospheric Administration
Scott Sobiech, U.S. Fish and Wildlife
Donald MacDonald, National Oceanic and Atmospheric Administration
Michael Anderson, Department of Toxic Substances Control
Laura Hunter, Environmental Health Coalition
Ed Kimura, Sierra Club
Jim Peugh, San Diego Audubon Society
Bruce Reznik, San Diego Baykeeper
Elaine Carlin, Representative for San Diego Bay Council
Brian Anderson, UC Davis - Marine Pollution Studies Laboratory
Russell Fairey, Moss Landing Marine Laboratories

NASSCO File No.: 03-0066.05
Southwest Marine File No.: 03-0137.05

Table 1
Station Comparison Between Pool 2b and Final Reference Pool

Pool 2b		Regional Board Final Reference Pool (modified Pool 2b)	
CP	2231	CP	~~2231~~
	2243		~~2243~~
	2433		2433
	2441		~~2441~~
	2238		2238*
SY	2231	SY	~~2231~~
	2243		2243*
	2433		2433
	2441		2441
Bight'98	2231	Bight'98	2231
	2233		2233
	2235		~~2235~~
	2238		2238
	2240		2240
	2241		2241
	2242		2242
	2243		2243
	2244		2244
	2245		~~2245~~
	2247		2247
	2249		~~2249~~
	2252		2252
	2256		2256
	2257		2257
	2258		~~2258~~
	2260		~~2260~~
	2265		2265
	2433		2433
	2435		2435
	2436		2436
	2440		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 will not be used in the final reference pool.

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2231	Out	Rationale: Remove CP 2231 based on 38% amphipod survival rate and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated PAH concentrations in sediment (1,063 ppb, TOC = 1.0%), however, uptake of PAHs in Macoma tissue is within reference station range (see Figure 1). Amphipod Toxicity[2]: Control-adjusted survival rate = 38% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 39.45 (Response Level 1 - Greater than 5% of reference species lost).
CP	2243	Out	Rationale: Remove CP 2243 based on 55% amphipod survival rate and BRI score of 55.05. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity[2]: Control-adjusted survival rate = 55% Benthic Community: BRI score = 55.05 (Response Level 3 - Greater than 50% of reference species lost).
CP	2433	In	Rationale: Retain CP 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 22.85 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2238	In	Rationale: Retain CP 2238 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 60.29 (Response Level 3 - Greater than 50% of reference species lost).
CP	2441	Out	Rationale: Remove CP 2441 based on elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (2,143 ppb, TOC = 1.82%) and in Macoma tissue (see Figure 1). Amphipod Toxicity: Control-adjusted survival rate = 78% Benthic Community: BRI score = 30.04 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2440	Out	Rationale: Remove CP 2440 based on elevated PCBs in sediment and elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (5,387 ppb, TOC = 1.04%) and in Macoma tissue (see Figure 1). Elevated PCB concentrations in sediment (283 ppb). Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 30.38 (Reference Level).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) Amphipod survival rates for CP 2231 and CP 2243 were previously adjusted based on SCCWRP's "mussel hypothesis" to remove amphipod toxicity replicate sample outliers. CP 2231 was adjusted from 38% to 84% survival and CP 2243 was adjusted from 55% to 83% survival. However, given the atypical benthic community in CP 2231, the relatively high BRI score for CP 2243, and uncertainties associated with the mussel hypothesis, the Regional Board decided to not apply the mussel hypothesis to adjust the amphipod toxicity results for these stations (and other Chollas site stations where the hypothesis was applied).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2231	Out	Rationale: Remove SY 2231 based on elevated PCBs in sediment and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated total PCB concentration in sediment (77 ppb) as compared to the other reference stations included in the pool. Amphipod Toxicity: Control-adjusted survival rate = 84% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 31 (Reference Level).
SY	2243	In	Rationale: Retain SY 2243 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 45.1 (Response Level 2 - Greater than 25% of reference species lost).
SY	2433	In	Rationale: Retain SY 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 16.8 (Reference Level).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2441	In	Rationale: Retain SY 2441 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 95% Benthic Community: BRI score = 19.9 (Reference Level).
SY	2440	Out	Rationale: Remove SY 2440 based on elevated lead, PAHs, and PCBs in sediment. Sediment Chemistry: Elevated lead (77 ppm), PAH (3,048 ppb), and PCB (117 ppb) concentrations in sediment. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 32.2 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2231	In	Rationale: Retain B'98 2231 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 94% Benthic Community: BRI score = 16 (Reference Level).
Bight'98	2233	In	Rationale: Retain B'98 2233 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2235	Out	Rationale: Remove B'98 2235 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 42.1 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2238	In	Rationale: Retain B'98 2238 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 87% Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2240	In	Rationale: Retain B'98 2240 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2241	In	Rationale: Retain B'98 2241 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 98% Benthic Community: BRI score = 35 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2242	In	Rationale: Retain B'98 2242 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 37 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2243	In	Rationale: Retain B'98 2243 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 36 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2244	In	Rationale: Retain B'98 2244 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 31.2 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2245	Out	Rationale: Remove B'98 2245 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity[2]: Control-adjusted survival rate = 82%. Benthic Community: BRI score = 42.6 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2247	In	Rationale: Retain B'98 2247 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 34 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2249	Out	Rationale: Remove B'98 2249 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 76% Benthic Community: BRI score = 45 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2252	In	Rationale: Retain B'98 2252 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 104% Benthic Community: BRI score = 4.3 (Reference Level).
Bight'98	2256	In	Rationale: Retain B'98 2256 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2257	In	Rationale: Retain B'98 2257 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2258	Out	Rationale: Remove B'98 2258 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 43 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2260	Out	Rationale: Remove B'98 2260 based on amphipod toxicity results. The 90th percentile minimum significant difference (MSD) approach was applied and the amphipod survival data met two criteria for being defined as toxic: (1) there was a significant difference ($p < 0.05$) in mean organism response between a sample and the negative control survival, as determined using a separate-variance t test, and (2) the difference in organism response between the sample and control was greater than the protocol-specific 90th percentile MSD value. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 73%. Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2265	In	Rationale: Retain B'98 2265 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 85% Benthic Community: BRI score = 27 (Reference Level).
Bight'98	2433	In	Rationale: Retain B'98 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 97% Benthic Community: BRI score = 21 (Reference Level).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2435	In	Rationale: Retain B'98 2435 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 102% Benthic Community: BRI score = -1.1 (Reference Level).
Bight'98	2436	In	Rationale: Retain B'98 2436 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 19 (Reference Level).
Bight'98	2440	In	Rationale: Retain B'98 2440 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 103% Benthic Community: BRI score = 32 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) The Regional Board adjusted the amphipod survival rate for B'98 2245 from 66% to 82%. The adjustment was made based on the results of the 5 replicate samples. Four of the replicate samples had relatively similar survival rates of 90%, 80%, 80%, and 75%, respectively, and one replicate had an anomolous survival rate of 0%. The 0% survival rate replicate was removed and the amphipod survival rate for B'98 2245 was adjusted accordingly.

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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Gray Davis
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October 7, 2003

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Dear Ms. Hunter and Messrs. Reznik, Kimura, Peugh, and Gonzalez:

REGIONAL BOARD DETAILED RESPONSES TO SAN DIEGO BAY COUNCIL'S MAY 5, 2003 AND AUGUST 12, 2003 LETTERS COMMENTING ON THE SELECTION OF REFERENCE STATIONS FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

The Regional Board received your written comments dated May 5, 2003 and August 12, 2003 regarding the Regional Board's selection of reference stations for the National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Inc. (Southwest Marine), Mouth of Chollas Creek, and 7th Street Channel sediment investigations. We appreciate the time and effort San Diego Bay Council has taken to provide us with views on the reference station issue.

We provided an initial response in a letter dated September 5, 2003 (Attachment A). My staff has spent a considerable amount of time reviewing your comments in detail. Prior to finalizing the reference pool we carefully considered your input, including that provided in your letter dated May 5, 2003. The Regional Board's decision on a final reference pool is provided in Attachment B as emailed to you on June 9, 2003. Staff's detailed written responses to your May 5 and August 12 letters are provided in Attachment C.

Should you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

JOHN H. ROBERTUS
Executive Officer

JHR:dtb:clc:tca

Attachments:
A. Regional Board Response to Comment Letters from San Diego Bay Council Regarding the Selection of Reference Stations for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations (September 5, 2003)

B. Regional Board Decision on Final Reference Pool

C. Regional Board Detailed Responses to San Diego Bay Council's May 5, 2003 and August 12, 2003 Letters

cc: Elaine Carlin, Representative for San Diego Bay Council
Mike Chee, NASSCO
Shaun Halvax, Southwest Marine
Dreas Nielsen, Exponent
Michael Martin, CA Department of Fish and Game
Scott Sobiech, U.S. Fish and Wildlife
Denise Klimas, National Oceanic and Atmospheric Administration
Donald MacDonald, National Oceanic and Atmospheric Administration
Steve Bay, Southern California Coastal Water Research Project
Bart Chadwick, SPAWAR Systems Center San Diego
Chuck Katz, SPAWAR Systems Center San Diego
Brian Anderson, UC Davis – Marine Pollution Studies Laboratory
John Hunt, UC Davis – Marine Pollution Studies Laboratory
Russell Fairey, San Jose State University – Moss Landing Marine Laboratories

ATTACHMENT A

Regional Board Response to Comment Letters from San Diego Bay Council Regarding the Selection of Reference Stations for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations (September 5, 2003)

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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Gray Davis
Governor

September 5, 2003

Ms. Laura Hunter
Environmental Health Coalition
1717 Kettner Boulevard, #100
San Diego, CA 92101

Mr. Jim Peugh
San Diego Audubon Society
2776 Nipoma Street
San Diego, CA 92106

Mr. Bruce Reznik
San Diego Baykeeper
2924 Emerson Street, Suite 220
San Diego, CA 92106

Mr. Marco Gonzalez
Surfrider Foundation - San Diego Chapter
P.O. Box 1511
Solana Beach, CA 92075

Mr. Ed Kimura
Sierra Club
3820 Ray Street
San Diego, CA 92104

Dear Ms. Hunter and Messrs. Reznik, Kimura, Peugh, and Gonzalez:

REGIONAL BOARD RESPONSE TO COMMENT LETTERS FROM SAN DIEGO BAY COUNCIL REGARDING THE SELECTION OF REFERENCE STATIONS FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

This is in response to the San Diego Bay Council's letters of May 5, 2003 and August 12, 2003 regarding the Regional Board's final selection of reference stations for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations. We were in the process of finalizing our response to your May 5, 2003 letters when we received your August 12 letter. I elected to delay our original response to your May 5 letter in order to address all of your concerns with the reference stations from both of your letters. We are now drafting detailed written response to both your May 5, 2003 and August 12, 2003 letters, and will issue those responses under separate cover in the near future.

As you know the Regional Board has been considering for some time how to deal with the reference pool issue. I appreciate the time and effort the San Diego Bay Council has taken to provide the Regional Board with comments and perspective on selecting appropriate reference stations for inclusion in the reference pool. I do not agree with your characterization of the Regional Board's selected reference pool, your critique of the decision making process, your

recommendation that the Board use the reference pool favored by San Diego Bay Council, and in particular your comments that my staff excluded you from critical deliberations on the reference pool.

In our deliberations on this issue we have considered a significant amount of information and comment from all stakeholders, including San Diego Bay Council, regarding the NASSCO, Southwest Marine, Chollas Creek and Seventh Street Channel contaminated marine sediment investigations. We have also consulted with a number of recognized technical experts in the sediment quality assessment field. At the conclusion of a final extensive two day January 22-23, 2003 technical meeting on the reference pool issue (attended by technical experts, the Natural Resource Trustee Agencies, NASSCO, Southwest Marine, the Navy, and the Bay Council) David Barker of my staff announced that it was the Regional Board's intent to consider all of the information and perspectives presented by the stakeholders and make a decision on the reference pool.

The staff spent a considerable amount of time following the January meetings, pouring over the data and evaluating various reference pool options favored by different stakeholders, including San Diego Bay Council, from a number of different perspectives. We think we arrived at a decision on a suitable reference pool that will provide a sound scientific basis for developing protective cleanup levels. On June 9, 2003 we informed you of our decision on the reference station pool and our intent to direct NASSCO and Southwest Marineto move forward with finalizing the technical report using that reference station pool.

In June 2003 my staff instructed NASSCO and Southwest Marine to proceed with completing their technical report on the sediment quality investigation using the reference pool selected by my staff. NASSCO and Southwest Marine are well into preparing the report and it is due to be submitted in approximately two weeks on September 30, 2003. I cannot support delaying the submission of this report and further delaying a Regional Board decision on cleanup in order to continue the debate on the relative technical merits of alternative reference station pool approaches.

I think we are at the point where it would be useful to apply the Regional Board's reference pool and appropriate statistical procedures to the NASSCO and Southwest Marine sediment site data and see what the various cleanup scenarios are. There is lot of good solid information that has been collected on multiple lines of evidence on this project. Therefore I am anticipating that there will be sufficient information in the technical report to ensure that the Regional Board will be able to evaluate options and make a cleanup decision that is protective of beneficial uses. Staff resource considerations and competing work on other priority projects are also pressing issues for us.

At this juncture I believe that the efficacious course for the Regional Board to conclude the investigation and determine cleanup levels is to obtain the technical report from NASSCO and Southwest Marine on September 30, 2003. The technical report will be available for public review upon our receipt of the document. My staff will review the report to determine its adequacy to develop appropriate cleanup levels and has tentatively scheduled the Regional Board's consideration of cleanup and abatement orders for NASSCO and Southwest Marine at the February 2004 Regional Board meeting. The Regional Board will provide ample opportunity for public comment on the cleanup and abatement orders, including the recommended cleanup levels as well as the reference station pool used in deriving the cleanup levels, during the public review process for the cleanup and abatement orders.

Should you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

JOHN H. ROBERTUS
Executive Officer

ATTACHMENT B

Regional Board Decision on Final Reference Pool

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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REGIONAL BOARD DECISION ON FINAL REFERENCE POOL

The goal of the sediment quality assessment at National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Inc. (Southwest Marine), Mouth of Chollas Creek, and 7th Street Channel is to identify polluted marine sediment areas that may require cleanup in order to protect or restore beneficial uses. In accordance with State Water Resources Control Board – Resolution No. 92-49 (SWRCB, 1996), the Regional Board reference pool was selected to represent the pre-discharge condition at these sites (i.e., the current sediment quality condition absent these sites) and protection of aquatic life beneficial uses. The purpose of the reference pool is to determine if there are statistically significant differences between site sediment quality conditions (NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel) and reference sediment quality conditions with respect to sediment chemistry, toxicity, and benthic community structure. The results of the statistical comparisons will be used in a weight-of-evidence approach to determine whether site stations exhibit impacts to aquatic-life beneficial uses.

The Regional Board's decision on a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations was provided to all stakeholders on June 9, 2003 (RWQCB, 2003a). The final reference pool, as shown below, is based on a modified version of Reference Pool #2b as proposed by SCCWRP, the Navy, and Exponent (Bay et. al., 2003). Reference Pool #2b was primarily developed based on the comments and decisions made by the stakeholders present at the January 22-23 technical meeting held at the Regional Board (details provided in Attachment C - Regional Board response to Comment #3 - Status of Tasks (May 5, 2003 Letter)). These comments and decisions were documented and subsequently used to guide SCCWRP, the Navy, and Exponent in developing Reference Pool #2b (RWQCB, 2003b).

Table 1. Regional Board Final Reference Pool.

2001 Chollas/Paleta (CP) Reference Station Data	2001 Shipyard (SY) Reference Station Data	1998 Bight'98 Station Data
2433	2441	2231
2238*	2433	2233
	2243*	2238
		2240
		2241
		2242
		2243
		2244
		2247
		2252
		2256
		2257
		2265
		2433
		2435
		2436
		2440

* The benthic community data including the Benthic Response Index (BRI) scores for CP Station 2238 and SY Station 2243 should not be used in this final reference pool.

The Regional Board's modifications to Reference Pool #2b and rationale for selecting stations in the final reference pool are provided in Appendix 5 of Attachment C. In summary, the approach we used to modify Reference Pool #2b was based on weight of evidence using the triad approach and best professional judgement. The triad of data (sediment chemistry, amphipod toxicity, and benthic community) analyzed at each of the proposed reference stations included in Reference Pool #2b were evaluated and a decision was made whether to accept or reject the proposed station. The results of the final screening evaluation are provided in Appendix 6 of Attachment C.

REFERENCES

Bay, S., B. Chadwick, and D. Neilsen. 2003. Consensus Evaluation of Candidate Reference Sites for Use in Evaluating Data from the NASSCO/SWM Shipyard and Chollas/Paleta Creek THS Areas. Southern California Coastal Water Research Project, Westminster, CA, SPAWAR System Center, U.S. Navy, San Diego, CA, and Exponent, Bellevue, WA.

RWQCB. 2003a. Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations. California Regional Water Quality Control Board, San Diego Region.

RWQCB. 2003b. Personal Communication (Email to S. Bay (SCCWRP), B. Chadwick (Navy) and D. Neilsen (Exponent)] regarding instructions to evaluate 4 candidate reference pools). California Regional Water Quality Control Board, San Diego Region.

SWRCB. 1996. Resolution 92-49: Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304. State Water Resources Control Board, Sacramento, CA.

ATTACHMENT C

Regional Board Detailed Responses to San Diego Bay Council's May 5, 2003 and August 12, 2003 Letters

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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REGIONAL BOARD RESPONSES TO SAN DIEGO BAY COUNCIL'S MAY 5, 2003 AND AUGUST 12, 2003 LETTERS

REGIONAL BOARD RESPONSES TO MAY 5, 2003 LETTER

1. EPA Definition of Reference Conditions and Reference Sites

Comment from San Diego Bay Council:
One of the most critical steps – and the step that has held up progress toward cleanup of San Diego Bay – is the *selection of reference sites* for the Bay that will establish background levels, and thus, determine how clean San Diego Bay will ever get. There are EPA guidelines for this process that are readily achievable in San Diego Bay. We wish to re-emphasize that these are widely accepted practices; the selection of reference sites is a relatively simple, straightforward exercise when executed properly. The real basis is simply common sense. Reference stations are those that represent relatively undisturbed conditions within the Bay or within a study area.

Regional Board Response:
The Regional Board recognizes that there are various documents (from EPA and the Department of Interior (DOI)) that provide definitions on reference conditions. The definitions provided in these documents have some similarities and some differences. In making our reference pool decision for the National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Inc. (Southwest Marine), Mouth of Chollas Creek, and 7th Street Channel sediment investigations, the Regional Board managed to balance these differences by selecting reference stations based on the following key criteria:

- Located within San Diego Bay away from known point sources;
- Physical characteristics similar to study sites (sediment grain size, total organic carbon, and water depth);
- Level of sensitivity that separates the effects on organisms due to natural non-pollutant factors (e.g., grain size, unionized ammonia, and sulfides) from the effects due to pollutants.
- Protective of aquatic life beneficial uses (i.e., relatively low sediment chemistry, lack of acute toxicity, and relatively healthy benthic community); and
- Representative of the pre-discharge conditions at these sites.

In addition to the EPA document cited by Bay Council (U.S. EPA, 2000) there are several other EPA and DOI documents that provide definitions on reference conditions. Reference definitions from these other documents are provided below:

"The degree of sediment contamination in a particular area is often evaluated by comparing the structure of benthic communities, levels of pollutants, or bioassay test results in sediments collected from the area being investigated with those in the surrounding area. The terms used to describe the different sediments in the comparisons are test sediments, control sediments, and reference sediments. As used in sediment assays and assessments, a test sediment is sampled from the area whose quality is being assessed. A control sediment is a pristine (or nearly so) sediment, free from localized anthropogenic inputs of pollutants with contamination present only because of inputs from the global spread of pollutants. A reference sediment, on the other hand, is collected from a location that may contain low to moderate levels of pollutants resulting from both the global inputs and some localized anthropogenic sources, representing the background levels of pollutants in an area. The reference sediment is to be as similar as possible to the test sediments in grain size, total organic carbon (TOC), and other physical characteristics." (U.S. EPA, 1992)

"A general guideline is to select reference locations that reflect the overall environmental conditions that can reasonably be expected in the site area given current uses other than those associated with the contamination under investigation." (U.S. EPA, 1994)

"Baseline data should reflect conditions that would be expected at the assessment area had the discharge of oil or release of hazardous substances not occurred, taking into account both natural processes and those that are the result of human activities." (U.S. DOI, 1996)

"A relatively uncontaminated site used for comparison to contaminated sites in environmental monitoring studies ... Reference biological samples may be taken from a reference area outside the influence of the site ... The reference area should be close to the site. It should have habitats, size, and terrain similar to the site under investigation ... The reference site need not be pristine." (U.S. EPA, 1997)

"The reference area should have the same physical, chemical, geological, and biological characteristics as the site being investigated, but has not been affected by activities on the site." (U.S. EPA, 2002)

2. Bay Council Participation in Regional Board Workshops

Comment from San Diego Bay Council:
There have been at least two lengthy workshops held by staff to discuss the selection of reference sites, however, we have only been included in the second of these.

Regional Board Response:
The Regional Board has received and considered numerous comments from Bay Council regarding the suitability of the 5 reference stations originally selected for the shipyard sediment investigations. Consequently, the Regional Board decided to hold a meeting on December 12, 2002 to solicit the assistance of various technical experts to address and respond to Bay Council's concerns with the reference stations. The technical experts included representatives from the Department of Fish and Game (DFG), U.S. Fish and Wildlife (USFW), National Oceanic and Atmospheric Administration (NOAA), Southern California Coastal Water Research Project (SCCWRP), San Jose State University - Moss Landing Marine Laboratories (San Jose State), UC Davis - Marine Pollution Studies Laboratory (UC Davis), SPAWAR Systems Center – Marine Environmental Quality Branch (SPAWAR), and Exponent. Representatives from NASSCO and Southwest Marine shipyards were also present at the meeting to listen to the concerns raised on the 5 reference stations selected for their sediment investigations.

Bay Council was not included in this meeting because it was a "technical" meeting and not a "public" meeting. The purpose of the technical meeting was to allow Regional Board staff to consult with other technical experts regarding the selection of a suitable reference pool and the reference station concerns raised by Bay Council. It was always our intention to present the Regional Board's response to comments on the reference stations to Bay Council and others following the December 12 meeting. We were informed of Bay Council's desire to provide additional input to us on the reference stations rather than wait on our response to comments. As such, we invited Bay Council to attend the technical meeting on January 22-23, 2003.

3. Status of Tasks

Comment from San Diego Bay Council:
Our expectation was that these tasks would be carried out in a transparent manner with all participants informed, provided with the necessary data, and provided the opportunity to offer input. We are very unclear as to the status of these overarching tasks and are concerned that decisions are being made with discharger input but not with the other interests represented.

Regional Board Response:
The Regional Board disagrees with Bay Council that decisions are being made without input from other interested stakeholders. The Regional Board has followed a lengthy and open process in considering the views of all stakeholders on the reference station issue. We have included all key stakeholders in the reference pool decision process as evidenced by participation in the technical meetings we held on December 12, 2002 and January 22-23, 2003. We received a significant amount of input at these technical meetings from NASSCO and Southwest Marine as well as groups representing:

- the interests of the public (San Diego Bay Council);
- the protection and conservation of State and Federal natural resources (DFG, USFW, and NOAA); and
- the scientific community (SCCWRP, San Jose State, UC Davis, and SPAWAR).

We have also considered all additional stakeholder input provided via written comments and conference calls subsequent to the technical meetings.

Following these meetings, it remained for the Regional Board to decide on how to proceed forward in selecting the reference pool for the NASSCO, Southwest Marine, Chollas Creek and 7th Street Channel sediment investigations . We announced our intent to do that at the conclusion of the January 2003 meetings and took on that task using the weight-of-evidence tables (sediment chemistry and toxicity only) and criteria developed by all stakeholders present during the January meetings. Accordingly, the Regional Board decided to narrow the reference pool options to the four alternatives listed below. It should be noted that Reference Pools #1a and #1b are based on the weight-of-evidence tables and Reference Pools #2a and #2b are based on the criteria developed by the group to evaluate the suitability of the 2001 Shipyard (and Chollas/Paleta) reference stations.

(1) Reference Pool #1a - 6 Reference Stations from 2001 data

(2) Reference Pool #1b - Reference Pool #1a + 22 Bight'98 stations selected from the Distance-From-Shore approach (Appendix 3 of Attachment C)

(3) Reference Pool #2a - Reference Stations selected from the criteria established at the January 23 meeting

(4) Reference Pool #2b - Reference Pool #2a + 22 Bight'98 stations selected from the Distance-From-Shore approach

On February 3 we requested that SCCWRP, Navy, and Exponent calculate the descriptive statistics for each of these four candidate reference pools (Appendix 1 of Attachment C). We would like to clarify that the April 10, 2003 document produced by SCCWRP, Navy, and Exponent was developed in accordance with the instructions prepared by the Regional Board (Appendix 4 of Attachment C). Furthermore, the Regional Board instructions were prepared based on the comments received from the entire stakeholder group present at the January 22-23 meeting.

The Regional Board has gone to great lengths to afford an opportunity for all stakeholders to participate in the shipyard investigation decision making process. We have held numerous meetings and teleconferences with Bay Council, the Natural Resource Trustee Agencies,

NASSCO, Southwest Marine, and other stakeholders to discuss concerns and technical issues associated with the investigation. At times we have had daylong meetings with Bay Council and others to ensure that all issues and input have been considered and discussed. The Regional Board has also provided detailed written responses to comments received from stakeholders such as the Bay Council regarding the shipyard investigation and has held several workshops to update the public including the Regional Board members on current sediment investigation and cleanup projects in San Diego Bay. A list of the key technical meetings, Regional Board written responses, and public workshops involving Bay Council is provided in Table 1 below.

Table 1. Regional Board's Commitment to Involve Bay Council in the Shipyard Sediment Investigation Process.

Type	Date	Purpose	Participants
Public Workshop	Aug 3, 2001	Public workshop held by the Regional Board to receive public comment on current sediment investigation and cleanup projects in San Diego Bay.	Public (including representatives from the **Bay Council**).
Meeting	Aug 14, 2001	Meeting with **Bay Council** to discuss technical issues identified by Bay Council on the Shipyard workplan.	Regional Board and **Bay Council**.
Meeting	Oct 12, 2001	Joint meeting to provide a forum for discussion and resolution of the technical issues raised by **Bay Council** on the Shipyard workplan.	Regional Board, **Bay Council**, NASSCO, Southwest Marine, Exponent, SCCWRP, and SPAWAR Systems Center – Marine Environmental Quality Branch (Navy).
Letter	Jan 15, 2002	Regional Board response to comments on 8/21/01 letter and 10/10/01 list of questions from **Bay Council** regarding the Shipyard sediment investigation workplan.	Not applicable.

Meeting	Jan 30, 2002	Formal presentation on the Phase 1 sampling results and receive comments.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, Exponent, NASSCO, Southwest Marine, SCCWRP, and Navy.
Meeting	Mar 29, 2002	Discuss issues raised in **Bay Council's** March 6, 2002 letter regarding the Shipyard sediment investigation.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, and SCCWRP.
Public Workshop	Jun 18, 2002	Update the Board Members and the public on current sediment investigation and cleanup projects in San Diego Bay. As part of the workshop agenda, **Bay Council** presented their opinions on the Shipyard investigation.	Regional Board members and the Public (including **Bay Council**.
Meeting	Aug 22, 2002	Formal presentation on the Shipyard draft Phase 2 workplan and receive comments.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, Exponent, NASSCO, and Southwest Marine.
Letter	Nov 14, 2002	Regional Board response to comments on 8/28/02 letter from **Bay Council** regarding the Shipyard draft Phase 2 field sampling plan.	Not applicable.
Meeting	Dec 12, 2002	Technical meeting to solicit the assistance of various technical experts to address and respond to **Bay Council's** reference station comments.	Regional Board, Natural Resource Trustee Agencies, SCCWRP, Moss Landing Marine Laboratories, UC Davis - Marine Pollution Studies Laboratory, SPAWAR Systems Center – Marine Environmental Quality Branch, Exponent, NASSCO, and Southwest Marine.

Meeting	Jan 22-23, 2003	Technical meeting to solicit the assistance of various technical experts to address and respond to **Bay Council's** reference station comments.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, SCCWRP, UC Davis - Marine Pollution Studies Laboratory, SPAWAR Systems Center – Marine Environmental Quality Branch, Exponent, NASSCO, and Southwest Marine.
Meeting	Jul 31, 2003	Meeting to discuss **Bay Council's** concerns on the Regional Board's final reference pool.	Regional Board and **Bay Council**.
Meeting	Aug 8, 2003	Meeting to discuss **Bay Council's** concerns on the statistical procedures.	Regional Board and **Bay Council**.

In addition to the above list of meetings, letters, and workshops, the Regional Board has communicated extensively with Bay Council and other stakeholders via telephone conversations, conference calls, and email.

4. Access to Data

Comment from San Diego Bay Council:
Access to the data sets being used is critical for our meaningful participation. As you know, despite repeated requests for data – data that staff, the industry, and Navy have been using for quite some time – we were only provided access after the second meeting, in January of 2003. This has put us at a considerable disadvantage. We are concerned that it was indicated that the input we provided before we had access to the data, is what you are considering the full extent of our input. It is not.

Regional Board Response:
The Regional Board provided all available data requested by your scientific consultant, Ms. Elaine Carlin, prior to the January 2003 technical meetings. The only requested data that we could not provide was SCCWRP's complete Bight'98 data set. At that time the Regional Board did not have all of the sediment quality data electronically (incomplete sediment chemistry data set and no benthic community data) and suggested that Ms. Carlin contact SCCWRP directly for

the complete Bight'98 data set. We understand that SCCWRP provided you with the data needed to complete your analysis following the January 2003 meetings.

We carefully reviewed and considered the full extent of your input in making our final reference pool decision. For example, as you pointed out in your approach, the benthic community data is considered an important criterion that should be used to select reference stations. The Regional Board, as a final screen of the reference stations in Reference Pool #2b, used the Benthic Response Index for Embayments (BRI-E) developed by SCCWRP to evaluate the benthic community (Ranasinghe et. al., 2003). By incorporating the BRI-E we removed stations with disturbed benthic communities from the reference pool. Additionally, the Regional Board has essentially used the same weight of evidence approach used by Bay Council to select stations in the final reference pool. Details are provided in Regional Board response to Comment #6 – Identification of a Set of Relatively Clean Sites (May 5, 2003 Letter).

5. Request for Working Group Meeting

Comment from San Diego Bay Council:
To expedite action we request that the staff hold a full working group meeting to address the various proposals and the action items identified at the last work group meeting. We request that the Regional Board solicit and distribute written comments on the pool of reference stations we have proposed here as well as other proposals such as NOAA's 14 and the Regional Board's set of 12 stations used to set background levels in March 2002 from the various entities and individuals participating in this process prior to the working group meeting.

Regional Board Response:
The Regional Board disagrees that written comments be solicited on various reference pool proposals including the Regional Board's March 6, 2002 letter establishing background conditions for NASSCO and Southwest Marine, and that another technical workgroup meeting be held to discuss these proposals. The Regional Board has thoroughly reviewed and considered all proposals, including comments received on these proposals, in the selection process of the final reference stations. The proposals received to date include those from NOAA (MacDonald and Klimas, 2003) and the Bay Council (Carlin, 2003). In addition, the background sediment concentrations defined in the Regional Board's March 6 letter is being replaced with the background sediment concentrations established by the final reference pool (n = 22) selected by the Regional Board. The Regional Board has already instructed NASSCO and Southwest Marine to use the final reference pool in determining areas exceeding background conditions within and adjacent to their respective leaseholds. We have requested that these areas be depicted in maps provided in the comprehensive technical report. The comprehensive technical report will be submitted to the Regional Board in mid October 2003 and will be available for public review and comment.

The NOAA reference pool approach was distributed to the technical workgroup for review and was formerly presented by NOAA at the January 22-23 meeting. The approach was discussed extensively at the meeting and comments were provided by the workgroup. We would like to clarify that the NOAA approach does not specifically recommend using just the 14 Bight'98 stations as you stated in your letter. Rather, NOAA suggested the possible use of 6 reference stations sampled in the 2001 sediment investigations (NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel) plus the 14 Bight'98 stations; for a total of 20 recommended stations.

Even though Bay Council submitted their proposed reference pool approach after the January 22-23 technical meeting, the Regional Board spent a significant amount of time reviewing their approach prior to issuing our decision on a final reference pool. In fact, both the Regional Board and Bay Council used the same weight-of-evidence approach to select reference stations by considering the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure). The screening criteria differed as shown in Appendix 5 of Attachment C.

The Regional Board's reference station pool includes reference stations recommended in the NOAA and Bay Council approaches. The reference pool includes 13 of 20 NOAA reference stations and 3 of 7 Bay Council reference stations. These stations are shown in Tables 2 and 3 below.

Table 2. 13 of 20 NOAA Reference Stations Included in Regional Board Final Pool (bold and shaded).

2001 Chollas/Paleta Reference Stations	2001 Shipyard Reference Stations	Bight'98 Reference Stations
2433	**2243**	2224
2238	**2433**	2239
2243	**2441**	**2436**
		2231
		2434
		2228
		2243
		2229
		2433
		2227
		2242
		2440
		2233
		2435

Table 3. 3 of 7 Bay Council Reference Stations Included in Regional Board Final Pool (bold and shaded).

2001 Chollas/Palcta Reference Stations	2001 Shipyard Reference Stations	Bight'98 Reference Stations
Not Applicable	Not Applicable	**2252**
		2435
		2229
		2433
		2227
		2434
		2441

The Regional Board also compared the mean values between the Regional Board reference pool and the reference pools proposed by NOAA and Bay Council to determine the similarities and differences. The mean values were used because it allows for a simple, baseline comparison between all of the various pools. The Regional Board recognizes that there are a variety of statistical methods to compare the various reference pools and that the mean is not the statistics used to compare reference to site stations.

As shown in Table 4 below, the reference pools are generally not significantly different from one another with respect to sediment chemistry (except for total priority pollutant PAHs [PP-PAHs]) and amphipod toxicity. The Regional Board's pool for total PP-PAHs is significantly lower (i.e., more protective) than both Bay Council's pool and NOAA's pool. The Bay Council's pool and NOAA's pool are approximately 50% and 30% higher, respectively, in PP-PAH concentrations.

Another significant difference is the mean Benthic Response Index Embayment (BRI-E) scores for the reference pools. Bay Council's pool for the BRI-E score is significantly lower, as expected, because the Regional Board's pool included stations within the BRI-E Response Level 1 threshold (details provided in Appendix 5 of Attachment C). Bay Council's pool only included stations within the BRI-E Reference Level threshold. Also worth noting is that the mean BRI-E scores for the Regional Board's pool and NOAA's pool are similar.

Table 4. Comparison of Mean Values Between the Regional Board, Bay Council, and NOAA Reference Pools.

		Mean Values[1]		
		Regional Board Pool	**Bay Council Pool**	**NOAA Pool**
		n = 22	n = 7	n = 20
Sediment Chemistry[2]	**Units**			
Arsenic	mg/kg	5.45	6.76	5.45
Cadmium	mg/kg	0.14	0.16	0.15
Chromium	mg/kg	30.8	31.8	32.3
Copper	mg/kg	56.7	54.9	54.9
Lead	mg/kg	23.5	19.7	23.1
Mercury	mg/kg	0.26	0.18	0.28
Nickel	mg/kg	9.37	11.1	9.87
Silver	mg/kg	0.52	0.56	0.50
Zinc	mg/kg	112	103	109
Total PP-PAHs[3]	**ug/kg**	**346**	**803**	**513**
Total PCBs	ug/kg	43.3	51.3	42.0
Toxicity				
Amphipod Survival (control-adjusted)	%	95	98	95
Benthic Community				
BRI-E[4]	**unitless**	**27.6**	**15.1**	**26.0**

Notes: (1) Sediment quality data taken from April 10, 2003 document produced by SCCWRP, Navy, and Exponent (Bay et. al., 2003).

(2) One-half of the method detection limit was substituted for nondetect values, except for the Shipyard data, where one-half of the reporting was used (Bay et. al., 2003).

(3) Total PP-PAHs = Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz[a]anthracene, Chrysene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo[a]pyrene, Indeno[1,2,3-cd]pyrene, Dibenz[a,h]anthracene, and Benzo[ghi]perylene.

(4) BRI-E = Benthic Response Index - Embayments

6. Identification of a Set of Relatively Clean Sites

Comment from San Diego Bay Council:
To move the process forward, and because of profound concerns about how this selection process appears to be unfolding, (and now that we have the necessary data), we have identified a set of relatively clean sites, with relatively healthy benthic communities, to be used as a reference pool for the Bay (enclosed). We had the following in mind as we proceeded:

- *Select a Pool of Reference Stations that will define background (ambient) conditions in San Diego Bay.*
- *This pool can be used for general assessments of whether areas of the Bay are degraded.*
- *This pool, or a subset of this Pool, can be used as reference for site-specific cleanups, including clean-up of the NASSCO and Southwest Marine Shipyards sites.*
- *Recommend that the stations that make up this pool be protected from degradation.*

Regional Board Response:
The criteria the Regional Board had in mind when selecting the reference pool is provided in our response to Comment #1 – EPA Definition on Reference Conditions and Reference Sites (May 5, 2003 letter). The Regional Board believes that the best way to move the project forward is to apply the Regional Board's reference pool and appropriate statistical procedures to the NASSCO and Southwest Marine sediment site data and evaluate the resultant cleanup scenarios. A lot of good solid information that has been collected on multiple lines of evidence on this project. Therefore we are anticipating that there will be sufficient information in the technical report to ensure that the Regional Board will be able to evaluate options and make a cleanup decision that is protective of beneficial uses.

The Regional Board has considered all stakeholder input, including the Bay Council's proposed reference pool, and believes we have arrived at a decision on a suitable reference pool that will provide a sound scientific basis for identifying site stations exceeding reference conditions. All of the stations in the Regional Board's final reference pool meet the screening criteria used to evaluate sediment chemistry, amphipod toxicity, and benthic community structure. The weight-of-evidence, therefore, concludes that each station included in the Regional Board's final reference pool is not impacted by sediment contamination (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and is supportive of aquatic life beneficial uses. Consequently, we are confident that the Regional Board's reference pool is suitable for the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations.

The screening criteria used by the Regional Board to select stations in the final reference pool and the results are provided in Appendices 5 and 6 of Attachment C, respectively.

REGIONAL BOARD RESPONSES TO AUGUST 12, 2003 LETTER

1. Precedent for Cleanup in San Diego Bay and California

Comment from San Diego Bay Council:
We have invested very significant time and resources in this, and we believe that the outcome of the Regional Board process, and your ultimate decision will provide a very significant precedent for clean up, not only of San Diego Bay, but for sediments in the rest of the State.

Regional Board Response:
We appreciate the time and resources the Bay Council has spent on this project and we have fully considered all of your input. The Regional Board process on the NASSCO and Southwest Marine projects do not set a binding precedent for current and future sediment investigations in San Diego Bay and throughout the State of California.

We have stated repeatedly in our technical meetings and workshops, the framework we developed to assess the contaminated sediments at NASSCO and Southwest Marine Chollas Creek and Seventh Street Channel is an evolving process. The Regional Board will continue to consult with stakeholders representing the interests of the public, the protection of State and Federal natural resources, and the scientific community to improve the decision-making process for other current and future sediment projects in San Diego Bay.

The Regional Board will not be setting a precedent for the entire state of California. The State Water Resources Control Board (SWRCB) is conducting an independent effort to establish sediment quality objectives (SQOs) and an implementation policy for California's enclosed bays and estuaries. The SWRCB has already initiated the process. A workplan was adopted by the SWRCB at its May 21, 2003 Board meeting which describes the approach and key tasks that will be implemented to develop SQOs for California (SWRCB, 2003). It is anticipated that the process through adoption of the SQOs will take approximately four years to complete (Year 2007). Also worth noting is that the SQOs will only provide protection to aquatic life (i.e., benthic community). A framework for the calculation of sediment objectives based on fish bioaccumulation and consumption by humans or wildlife will be developed and illustrated through its application in a case study. This framework and case study will serve to illustrate the methods and data needed to develop bioaccumulation-based sediment objectives by regulatory agencies.

2. Problems Identified by the Natural Resource Trustee Agencies

Comment from San Diego Bay Council:
We would like to take this opportunity to update you regarding serious concerns we have about how the cleanup effort is proceeding, particularly as it relates to the pool of reference stations

selected and recently released by your staff. These problems with the selection and approach used have also been identified by the natural resource trustee agencies, including the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service, and California Fish and Game.

Regional Board Response:
The Resource Agencies recently submitted comments on September 12, 2003 regarding the Regional Board's reference pool (Appendix 2 of Attachment C). Prior to issuing our final reference pool decision we consulted with the Resource Agencies extensively and took significant steps to address the Resource Agencies' concerns. While we recognize that there are a few issues that still need to be resolved with the Resource Agencies, we do not agree with Bay Council that the Resource Agencies have identified the same set of problems as the Bay Council with the reference pool selection.

3. NOAA and Bay Council Proposed Reference Pools

Comment from San Diego Bay Council:
Previously NOAA and the San Diego Bay Council each submitted for consideration proposed pools of reference stations representing *the least impaired, or "cleanest" sites in San Diego Bay.* These approaches are based on widely accepted scientific practices used throughout the nation and supported by EPA Guidance (See for example, U.S. Environmental Protection Agency, Office of Water. December 2000. *Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance.* EPA-822-B-00-024).

Regional Board Response:
See Regional Board responses to Comment #1 – EPA Definition of Reference Conditions and Reference Sites (May 5, 2003 Letter) and Comment #5 – Request for Working Group Meeting (May 5, 2003 Letter).

4. Pristine Levels not required for Cleanup

Comment from San Diego Bay Council:
Using reference sites within San Diego Bay takes into account that while the Shipyards must cleanup contamination they contributed to the Bay, cleanup cannot be required to pristine levels.

Regional Board Response:
Water Code Section 13304 provides that ... "any person who has discharged or discharges waste into waters of the state in violation of any waste discharge requirement or other order or prohibition issued by a Regional Water Board or the State Water Board ... may be required to clean up the discharge and abate the effects thereof." This section authorizes the Regional

Board to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge).

5. Solicit Comments on Bay Council and NOAA Proposals

Comment from San Diego Bay Council:
The Bay Council requested that the staff solicit comment on our proposal from members of the working group. We have also inquired about the status of NOAA's proposal, a proposal we could support, and requested a meeting at which both of these proposals along with others could be fully considered. These requests were denied, and we have received no response to our proposal, or to request that comment be solicited from members of the working group.

Regional Board Response:
See Regional Board responses to Comment #3 – Status of Tasks (May 5, 2003 Letter) and Comment #5 – Request for Working Group Meeting (May 5, 2003 Letter).

6. Bay Council Proposal used by the Navy and Regional Board Staff

Comment from San Diego Bay Council:
In the meantime, our proposal has received very favorable review from several individuals and agency representatives both prominent in the field and familiar with San Diego Bay. Our proposal has been used in the selection of reference stations by the Navy and by other members of your staff for TMDL and other cleanup projects in the Bay.

Regional Board Response:
The Regional Board is not aware of any sediment investigation projects in San Diego Bay that has used the Bay Council's approach in selecting reference stations. In fact, we are puzzled with your comment that Staff has used the Bay Council approach for TMDL sediment investigations. The Regional Board has not used the Bay Council approach in determining a reference pool for any of the TMDL sites in San Diego Bay. We recognize that we are using three of the same Bight'98 stations (2435, 2441, and 2229) identified in the Bay Council approach in the Switzer Creek, Downtown Anchorage, and B Street/Broadway Piers TMDLs. However, Bay Council's approach was not used to select these three stations. These three stations were selected based on the results of previous studies (Bight'98, BPTCP, Shipyard Investigation) and specific criteria:

- Location (i.e., not located in a marina);
- Low sediment chemistry;
- Lack of acute toxicity;
- Healthy benthic community;
- Similar physical characteristics to study sites (total organic carbon and sediment grain size); and

- Level of sensitivity that separates the effects on organisms due to natural non-pollutant factors (e.g., grain size, unionized ammonia, and sulfides) from the effects due to pollutants.

The Regional Board requests that the Bay Council provide us a list of sediment projects in San Diego Bay that have used the Bay Council approach in selecting reference stations, including detailed information on how the approach was applied. In addition, the Regional Board requests that the Bay Council provide us a separate list of the agencies and sediment experts that have reviewed the Bay Council reference pool approach. Please include their name, title, organization, and phone number when providing us this list. We would like to contact them to receive additional input on the Bay Council approach for potential application to future sediment investigations in San Diego Bay.

7. Excluded from First Key Meeting

Comment from San Diego Bay Council:
Despite our deep involvement and commitment to this process from the beginning, and our provision of valuable scientific input, we were excluded from the first key meeting of the reference pool working group.

Regional Board Response:
See Regional Board response to Comment #2 – Bay Council Participation in Regional Board Workshops (May 5, 2003 Letter).

8. Lack of Balanced Input

Comment from San Diego Bay Council:
We, along with other parties involved in the process, are fundamentally concerned about the lack of balanced input and heavy access and influence afforded by the dischargers – staff has worked very closely with the Navy and shipyards and their consultants in selecting an approach, selecting the pool of stations, and the statistical approach. We have been excluded from these critical deliberations.

Regional Board Response:
The Regional Board is disappointed in Bay Council's assertions that we have not provided equal attention to all stakeholders interested in the reference pool selection process and that we have excluded Bay Council from "critical deliberations" we have had with the Shipyards and the Navy. The Regional Board has maintained an open process to ensure that we have considered the views of all key stakeholders on the reference station issue. We have held three day-long technical meetings to discuss the approach and selection of reference stations and have also considered all additional stakeholder input provided to us before and after these technical

meetings. The Regional Board had several discussions separately with the Shipyards and the Navy following the technical meetings to provide further clarification on the instructions we provided to them and because they had questions regarding the candidate reference pools identified in the instructions. As a reminder, the Regional Board instructions including the candidate reference pools were prepared based on the input received from the entire stakeholder group present at the January 22-23 technical meeting (RWQCB, 2003a). There were no "critical deliberations" following the technical meetings that warranted the inclusion of the entire stakeholder group. The purpose of the limited discussions between the Regional Board and the Shipyards/Navy were to keep the reference pool analysis proceeding forward.

9. Process Deserves Full Stakeholder Participation

Comment from San Diego Bay Council:
As a result, the staff's proposed reference pool and approach were determined without full stakeholder participation and despite the fact that stakeholders were providing high caliber scientific input. Management of the San Diego Bay contaminated sediment clean up process deserves transparency and full participation of the stakeholders including the public.

Regional Board Response:
See Regional Board responses to Comment #3 – Status of Tasks (May 5, 2003 letter) and Comment #8 – Lack of Balanced Input (August 12, 2003 letter).

10. Regional Board Reference Pool not Protective of Beneficial Uses

Comment from San Diego Bay Council:
The approach and reference pool decided upon your staff does not appear to be scientifically defensible, and no evidence has been presented that beneficial uses will be protected.

Regional Board Response:
The Regional Board disagrees with Bay Council that the approach used to select the reference pool is scientifically indefensible and that the final pool does not protect beneficial uses. As we stated in Regional Response to Comment #6 – Identification of a Set of Relatively Clean Sites (May 5, 2003 letter), the final reference pool is based on a final screening evaluation using the triad approach and best professional judgement. The triad approach is a widely-accepted approach that is used throughout the United States to evaluate sediment quality. In fact, Bay Council in selecting a proposed reference pool also used the triad approach. Based on the final screening evaluation, the reference stations in the Regional Board's final pool are not impacted by sediment contamination and are supportive of aquatic life beneficial uses (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community). The evaluation results are provided in Appendix 6 of Attachment C.

11. Distance-From-Shore Approach

Comment from San Diego Bay Council:
The approach is based on the concept that the contamination levels decrease with the distance from shore – despite the fact that some of the cleanest sites are relatively close to shore. The Trustee Agencies and sediment experts experienced in the Bay rejected this method when it was first proposed last January. It has not been peer-reviewed, and to our knowledge has never been used before.

Regional Board Response:
The Regional Board recognizes that the Bay Council does not agree with the approach used to identify additional reference stations for the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations (distance-from-shore approach). We also recognize that the Resource Agencies are not in full agreement with the use of the distance-from-shore approach and need further clarification on its development and application (Appendix 2 of Attachment C).

The Regional Board disagrees with Bay Council that the distance-from-shore approach is an inappropriate approach because it does not consider "clean" stations close to shore. In order to clear up confusion on the approach provided below is a brief summary of the distance-from-shore approach. Also discussed are why it was developed, how it accounts for near-shore (and far from shore) Bight'98 stations, and how the remaining distance-from-shore stations are protective of beneficial uses.

Distance-From-Shore Approach (Appendix 3 of Attachment C):

One of the concerns raised by some of the participants in the technical workgroup was the number of reference stations (n) used to calculate the parametric statistics for sediment chemistry, toxicity, and benthic community structure. The Regional Board, among others, decided that it was important to increase n to improve the power of the statistical procedures for the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations. As a first step, the reference stations from these investigations were combined to increase n to 11 (five from NASSCO and Southwest Marine, and six from Chollas Creek and 7th Street Channel). It was appropriate to combine these reference stations because they: (1) are the same stations with respect to location (with the exception of one station), (2) were sampled within the same time frame (July and August 2001), (3) were sampled for the same sediment quality data, and (4) followed the Bight'98 sampling and analysis protocols. Because the chemical and biological results from some of these reference stations were considered to be unsuitable for representing reference conditions; thus decreasing n, the Regional Board and others decided that it was necessary to supplement the combined reference stations. Consequently, SCCWRP identified additional reference stations in San Diego Bay from the Bight'98 data set. The approach used by SCCWRP is based on the

premise that contaminant concentrations in sediments decrease away from shore (i.e., away from point and non-point sources). SCCWRP determined that concentrations of copper, chromium, mercury, lead, zinc, total PAHs, and total PCBs (common chemicals of concern) appeared to level off at approximately 290 meters from shore. Threshold chemical concentrations for each of these constituents were then calculated using only stations greater than or equal to 290 meters from shore. All 46 Bight'98 stations in San Diego Bay were compared to these threshold values (regardless of distance from shore) and stations below these threshold values were identified as suitable reference stations. Twenty-two stations from the Bight'98 data set were below the threshold values ranging from 10 to 1,080 meters from shore. These stations were, therefore, considered as candidate supplemental reference stations.

The Regional Board, as a final screen of these additional 22 stations, evaluated the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure) using the criteria specified in Appendix 5 of Attachment C. Based on the results of the Regional Board's screening evaluation (Appendix 6 of Attachment C), 5 of 22 stations were removed based on their respective BRI scores. The remaining 17 stations were retained in the final reference pool because they met all screening criteria. The weight-of-evidence, therefore, concludes that the 17 stations are not impacted by sediment contamination (based on weight-of-evidence: relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and are therefore supportive of aquatic life beneficial uses.

12. Number of Reference Stations in Final Pool

Comment from San Diego Bay Council:
The pool is exceptionally large, and as a result contains stations that are too contaminated or impaired to be used to establish the bar to which cleanup will be required – the pool has over 20 stations, where other reference pools for San Diego Bay have 5 or 6 stations. It has been demonstrated that much smaller pools – if selected properly – provide the necessary range of physical characteristics and statistical power, and importantly, allow for a cleaner reference condition.

Regional Board Response:
From a statistical standpoint, a large pool is typically preferable to a small pool, yet the comment suggests otherwise. The Bay Council's standard being used to justify a "smaller pool" is that it allows for a "cleaner reference condition". The goal in choosing reference sites is not to choose the cleanest reference condition. It is to choose reference conditions that represent the pre-discharge conditions at the site.

The Regional Board disagrees with Bay Council that the reference stations in the final pool are "too contaminated or impaired." Each reference station in the final pool has relatively low

sediment chemistry, lack of acute toxicity, and a healthy benthic community. See response to Comment #6 – Identification of a Set of Relatively Clean Sites (May 5, 2003 letter). Furthermore, the reference stations included in the final pool provide the necessary range of physical characteristics at NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel: Fines content (13% - 77%), Total Organic Carbon (0.30% - 1.63%), and Depth (3 – 12 meters).

The Regional Board is familiar with only one site in San Diego Bay that has used 5 reference stations: Site 12 - Boat Channel at the Former Naval Training Center (Bechtel, 1999). The Regional Board requests that Bay Council provide a list of San Diego Bay sites that have used 5 or 6 reference stations and include a detailed rationale with supporting documentation on how these sites demonstrate that "much smaller pools – if selected properly – provide the necessary range of physical characteristics and statistical power, and importantly, allow for a cleaner reference condition."

Finally, Bay Council's above comment recommending the use of "much smaller pools" is not consistent with the Bay Council's endorsement of the NOAA reference pool, which recommends a total of 20 reference stations (2 reference stations less than the Regional Board's final pool). We request that Bay Council clarify their position on the number of stations in the large NOAA pool.

13. Choice of Statistical Techniques

Comment from San Diego Bay Council:
The second major set of problems involves the choice of statistical techniques which apparently will result in a less protective level of cleanup. Commonly used, simpler, and much more transparent statistics are the appropriate tools to use and would be expected to result in significantly more protection for the Bay. These simpler techniques are entirely consistent with the triad approach to selecting reference sites.

Regional Board Response:
The Regional Board is unclear as to which statistics Bay Council is referring to that is "commonly used, simpler, and much more transparent ... and would be expected to result in significantly more protection for the Bay". Therefore, we cannot respond specifically to your suggestion.

The Regional Board is aware that the Bay Council used the 95% upper confidence limit (UCL) on the mean as the statistic for evaluating their proposed reference pool. We disagree with Bay Council in using UCL's when comparing a reference pool to individual site stations because it is technically incorrect. The Regional Board recommends using the 95% upper predictive limit

(UPL) as specified in our June 9, 2003 letter to the Shipyards (RWQCB, 2003). A detailed discussion on the UCL and UPL is provided below.

A confidence limit on the mean is an estimate of the value for which there is a specific chance that the true mean of a population is less than this value (e.g. 95%). The 95% UCL is a population statistic because it describes a characteristic of the entire population. For example, one could use the UCL to represent a reference condition to evaluate dissolved phase concentrations in a pond. Since it is the pond as a whole that one is concerned with and the mean concentration of a chemical represents this pond, the 95% UCL may be used to estimate if the pond concentrations exceed reference.

A predictive limit (e.g. the 95% UPL) is an estimate of the value for which there is a 95% chance that a future selected sample will not exceed this value if it is actually a member of the population (or site) being studied. The 95% UPL is a statistic that applies to individual samples. When we evaluate exceedences of sediment quality, we look at individual sediment samples. We are interested in knowing whether or not there is impairment in the immediate vicinity of the sample. Therefore, we want to know if the individual sample is a member of the reference sampling population and the UPL is the appropriate statistic to use.

Confidence limits and predictive limits are generically referred to as interval estimates. According to Dennis Helsel and Robert Hirsch (authors of "Statistical Methods in Water Resources") (Helsel and Hirsh, 2002) there are two types of interval estimates:

> "Interval estimates can provide two pieces of information which point estimates cannot:
>
> 1. A statement of the probability or likelihood that the interval contains the true population value (its reliability).
> 2. A statement that the likelihood that a single data point with specified magnitude comes from the population under study.
>
> Interval estimates for the first purpose are called confidence intervals; intervals for the second purpose are called prediction intervals. Though related, the two types of interval estimates are not identical and cannot be interchanged."

The authors further describe how prediction intervals are appropriate for evaluating individual data points and confidence intervals are not:

> "Prediction intervals are computed for a different purpose than confidence intervals – they deal with individual data values as opposed to a summary statistic such as the mean. A prediction interval is wider than the corresponding confidence interval, because an individual observation is more variable than is a summary statistic computed from several observations.

Unlike a confidence interval, a prediction interval takes into account the variability of single data points around the median or mean, in addition to the error in estimating the center of the distribution. When the mean +/- 2 standard deviations are mistakenly used to estimate the width of a prediction interval, new data are asserted as being from a different population more frequently than should."

Some notable investigations in which the UPL was used to differentiate contaminated sediments from reference station conditions include:

- Southern California Bight 1998 Regional Monitoring Program (Noblet et. al., 2003)
- Natural Trace Metals Concentrations in Estuarine and Coastal Marine Sediments of the Southeastern United States (Windom et al., 1989)
- Statistical Approach for Discrimination of Background and Impacted Areas for Midnite Mine RI/FS (URS Greiner, 2001)
- Remedial Investigation, Naval Air Station, North Island, San Diego, California (SPAWAR, 1999)
- Sediment Quality in Puget Sound (Long et. al., 2000)

It should be noted that the above are the only investigations identified by the Regional Board, thus far, that have used the UPL. There may be more investigations.

14. Calculations on the Regional Board Reference Pool

Comment from San Diego Bay Council:
Staff has indicated that we should wait until the shipyards make these calculations or run them ourselves, and that even the staff has not run these calculations on the pool they selected. This is confusing – how has staff evaluated its final pool and approach as to whether it is protective of beneficial uses, and how will staff evaluate the shipyard's work?

Regional Board Response:
The Regional Board met with Ms. Elaine Carlin (Bay Council's scientific consultant) and Mr. Ed Kimura of Sierra Club on July 31, 2003 to discuss Bay Council's comments on the final reference pool. At that meeting, we indicated that we did not need to perform the statistical calculations on the final pool because: (1) we directed the Shipyards to conduct the calculations (RWQCB, 2003b), (2) the calculations would be available in the Shipyard's comprehensive report due in mid October 2003, and (3) the Regional Board had limited time and resources. The Regional Board, however, has evaluated the final pool by using the triad approach to screen and select the final reference stations (for details see Regional Board response to Comment #6 – Identification of a Set of Relatively Clean Sites). We evaluated the sediment chemistry, amphipod toxicity, and benthic community structure data in each of the reference stations included in Reference Pool #2b (Bay et. al., 2003) and removed stations that did not meet our

criteria. The final remaining stations are stations that are not impacted by sediment contamination (based on weight-of-evidence: relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and are therefore supportive of aquatic life beneficial uses.

Finally, the Regional Board has the necessary resources to review the Shipyard's comprehensive sediment investigation report, which includes the statistical calculations. We will also seek assistance, as necessary, from the Natural Resource Trustee Agencies and others that have the technical expertise on issues such as risks to human health and wildlife. Furthermore, we will consider all input received from interested stakeholders on the comprehensive technical report.

15. Site-Specific Approach to Select Reference Stations

Comment from San Diego Bay Council:
Each of these problems has also been identified by the Trustee agencies, and you should know that the Trustees and the San Diego Bay Council have gone to extraordinary lengths to identify, communicate, and provide assistance with these problems as we have become aware of them. In response to these efforts, staff has indicated that the approach they are using will only be used for the commercial shipyard cleanup, a response that belies the precedent-setting nature of the staff's decision, and the fact that the approach is already being cited by other dischargers in their work on other cleanup sites in the Bay.

Regional Board Response:
See Regional Board response on Comment #1 - Precedent for Cleanup in San Diego Bay and California (August 12, 2003 Letter).

16. Request for Hearing on Reference Pool Issue

Comment from San Diego Bay Council:
By this letter we are appealing to you to schedule this issue for a hearing so that the Board can provide direction on selection of the pool of reference stations and so that all information and scientifically credible proposals – including those by NOAA and by the Bay Council – can be brought before the decision-makers.

Regional Board Response:
The Regional Board disagrees with Bay Council that a hearing be held specifically to discuss the reference station issues. As we pointed out in our above responses we have already gone through extensive discussions with all key stakeholders on the process to select a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations. The Regional Board has held three day-long technical meetings with groups representing:

- the interests of the public (Bay Council),
- the protection and conservation of State and Federal natural resources (DFG, USFW, and NOAA),
- the scientific community (SCCWRP, San Jose State, UC Davis, and SPAWAR), and
- the potential responsible parties (NASSCO, Southwest Marine, and Navy).

In addition, we have held numerous meetings and teleconferences separately with most of the groups mentioned above. The Regional Board has considered all stakeholder input not only from these technical workgroup meetings and teleconferences, but also from input provided via written comments (e.g., proposed approaches and comments received on these approaches).

In June 2003 Regional Board staff instructed NASSCO and Southwest Marine to proceed with completing their technical report on the sediment quality investigation using the reference pool selected by staff. NASSCO and Southwest Marine's consultant is already well into preparing the technical report and it is due to be submitted in mid October 2003. It should be noted that the Regional Board will be scheduling a day-long workshop in November 2003 to: (1) present an overview of the technical report, (2) provide an opportunity for the public to provide comments on the technical report, and (3) solicit input on the development of the Cleanup and Abatement Orders (CAOs) for NASSCO and Southwest Marine.

The purpose of the technical report is to present the data and findings of the comprehensive sediment investigation conducted within and adjacent to the NASSCO and Southwest Marine leaseholds. The technical report will, at a minimum, include the following:

- Sediment quality data collected at each shipyard. The data consists of bulk sediment and pore water chemistry, sediment and pore water toxicity, benthic community structure, and bioaccumulation.
- Nature and areal extent of sediment contamination resulting from current and historical waste discharges from the shipyards.
- Biological effects and risks to San Diego Bay beneficial uses (aquatic life, aquatic-dependent wildlife, and human health) associated with sediment contamination at the shipyards.
- Determination and evaluation of cleanup levels protective of beneficial uses, including cleanup levels representing background conditions in San Diego Bay.
- Analysis of sediment remedial alternatives.

Staff does not support delaying the submission of this report and further delaying a Regional Board decision on cleanup in order to continue the debate on the relative technical merits of alternative reference station approaches. At this juncture the efficacious course for the Regional Board to conclude the investigation and determine cleanup levels is to obtain the technical report

from the shipyards in mid October 2003. Staff will review the report to determine appropriate cleanup levels and has tentatively scheduled the Regional Board's consideration of CAOs for NASSCO and Southwest Marine at the February 2004 Regional Board meeting. The CAOs will include directives to cleanup and abate the effects of the discharges in accordance with the final cleanup levels and include a time schedule for compliance with the directives. The Regional Board will provide ample opportunity for public comment on the CAOs, including the recommended cleanup levels as well as the reference station pool used in deriving the cleanup during the public review process for the CAOs.

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Windom, H., Schropp, F., F. Chalder, J. Ryan, R. SmithJr., L. Burney, F. Lewis and C. Rawlinson. 1989. Natural Trace Metals Concentrations in Estuarine and Coastal Marine Sediments of the Southeastern United States, *Environmental Science and Technology* 23:314-320.

APPENDIX 1
OF ATTACHMENT C

Regional Board Instructions to Evaluate 4 Candidate Reference Pools

< Modified: February 7, 2003 >

I. CANDIDATE REFERENCE POOLS #1A & #1B

The tables provided below indicate which stations should be included in candidate reference pools #1a and #1b.

Reference Pool #1a – 6 Reference Stations from 2001 Data

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2231	None
2238	2243	
	2433	
	2441	

Reference pool #1a is a modified version of the pool that was developed during the January 23 meeting using a weight-of-evidence approach (plus and minus table for chemistry and toxicity). Regional Board staff modified the agreed pool by removing Chollas/Paleta Station 2243 because of the 55% amphipod survival rate. We will, however, consider retaining Chollas/Paleta Station 2243 if information is presented to establish a much h` gher survival rate.

< Modified: February 7, 2003 >

Reference Pool #1b – Reference Pool #1a + 18 Bight'98 Stations

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2231	2238
2238	2243	2440
	2433	2433
	2441	2231
		2252
		2265
		2435
		2258
		2257
		2240
		2436
		2256
		2247
		2242
		2233
		2244
		2243
		2241

Reference pool #1b is a combination of the stations in Reference pool #1a and 18 of 22 Bight'98 stations selected in the distance-from-shore approach developed by SCCWRP. Regional Board staff removed four Bight'98 stations due to the low amphipod survival rates. Stations 2249, 2245, 2235, and 2260 had survival rates of 75%, 66%, 71%, and 73%, respectively.

Descriptive Statistics for Reference Pools #1a and #1b

Descriptive statistics should be performed on the following parameters: sediment chemistry, amphipod toxicity, benthic community, and physical characteristics (% fines, % TOC). The sediment quality data and statistical results should be summarized in a table similar to the table provided in the NOAA document titled "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations" (January 16, 2003).

< Modified: February 7, 2003 >

- **Sediment Chemistry**

Statistics
- Mean
- Standard Deviation
- Upper one-tail 95% prediction interval (not adjusted)
- Upper one-tail 95% prediction interval (adjusted)

Details
- Provide statistical results for all contaminants of concern identified for Chollas/Paleta and NASSCO/SWM. A list of the combined COCs is provided in Attachment #5.
- Provide statistical results for ERMq. The ERMq should be calculated based on the same contaminant suite used in the November 8, 2002 document titled "Evaluation of Reference Station Data Obtained During the Shipyard or Chollas/Paleta Spatial Survey" prepared by Steve Bay et. al.
- For non-detects use ½ the detection limit reported by the analytical laboratory. USEPA 2002 guidance should be followed for summing ½ detection limit values (EPA 540-R-01-003, Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA sites, September 2002). Do you want to cite the EPA document discussed at the meeting as a possible reference?
- Total PCBs should be calculated using the 18 specific congeners recommended by NOAA (Attachment #2).
- Total PAHs should be calculated using the 23 specific PAHs used by NOAA in the document titled "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations" (January 16, 2003).
- Total DDTs should be calculated using ...
- Total chlordanes should be calculated using ...
- Include the ERM and ERL for each COC in the table.

- **Toxicity**

  Statistics
  - Mean
  - Standard Deviation
  - Lower one-tail 95% prediction interval (not adjusted)
  - Lower one-tail 95% prediction interval (adjusted)

  Details
  - Provide statistical results for % amphipod survival.

- **Benthic Community**

  Statistics
  - Mean
  - Standard Deviation
  - ?Lower/upper? one tail 95% prediction interval (not adjusted)
  - ?Lower/upper? one tail 95% prediction interval (adjusted)

  Details
  - Provide statistical results for number of taxa, abundance, and Shannon-Wiener diversity.
  - Provide an interpretation of the statistical results using best professional judgement.

- **Physical Characteristics**

  Statistics
  - Provide % fines and % TOC ranges.

  Details
  - Provide statistical results for % fines and % TOC.

II. CANDIDATE REFERENCE POOLS #2A & #2B

Reference pools #2a and #2b will be based on the criteria established at the January 23 meeting. Please use these criteria to establish candidate reference pools #2a and #2b. The criteria, as typed by Steve Bay at the meeting, are provided in Attachment #5. Please note that in the attachment we included some instruction/direction on a few criteria (red text and underlined).

< Modified: February 7, 2003 >

Reference Pool #2a – Reference Stations selected from 2001 Data

The following two tables should be developed prior to identifying potential suitable stations for reference pool #2a:

- Table A – Identify Outliers

  The purpose of this table is to identify outliers in the 2001 reference station data from the NASSCO/Southwest Marine and Chollas/Paleta investigations. Table 1 should be formatted similar to the table provided in the November 8, 2002 document titled ""Evaluation of Reference Station Data Obtained During the Shipyard or Chollas/Paleta Spatial Survey" prepared by Steve Bay et. al.

- Table B – Weight-of-Evidence

  The purpose of this table is to identify potential suitable reference stations from the Table A results using best professional judgement (i.e., weight-of-evidence approach). Table B should be formatted similar to the table with the pluses and minuses developed at the January 23 meeting (See Attachment #5). Additionally, Table B should include a column that provides a brief rationale for accepting or rejecting the station.

The selected stations from Table B should be placed in the following table:

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
Table B Results	Table B Results	None

< Modified: February 7, 2003 >

Reference Pool #2b – Reference Pool #2a + 18 Bight'98 Stations

The selected stations from Table B should be placed in the following table:

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
Table B Results	Table B Results	2238
		2440
		2433
		2231
		2252
		2265
		2435
		2258
		2257
		2240
		2436
		2256
		2247
		2242
		2233
		2244
		2243
		2241

Descriptive Statistics for Reference Pools #2a and #2b

Descriptive statistics should be performed on the following parameters: sediment chemistry, amphipod toxicity, benthic community, and physical characteristics (% fines and % TOC). Please follow the instructions provided above in the descriptive statistics for reference pools #1a and #1b (if applicable).

Issues and Decisions

What process should be used to evaluate suitability of 2001 reference station data?

1. Bight'98 comparison data set to use: 10 stations identified in 2001 Chollas/Paleta SAP (may use phase II data also).
2. Confirm normal distribution or do appropriate transformation
3. Calculate upper (lower) one tail 95% prediction interval, nonadjusted for multiple comparisons (or nonparametric substitute).
4. Compare to each 2001 station for chemistry, toxicity (% amphipod survival), and benthos (abundance, number of taxa, Shannon-wiener diversity) data using PI approach. Use chemistry contaminants of concern list.

	Shipyard	Chollas/Paleta		
As	X	X		
Cd	X	X		
Cu	X	X		
Cr	X	X		
Pb	X	X		
Hg	X	X		
Ag	X	X		
Ni	X	X		
Zn,	X	X		
(Butylytin)	X			
PCB/(PCT)	X	X		
PAH	X	X		
DDT		X		
Chlordane		X		
(Tot petrol)	X			

( ) not in Bight'98 dataset

Nondetects: use ½ detection limit reported by the analytical lab. Follow USEPA guidance (2002) guidance for summing ½ detection limit values and determining use of data.

-Consider Use Phase II Shipyard data for TBT, PCB and PAH comparisons.

- **The Bight'98 study had either detection limit issues or had a majority of non-detects for total PCBs and total PAHs. Do not use the Bight'98 data for these contaminants. Use the PCB and PAH data from the 12 Bight'98 stations resampled by the Shipyards in 2001 (Attachment #3).**
- **The Bight'98 study did not analyze for TBT and TPH. Use the TBT and TPH data from the 12 Bight'98 stations resampled by the Shipyards in 2001 (Attachment #3).**

Do a separate statistical comparison using the 12 phase II stations.

- **Perform comparison to 10 Bight'98 Stations using upper one tail 95% prediction interval, nonadjusted to determine if sediment chemistry data is suitable for use in the reference pool. For contaminants not anaylyzed in Bight'98 (include PCBs too because of the detection limit issues in Bight'98) use the 7 BPTCP reference sites located in SD Bay.)**

Obtain BPTCP data for 7 established SD Bay reference sites and use for prediction interval analyses for contaminants of concern

not represented in Bight'98 dataset (10 stations) and shipyard Phase II dataset.

- **The Bight'98 study had either detection limit issues or had a majority of non-detects for total DDT and total chlordane. Do not use the Bight'98 data for these contaminants. Use the DDT and chlordane data from the 7 BPTCP reference stations located in San Diego Bay (Attachment #4).**

5. Do a best professional judgment evaluation of chemistry, benthos and toxicity data.
6. Use results of 4 & 5 to decide on suitability of each station's data.

Conditional exclusion, based on the type of outlier?

Action items:
a. Mike M. will provide EPA guidance document on nondetect chemistry data treatment. Jan 31.
b. Circulate Phase II shipyard data for potential use in steps 1-6 analyses and make a decision regarding its use and specific stations to include (e.g, 2441). ~~Get data by Jan 31, agencies provide comments to Regional Board by Feb. 5 COB.~~
c. Do steps 1-4 and circulate results (SCCWRP, NAVY, exponent). ~~2 weeks after decision on inclusion of shipyard Phase II data.~~
d. Complete steps 1-6 and provide recommendations to Regional Board. ~~Submit within 4 weeks of decision on item c.~~

e. Draft final decision regarding inclusion/acceptability of 2001 data will be made by Regional Board. Decision will be circulated to interested parties for comment by email.

What data sets should be included in the analysis data pool? To be used in evaluating the study site stations for differences relative to the pool.

Step 7. Skip steps 1-6 and use best professional judgment

			C/P								
	c-n/ noaa	c- fws	c-	t-n/ noaa	t-fws	c-n/ noaa	c- fws	c-	t-n/ noaa	t- fws	
2231	+	-		-	-	+	+		+	+	
2243	+	+		-(+)	+	+	+		+	+	
2433	+	+		+	+	+	+		+	+	
2440	-	-		+	-	-	-		+	-	
2441	(+)	-		+	-	+	+		+	+	
2238	+	+		+	+						

~~Acceptable 2001 data~~
~~Bight'98 subset~~
~~Shipyard Phase II data (acceptable data, judged using a similar process to that applied to the 2001 data)~~

~~How to select the additional Bight'98 data for inclusion?~~
~~Include the 10 identified previously?~~
~~Include the 14 identified by NOAA?~~
~~Include the 22 identified with the distance approach?~~
~~Use a combination of PCA and distance from shore?~~
~~Use a combination of NOAA and distance approaches?~~

~~Outliers in Chollas/Paleta toxicity data?~~

~~What statistics/technique will be used to make comparisons between the reference data pool and the study site station?~~

~~1. Treat each sample as an independent replicate for statistical purposes (n=7 or 8).~~

~~2. Follow steps 1-6 previously identified for the evaluation of the 2001 reference site data.~~

~~3. Adjustment for multiple comparisons: to be determined later.~~

~~4. Use a limited list of constituents for the statistical comparisons in order to minimize the need to adjust for multiple corrections.~~

APPENDIX 2
OF ATTACHMENT C

Comment Letter from Natural Resource Trustee Agencies
(September 12, 2003)

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF RESPONSE & RESTORATION
COASTAL PROTECTION & RESTORATION DIVISION
c/o California Department of Toxic Substance Control,
Human and Ecological Risk Division
8800 Cal Center Drive
Sacramento, CA 95826

September 12, 2003

Mr. John Robertus
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Dear Mr. Robertus,

As you are aware, representatives from affected Federal and State natural resource trustees have been working with the Board staff as part of a multi-stakeholder work group to develop a process to evaluate sediment contamination at the National Steel and Shipbuilding Company (NASSCO), the South West Marine Shipyard, and the Chollas and Paleta Creek TMDL. On behalf of the natural resource trustee representatives, the National Oceanic and Atmospheric Administration (NOAA), would like to address the role of the natural resources trustees related to the cleanup of contaminated sites, and also present the trustees comments on the selected reference pool approach and it's implementation.

The Natural Resource Trustees derive their authority from the Clean Water Act (CWA) §311, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the CERCLA enabling regulations in the National Contingency Plan (NCP) §300.600. In the event of a release of a hazardous substance into the environment, the natural resource trustees act on behalf of the public to protect natural resources that may be impacted by the hazardous substance releases, and the trustees ensure that the impacted resource, and the human and ecological services that the resource provides, are appropriately restored. The trustees carry out their designated responsibilities for protection and restoration by first working cooperatively within the cleanup process with the regulatory agencies and the parties responsible for the release. This cooperation, which includes technical support to the regulatory agencies, is specifically intended to lead to establishing cleanup numbers that will eliminate or limit future harm to trust resources and will allow for the restoration of the impacted habitat.

The trustees also have an expressed interest in negotiating with the responsible party in order to grant them a release from future natural resource liability under the authorized Federal acts. This release from future liability can only occur if the trustees determine that the cleanup protects trust resources, and that restoration of the resource is achieved. Working in close partnership with the regulatory agencies is the most direct and productive avenue by which the trustees can fulfill their

obligation to the public under the designated statutes and regulations. The trustees do have the option of working independently with the responsible party to achieve both a protective cleanup and restoration for the site, but it is clearly more timely, and in the best interest of the resources for all parties to work in a cooperative manner.

Each trustee agency named in the NCP has designated natural resources that they are tasked with protecting. Many times these natural resources co-exist, are contiguous, and/or have concurrent jurisdictions. In these cases, the trustees work together as co-trustees to carry out their designated responsibilities. For the investigation and remediation of the Shipyards, the Federal trustees with jurisdiction are NOAA, and the Department of the Interior, represented by the United States Fish and Wildlife Service (USFWS). The State of California is also a co-trustee for this site. As stated in the NCP, the Governor of the state has the authority to appoint the trustee(s). The designated natural resource trustees for the State of California are the Department of Fish and Game, trustee for all state fish and wildlife resources; the Regional Water Quality Control Board for surface water, groundwater and sediment; and the Department of Toxics Substances Control for soils.

The trustees have been involved in the ecological risk assessment process for the Shipyards since 2001 and have worked closely with the Board staff on development of several work plans associated with the risk assessment. The trustees participated in technical workshops in December 2002, and January 2003 to determine a reference pool to help evaluate site-related contaminants. During the January 2003 meeting, NOAA, along with the Navy, the Southern California Coastal Water Research Program (SCCWRP), and the Shipyards, submitted different approaches for establishing a reference pool and determining the appropriate statistics to use in analysis of the data. The San Diego Bay Council also submitted an approach after the January meeting. In the months since the January meeting, the trustees have provided significant, additional technical information to the Board staff regarding methodologies for selecting and statistically evaluating a reference pool. Given that the trustees and the Board have complementary authorities for protecting the public resources, the trustees believe that there should be more conferring with, and reliance on the technical guidance and expertise of the trustees.

The trustees recognize that this has been a difficult process and, given any complex problem, there are multiple approaches for addressing the issues. The trustees had the opportunity to attend a meeting on September 3rd where the Board staff explained the process they used to select the final reference pool, and describe the statistical approach that was selected to evaluate the pool. Based on those discussions, and the trustee's current understanding of the approach, the trustees would like to provide you with the following comments.

"Distance from Shore" Approach

The trustees have previously expressed concern to the Board staff regarding the selection of the "Distance from Shore" approach to establish the reference pool. Little scientific justification has been provided for the initial screening process used to establish the pivotal threshold chemical concentrations. These threshold chemical concentrations were used to determine the initial reference pool, and there is some question as to whether all qualifying stations were included in the pool. In light of the precedent setting nature of this exercise, it is essential to ensure that the process is scientifically sound. Until the various questions surrounding this approach can be answered and validated, the trustees recommend that the Board staff not adopt the "Distance from Shore" approach for establishing a reference pool for any future site investigations in San Diego Bay.

Statistical Approach

Despite the fact that there are several uncertainties associated with the initial "Distance from Shore" approach, the Board staff utilized additional selection criteria, and selected a reference pool for the shipyards that appears to be reasonable. The average concentration of contaminants in sediment are close to NOAA's conservative screening values (Effects Range-Low), the average survival of organisms exposed to the reference pool sediments is 95%, and the average benthic community index for the reference pool stations is within the acceptable impact category. However, these averaged, apparently protective numbers are not the criteria that will be used to determine whether a location at the shipyard will be remediated.

An additional statistical approach will be applied to the reference pool to evaluate the differences between contaminant levels in shipyard samples and those in the reference pool. The trustees have had discussions with the Board staff with regard to choosing the appropriate statistic to apply to this data set, particularly when taking into consideration the inherent non-random and non-normal distribution of the selected reference pool. The trustees welcome the opportunity to assist the Board staff in their further determination of the appropriate statistical method for evaluating whether individual sites (i.e., samples) are considered different from the reference pool. We also anticipate working closely with the Board staff to: 1) assess the risk the impacted sites may pose to the trust resources that utilize the area; and 2) determine if the designated beneficial uses are being impacted by releases from the site.

Use of the Reference Pool

It is the understanding of the trustees that the Board staff is proposing to use the reference pool in the risk assessment for the shipyards. It is important to

separate the risk assessment process from the risk management process (selecting the appropriate cleanup level). The risk the shipyards pose to exposed ecological receptors must be evaluated first. Once this risk is assessed, site specific data (shipyard samples) should be compared with the reference pool to determine if those risks are site-related and warrant further consideration.

Although there are still several questions and levels of uncertainty around the selection of the reference pool, and the statistics that will be applied to the pool, the trustees believe that these issues can be resolved to arrive at cleanup levels that will reduce risk and lead to restoration. The trustees also believe that the public interest can best be served and protected by having an open and deliberative process involving the input of all stakeholders. The Board staff has invested considerable effort and capital into putting forward this approach for determining a reference pool, and they are to be recognized for embracing a difficult and complex task.

In recognition of the shared vision, that in the future, San Diego Bay will meet all designated beneficial uses established under the Porter-Cologne Act, the trustees would like to have the Board ensure that a close partnership, which is reliant and built upon all the appropriate, invested authorities, is established between the trustees and the San Diego Regional Water Quality Control Board staff. The trustees look forward to enhanced coordination with the Board and Board staff in working toward our mutual goal of protecting and restoring San Diego Bay. The trustees also appreciate your time and effort in responding to our aforementioned concerns. If you have any questions regarding these comments and concerns, please feel free to contact me at (916) 255-6686.

Thank you for your consideration.

Sincerely,

Denise M. Klimas

Denise M. Klimas
NOAA Coastal Resource Coordinator
Office of Response and Restoration
Coastal Protection and Restoration Division

Attachment included

Reviewed by:

Scott Sobiech
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Cc: Mr. John Minan and Regional Board Members
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APPENDIX 3
OF ATTACHMENT C

Distance-From-Shore Approach

Distance-from-shore approach to identify Bight'98 reference sites in San Diego Bay

Steve Bay and Jeff Brown, SCCWRP
January 8, 2003

Introduction

An approach to identify potential reference stations in San Diego Bay was created with the assumption that most contaminants in the bay's sediments originate from land-based discharges. Following this assumption, contaminant concentrations in sediments should diminish with distance from land, and eventually reach levels consistent with bay-wide ambient levels. By identifying background levels of contaminants, stations with contamination below the concentration threshold (regardless of distance from shore) can be used as appropriate reference sites. This summary describes the distance-from-shore approach that was used with Bight'98 data to identify reference sites in San Diego Bay.

Methods

The relationship between contaminant concentration and distance from shore was examined for 38 non-marina stations in San Diego Bay sampled during Bight'98. Seven contaminants were examined, including five metals (Cu, Cr, Hg, Pb, Zn) and two organics (total PAHs, total PCBs). Metal concentrations were iron-normalized and plotted versus distance from shore. Iron normalization was used in order to minimize the bias of selecting only stations with larger grain sizes, since concentrations of metals tend to increase naturally in finer grain sediments. Iron has been shown to be a conservative tracer that can help differentiate natural from anthropogenic concentrations of metals in the Southern California Bight. Iron normalization consists of dividing the concentration of a given metal (mg/kg) by the concentration of iron present (mg/kg). The organics data were not normalized. Non-detect values were substituted with the method detection limit.

Results

Each of the seven constituents tended to have diminished concentrations with distance from shore (Figures 1-7). For metals, concentrations appeared to level off at around 240 m for Cu, 160 m for Cr, and 150 m for Hg, Pb and Zn. For the organics, concentrations leveled off at around 290 m and 170 m for PAHs and PCBs, respectively.

Based on the plots, stations that are 290 m or greater from shore were determined to represent ambient conditions. An upper threshold concentration was developed for Cu, Cr, Hg, Pb, Zn, and PAHs by using the mean concentration + 1.64 standard deviations for stations that are $\geq$290 m from shore (equivalent to the one-tailed upper 95% confidence limit). The threshold for PCBs was derived from the maximum value for stations $\geq$290 m because PCB values were below the detection limit at a majority of sites, and the upper 95% confidence limit could not be calculated. The following upper threshold values were obtained: PAHs = 1040 ng/g, PCBs = 101.6 ng/g, Fe normalized Cr = 0.0022, Fe normalized Cu = 0.0044, Fe normalized Hg = 2.3×10^{-5}, Fe normalized Pb = 0.0020, Fe normalized Zn = 0.0073. All stations below the threshold levels for any of the seven indicator contaminants were then identified, regardless of distance from shore (Table 1). Those stations with constituents below the threshold concentrations for all of the indicators (Cr, Cu, Hg, Pb, Zn, PAHs, and PCBs) were considered to be representative of bay-wide ambient conditions. Twenty two stations were identified as revised reference sites, ranging from 10-1080 m from shore (Table 1). The location of these sites in San Diego Bay is shown in Figure 8.

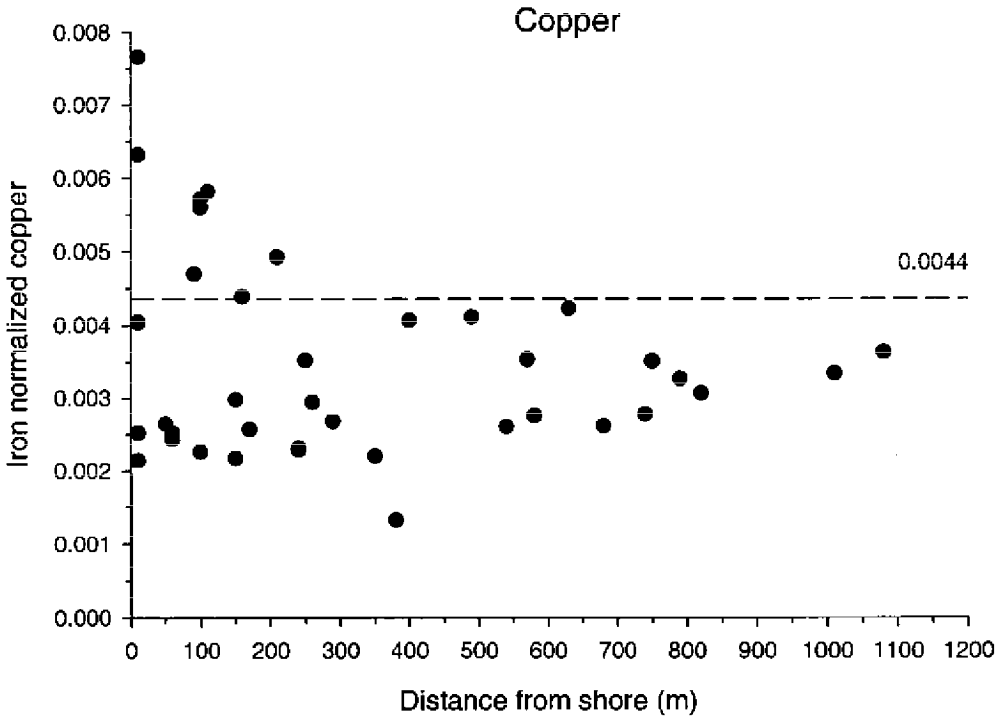

Figure 1. Relationship between the concentration of iron normalized copper and distance from shore. The dashed line indicates the upper threshold concentration.

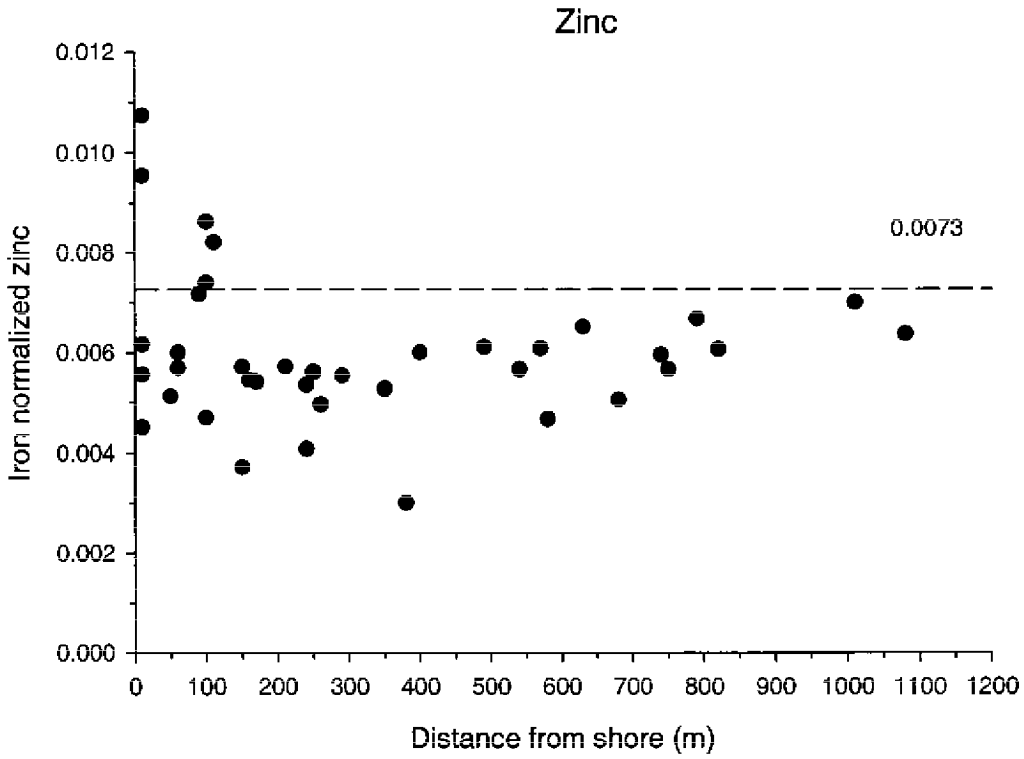

Figure 2. Relationship between the concentration of iron normalized zinc and distance from shore. The dashed line indicates the upper threshold concentration.

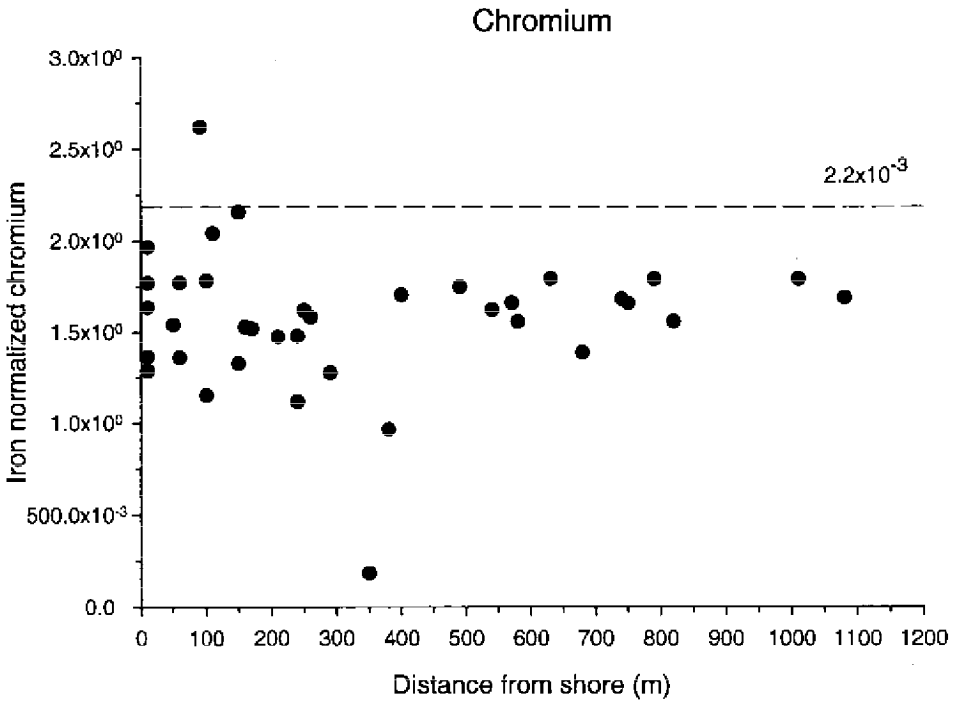

Figure 3. Relationship between the concentration of iron normalized chromium and distance from shore. The dashed line indicates the upper threshold concentration.

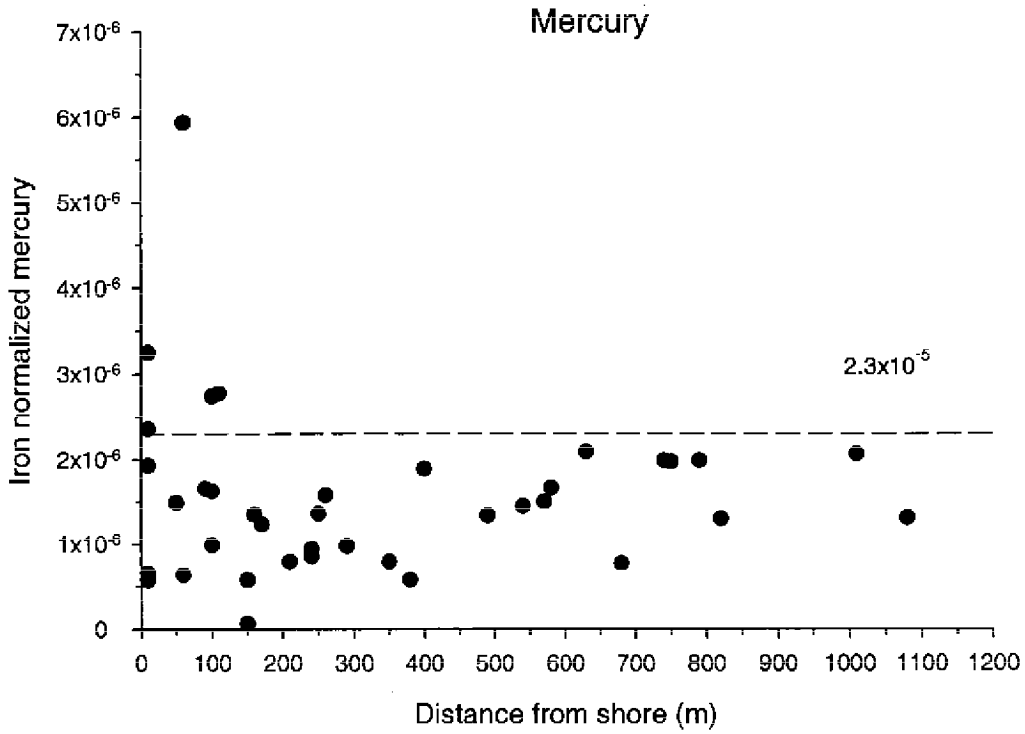

Figure 4. Relationship between the concentration of iron normalized mercury and distance from shore. The dashed line indicates the upper threshold concentration.

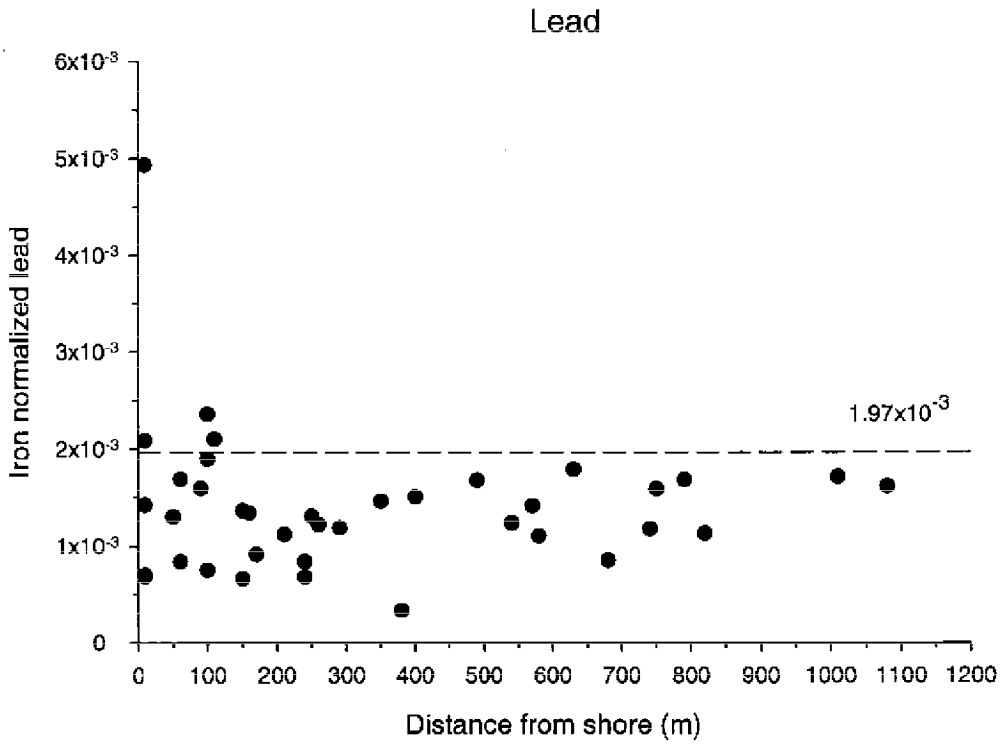

Figure 5. Relationship between the concentration of iron normalized lead and distance from shore. The dashed line indicates the upper threshold concentration.

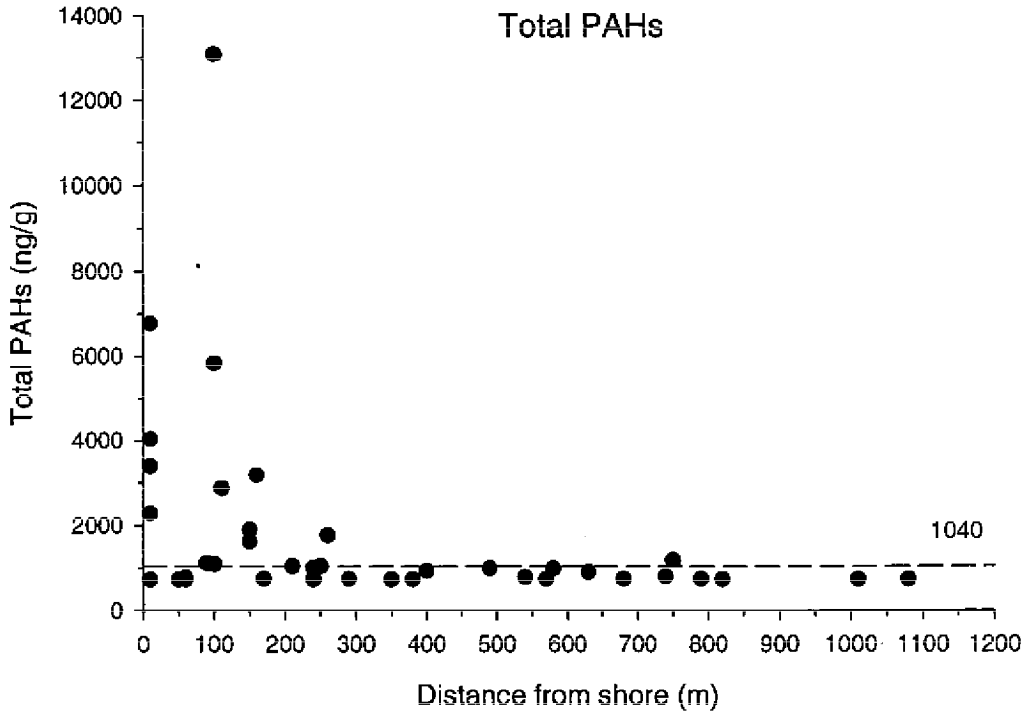

Figure 6. Relationship between the concentration of total PAHs and distance from shore. The dashed line indicates the upper threshold concentration. Non-detects were treated as equal to the method detection limit.

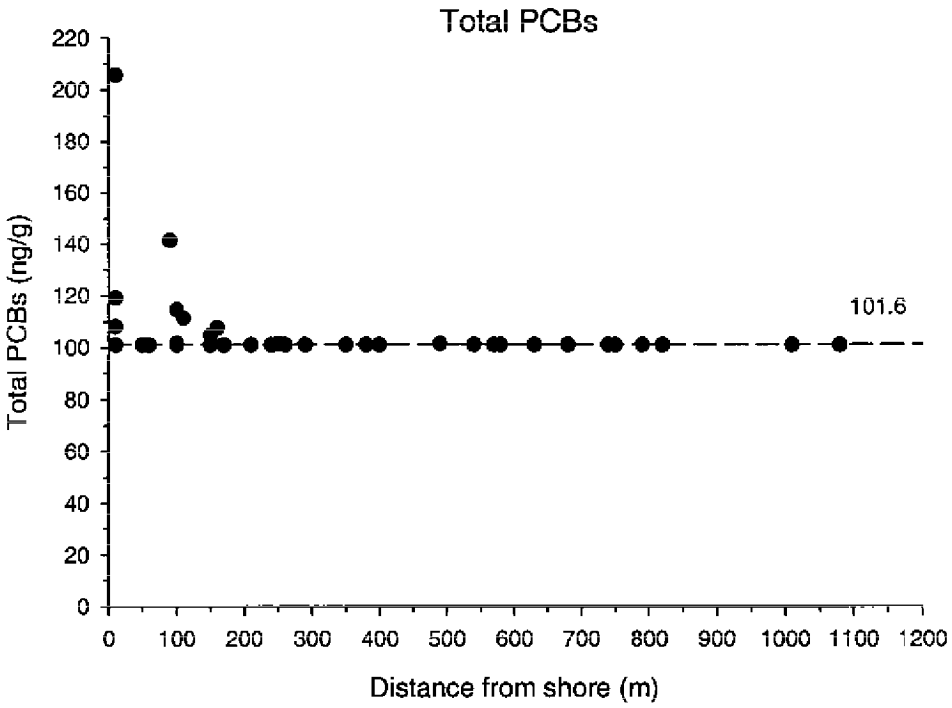

Figure 7. Relationship between the concentration of total PCBs and distance from shore. The dashed line indicates the threshold concentration. Non-detects were treated as equal to the method detection limit.

Table 1. Data used for selection of reference stations from the Bight'98 survey. Concentrations of Cu, Cr, Hg, Pb, Zn, PAHs or PCBs below the upper thresholds are indicated in grey. Stations where the concentrations are below the threshold for each of these constituents are considered to represent bay-wide ambient conditions; these stations are indicated with a Y in the Revised Reference site column. Iron normalized data have been multiplied by 1000 for convenience. The method detection limit was substituted for non-detect values.

Station	Distance from nearest shore (m)	Sampling Plan Reference site	Revised Reference site	Cu/Fe $x10^3$	Cr/Fe $x10^3$	Hg/Fe $x10^3$	Pb/Fe $x10^3$	Zn/Fe $x10^3$	Total PAHs ng/g	Total PCBs ng/g	Fe mg/kg	% Fines	% TOC
2238	10	Y	Y	2.1	1.29	0.007	0.70	5.6	735	101.1	25700	57	0.96
2253	10			7.7	1.64	0.032	2.09	9.5	2279	205.7	32900	66	1.57
2263	10			4.0	1.97	0.024	1.42	6.2	3389	108.1	29200	73	1.25
2264	10			6.3	1.77	0.019	4.94	10.7	4020	119.1	39100	73	2.01
2442	10			2.5	1.36	0.006	0.69	4.5	6771	101.1	30800	79	1.99
2440	50	Y	Y	2.6	1.54	0.015	1.30	5.1	735	101.1	15800	38	0.50
2230	60			2.5	1.77	0.059	1.69	6.0	735	101.1	6380	10	0.20
2249	60		Y	2.4	1.36	0.006	0.84	5.7	778	101.1	34600	72	1.35
2439	90			4.7	2.62	0.017	1.60	7.2	1119	141.3	28300	53	1.03
2227	100	Y		2.3	1.15	0.010	0.75	4.7	1088	101.1	23800	50	0.93
2251	100			5.6	1.78	0.016	2.36	7.4	5825	114.5	35000	72	1.99
2254	100			5.7	1.78	0.027	1.90	8.6	13087	101.7	13100	35	0.66
2255	110			5.8	2.04	0.028	2.10	8.2	2871	111.4	25100	59	1.18
2434	150			3.0	2.16	0.001	1.37	5.7	1614	104.8	23100	45	0.71
2441	150	Y		2.2	1.39	0.006	0.66	3.7	1890	101.1	33100	79	1.97
2259	160			4.4	1.53	0.013	1.35	5.5	3182	107.7	33000	68	1.24
2245	170		Y	2.6	1.52	0.012	0.92	5.4	745	101.1	26850	60	0.78
2262	210			4.9	1.47	0.008	1.12	5.7	1036	101.1	40600	74	1.64
2235	240		Y	2.3	1.48	0.009	0.84	5.4	735	101.1	25400	45	0.64
2433	240	Y	Y	2.3	1.12	0.009	0.68	4.1	994	101.1	30900	71	1.17
2231	250	Y	Y	3.5	1.62	0.014	1.31	5.6	1037	101.4	16500	31	0.64

Table 1 continued.

Station	Distance from nearest shore (m)	Sampling Plan Reference site	Revised Reference site	Cu/Fe $x10^4$	Cr/Fe $x10^3$	Hg/Fe $x10^3$	Pb/Fe $x10^3$	Zn/Fe $x10^3$	Total PAHs ng/g	Total PCBs ng/g	Fe mg/kg	% Fines	% TOC
2229	260	Y		2.9	1.58	0.016	1.23	5.0	1753	101.1	20000	43	0.92
2252	290		Y	2.7	1.28	0.010	1.19	5.5	737	101.1	11600	16	0.59
2265	350		Y	2.2	0.18	0.008	1.47	5.3	735	101.1	8190	13	0.35
2435	380	Y	Y	1.3	0.96	0.006	0.33	3.0	735	101.1	21400	49	0.55
2258	400		Y	4.1	1.70	0.019	1.51	8.0	925	101.1	35200	71	1.44
2257	490		Y	4.1	1.75	0.013	1.68	8.1	987	101.6	38200	77	1.63
2240	540	Y	Y	2.6	1.62	0.014	1.24	5.7	777	101.1	18200	44	0.55
2260	570		Y	3.5	1.66	0.015	1.42	6.1	735	101.1	14400	27	0.51
2436	580		Y	2.8	1.56	0.017	1.10	4.7	977	101.1	31133	55	1.36
2256	630		Y	4.2	1.79	0.021	1.79	6.6	895	101.1	30300	67	1.26
2247	680		Y	2.6	1.39	0.008	0.85	5.0	733	101.1	20400	44	0.58
2242	740		Y	2.8	1.68	0.020	1.18	5.9	791	101.1	15100	31	0.74
2239	750			3.5	1.66	0.020	1.59	5.7	1178	101.1	21400	34	0.72
2233	790		Y	3.3	1.79	0.020	1.69	6.7	733	101.1	15900	36	0.45
2244	820		Y	3.1	1.56	0.013	1.13	6.1	735	101.1	13600	20	0.30
2243	1010	Y	Y	3.3	1.79	0.021	1.72	7.0	735	101.1	11600	35	0.49
2241	1080		Y	3.6	1.69	0.013	1.62	6.4	735	101.1	16290	18	0.52

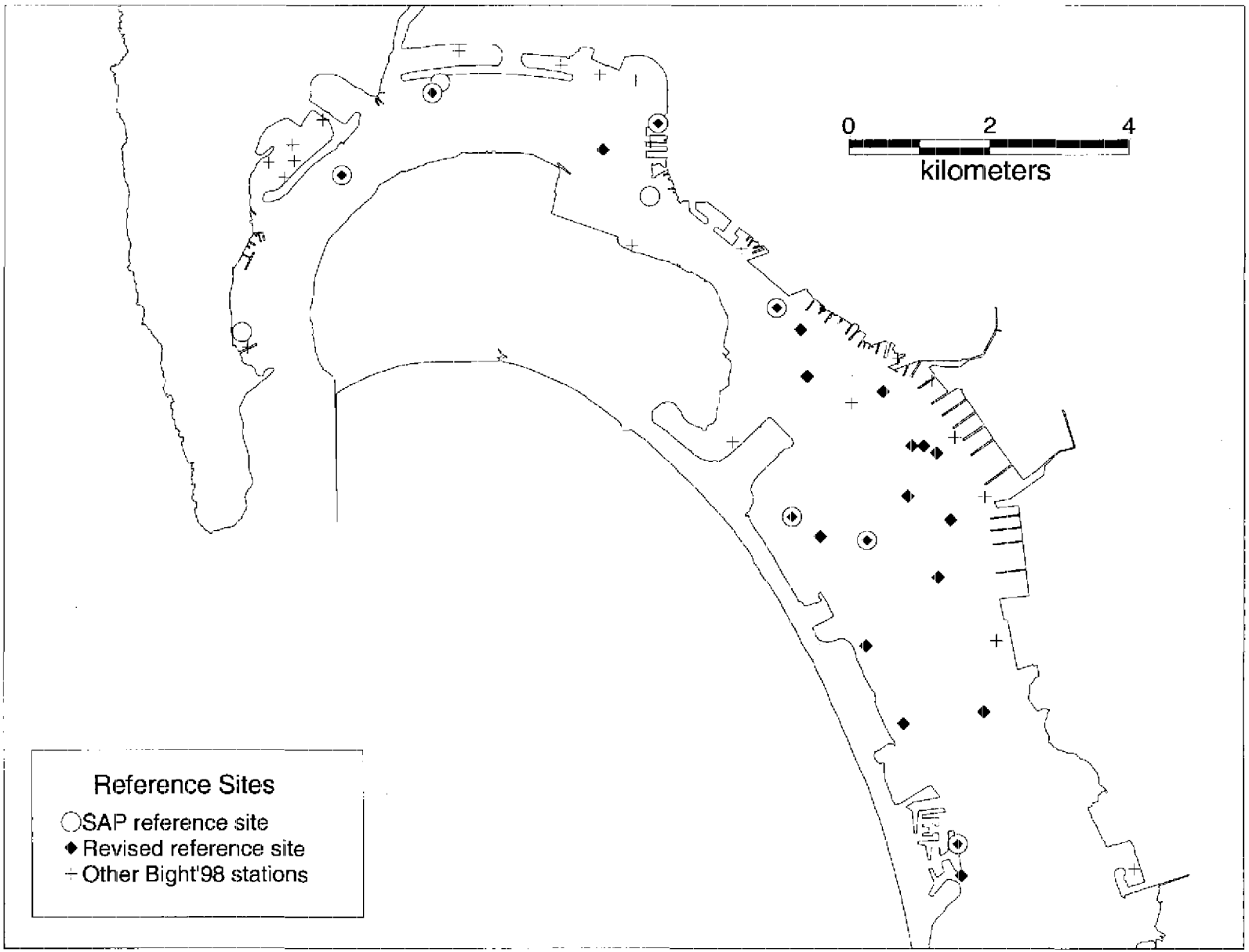

Figure 8. Bight'98 stations in San Diego Bay. Stations that represent bay-wide ambient conditions, based on the distance-from-shore approach, are indicated by diamonds. The ten reference sites identified in the Chollas/Paleta Sampling and Analysis Plan (SAP) are indicated by open circles. The remaining Bight'98 stations in San Diego Bay are indicated by crosses.

APPENDIX 4
OF ATTACHMENT C

Consensus Evaluation of Candidate Reference Sites for Use in Evaluating Data from the NASSCO/SWM Shipyard and Chollas/Paleta Creek THS Areas

[Data Not Provided in Appendix]

Consensus Evaluation of Candidate Reference Sites for Use in Evaluating Data from the NASSCO/SWM Shipyard and Chollas/Paleta Creek THS Areas

Steve Bay, SCCWRP
April 10, 2003

Background

This document summarizes the analyses conducted by SCCWRP, SSC, and Exponent in response to the 2/3/03 request by the San Diego Regional Water Quality Control Board to evaluate various reference data pools. These analyses had two objectives: to provide recommendations regarding the inclusion of candidate reference stations sampled in 2001 into an analysis pool (2A) and to summarize the characteristics of several combinations of reference stations using various measures of variability and prediction.

The information presented here represents the combined recommendations of SCCWRP, SSC, and Exponent specifically with regard to the evaluation of data from the NASSCO/SWM Shipyard and Chollas/Paleta Toxic Hot Spot (THS) assessment studies. While these recommendations may be applicable to the establishment of a regional reference data pool for other areas of San Diego Bay, decisions regarding the establishment of a regional reference data pool should include consideration of additional data and factors that have not been included here.

Candidate Reference Pool 2A

Methods

Statistical analyses were conducted in order to describe the similarity of chemical, biological, and toxicological characteristics of the 2001 reference sites to expectations based on prior data. These analyses followed steps 1-6 of the process developed during the January 22-23 2003 meeting on reference sites, as modified on February 7. These steps were:

Step 1. Compile data from the relevant studies. Data for the contaminants of concern (specified in the 2/3/03 instructions from the Regional Board), benthos (abundance, number of taxa, and diversity), and toxicity (amphipod survival) were compiled for the six 2001 Chollas/Paleta reference sites, five 2001 (phase I) and 12 2002 (phase II) Shipyard reference sites, selected Bight'98 candidate reference sites, and seven BPTCP reference sites. One-half of the method detection limit was substituted for nondetect values, except for the shipyard data, where one-half of the reporting limit was used. Sums of some organic contaminant groups were calculated as follows: total PCB = sum of measured congeners, total DDT or Chlordane = sum of measured isomers/metabolites, total PPAH = sum of priority pollutant PAHs. The individual constituents comprising each of these sums and the raw data are shown in the enclosed workbook (ReferenceEnvelope_Sc_Nv_Ex.xls). Amphipod survival data are expressed as a percentage of the control sample to facilitate comparisons among datasets. In addition, the survival data for the CP stations has been modified by the removal of outlier replicates as endorsed by the Regional Board.

Step 2. Confirm normal distribution of the chemistry data. The Bight'98 chemistry data for non-marina stations within San Diego Bay were analyzed using the Kolmogorov-Smirnov (K-S) test for normality. Separate tests were conducted for untransformed and natural log transformed data.

Step 3. Calculate one-tailed 95% prediction intervals for the Bight98, phase II, or BPTCP data. Three types of prediction intervals were calculated. The 95% one-tailed prediction interval was calculated without adjustment for multiple comparisons. A multiple comparison prediction interval was also calculated by adjusting the alpha level of the test for the number of expected comparisons to the 2001 reference sites. In most cases, this adjustment was accomplished by using an alpha of 0.004 (0.05/11) for the prediction interval calculation.

Finally, the tolerance limit was calculated for each parameter in order to resolve uncertainty regarding the appropriate adjustment of the prediction interval for multiple comparisons. Whereas the prediction interval gives us a concentration that the next sample (or next n samples) will not exceed (with a given level of confidence), the tolerance limit gives us a concentration that a specified fraction of the population will not exceed (with a given level of confidence). Because the number of candidate reference stations that may ultimately be compared to the screening level is indefinite, the tolerance limit is most appropriate to characterize the expected results of an indefinite number of future comparisons to the reference area population. Use of tolerance limits to screen data requires an explicit recognition that there is a specific expected error rate, which is analogous to the type I and II errors associated with other statistical tests. The parameters used here represent 95% coverage of reference area conditions (i.e. an alpha of 0.05), with 99% confidence. These parameters produce tolerance limits that are, in most cases, comparable to the multiple-comparison-corrected upper prediction limit. Calculations of the tolerance interval are based on: Natrella, M.G. 1963. Experimental Statistics. National Bureau of Standards Handbook 91. National Bureau of Standards., U.S. Department of Commerce, Washington, D.C.

All metals data were normalized to the percent fines before statistical analysis.

Step 4. Compare the prediction/tolerance intervals to the 2001 data. The number of exceedences for each of the identified parameters was tabulated for each station using each of the three types of intervals. Comparisons involving the shipyard phase II data set excluded station 2440 since this station has been identified in previous discussions as probably not representative of ambient reference conditions in San Diego Bay.

Steps 5 & 6. Use best professional judgment to evaluate the statistical comparison results and decide on the suitability of each 2001 reference site. Factors considered in the evaluation included: the number and type of intervals exceeded (e.g. unadjusted/adjusted prediction interval and tolerance interval) and the magnitude of the deviation in relation to ER-M/ER-L sediment guidelines or to the mean of the data. Separate evaluations were conducted for the chemistry, benthos, and toxicity data.

Results

Step 1. The compiled data is shown in the sheet named "total .5mdl" of the "ReferenceEnvelope.." workbook. Additional sheets showing each individual data sheet are also included.

Step 2. The results of the K-S normality test of the Bight'98 data are shown in Table 1. Analyses are shown only for metal constituents of concern. Analyses could not be conducted for PAHs, DDTs, Chlordane, or PCBs due to the presence of multiple nondetect values in the dataset. Nonnormality was indicated for arsenic and mercury. A retest of natural log transformed data resulted in a better fit to a normal distribution for As and Hg ($p>0.05$). Consequently all subsequent analyses were conducted with transformed data for these two metals. Data for tributyltin was also natural log transformed, based on prior studies by Exponent indicating that this constituent usually had a log normal distribution in environmental samples. No transformation was applied to any of the other chemical constituents because there was no conclusive indication from the Bight98 San Diego Bay dataset indicating nonnormality.

Table 1. Results of K-S normality test on Bight'98 data (marina stations excluded). Boxed cells indicate parameters where nonnormality is indicated in nontransformed data. Normality of organics data could not be evaluated due to the relatively high number of nondetect values.

	Non-transformed	Natural log transformed
Ag	>0.15	<0.0100
As	**0.0259**	**>0.15**
Cd	0.0811	<0.0100
Cr	>0.15	0.0373
Cu	>0.15	>0.15
Hg	**<0.0100**	**0.072**
Ni	>0.15	0.1045
Pb	>0.15	>0.15
Zn	0.0983	>0.15

Step 3. The data and resulting prediction interval calculations are shown (magenta highlight) in the sheet named "calcs as per 23 jan meeting" of the "ReferenceEnvelope..." workbook. The tolerance interval calculations are shown (yellow highlight) in the "data for calcs" sheet. A summary of the prediction/tolerance intervals and a tabulation of the number of exceedences for each station is shown in the sheet named "site comparisons". The total number of interval exceedences is summarized in Table 2.

Each of the stations, except for CP 2238, had at least one exceedence of the nonadjusted prediction interval. The number of exceedences declined for the adjusted PI and tolerance interval, indicating that some of these exceedences may be due to random variability in the data. Station 2440 for both the CP and SY datasets demonstrated the highest number of exceedences for each type of interval. Almost all of the interval exceedences were due to elevated chemistry. Benthic parameter intervals were only exceeded for reduced diversity at station 2231, which has

been identified previously as having an atypical fauna dominated by a crustacean species. Several stations exceeded the unadjusted PI for reduced amphipod survival (2231, CP 2433, and CP 2441), but no exceedences for toxicity using the adjusted PI or tolerance interval were present.

Table 2. Results of prediction and tolerance limit comparison for each 2001 reference site.

Study	Station	# over Unadjusted PI	# over Adjusted PI	# over Tolerance Interval	# total possible
CP	2231	8	3	2	17
CP	2243	8	3	1	17
CP	2433	5	1	1	17
CP	2440	10	9	8	17
CP	2441	3	1	1	17
CP	2238	0	0	0	17
SY I	2231	7	1	1	16
SY I	2243	2	0	0	16
SY I	2433	1	1	1	16
SY I	2440	6	5	4	16
SY I	2441	1	1	1	16

Steps 4 & 5. The consensus results of the evaluation of the data regarding inclusion of the reference sites in pool 2A are summarized in Table 3. The pool 2A recommendations agree with the pool 1A recommendations for 8 of 11 stations and no additional discussion of these stations is therefore needed. Discussion of the three stations showing different recommendations is provided below.

CP 2231: The pool 2A recommendation is to include this station in the dataset. The benthos community at this station is atypical of other reference areas and those data should be excluded from a general reference data pool. However, the chemistry and toxicity data are consistent with other reference areas and these data should be retained because this station has high temporal and method comparability with the CP study sites. Examination of the number of unadjusted and adjusted PI exceedences shows that the concentrations of Cd, Cr, Ni, and DDT are relatively small; equal to or less than the adjusted PI. Thus, these exceedences are likely due to low variability in the data and the application of multiple statistical comparisons, not the presence of site-specific contamination. Similarly, the reduced amphipod survival reported for this station (76% of control) is a marginal decrease that is within the test-to-test variability observed in other studies. The concentration of PPAH at CP 2231 is substantially elevated relative to the comparison dataset. However, the PPAH concentration is well below the ERL, indicating a low potential for toxicity, and within a factor of 2 of the concentration reported for SY 2231. It is concluded that the CP 2231 PPAH is a marginal exceedence that may be due to analytical lab variability and not of sufficient biological significance to outweigh the benefits of including the data.

CP 2441: The pool 2A recommendation is to include this station in the dataset. This station shows exceedences of the unadjusted PI for Cd, PPAH, and toxicity. The Cd and toxicity deviations are small and likely due to statistical artifacts (low data variability and multiple comparisons) since they do not exceed the adjusted PI. The PPAH concentration of 2143 ug/kg is above the tolerance interval and is considered a substantial elevation relative to the dataset. However, this station contains a relatively high TOC content that is likely to account for the elevated concentration. Figure 1 shows the relationship of PPAH concentration to TOC. A general direct relationship is evident and station CP 2441 lies close to the apparent regression line, while the points for the clearly contaminated stations CP 2440 and SY 2440 lie much further from the regression line. This plot shows that variation in TOC is a likely contributing factor to the PPAH data variation. A similar trend is also present for grain size, as shown in the plot in the enclosed workbook named "RefPAHAnalysis.xls". Normalization of the data to TOC (Figure 2) or percent fines shows that the PPAH concentration is similar to that of other stations with acceptable nonnormalized PPAH concentrations (e.g., 2433). An analysis of the pattern (i.e., fingerprint) of PAH compounds also indicates that CP 2441 is similar to other acceptable reference sites. The relative (%) concentration of each parent PAH to the total PPAH is shown in Figure 3. Station CP 2441 has a relative PAH concentration that is similar to the values for the three stations with the lowest total PPAH concentrations (2243, 2433, 2238) for 16 of 20 analytes, whereas CP 2440 is similar for only 9 analytes. This figure demonstrates that the source of PAH at CP 2441 is similar to that of other less contaminated stations, indicating that this station reflects ambient PAH exposure, not a site-specific source.

SY 2231: This station shows an atypical benthos community and those specific data should not be included in a general reference pool. Exceedences of the unadjusted PI were also present for As, Pb, PPAH, PCB, toxicity, and TBT, but these parameters did not exceed the adjusted PI, which indicates that statistical artifacts were likely responsible. The chemistry and toxicity data for this station should be included in the general data pool because the benefit of including data with high comparability to the CP and SY studies is greater than the negative impact of including a site with marginal elevated contaminants. This station also includes a relatively high TOC and fines content, which makes it valuable for data interpretation.

Table 3. Station inclusion recommendations for reference pool 2A based on Table 2 results and best professional judgment. Pool 1A inclusion based on results of Jan 23rd meeting as modified by the Regional Board. Areas of difference between pool 1A and 2A designations are highlighted within boxes.

Study	StationID	%FINES	%TOC	Chemistry	Toxicity	Benthos	Overall	Pool 1A Inclusion
CP	2231	41.24	1	yes	yes	N/A	*yes	no
CP	2243	30.25	0.56	yes	yes	yes	yes	yes
CP	2433	38.44	0.53	yes	yes	yes	yes	yes
CP	2440	26.4	1.04	no	yes	yes	no	no
CP	2441	82.83	1.82	yes	yes	yes	yes	no
CP	2238	69	1.01	yes	yes	yes	yes	yes
SYI	2231	45	1.3	yes	yes	N/A	*yes	no
SYI	2243	28	0.51	yes	yes	yes	yes	yes
SYI	2433	41	0.67	yes	yes	yes	yes	yes
SYI	2440	32	1.62	no	yes	yes	no	no
SYI	2441	41	1.1	yes	yes	yes	yes	yes

* Not suitable for overall benthos evaluation in this study.

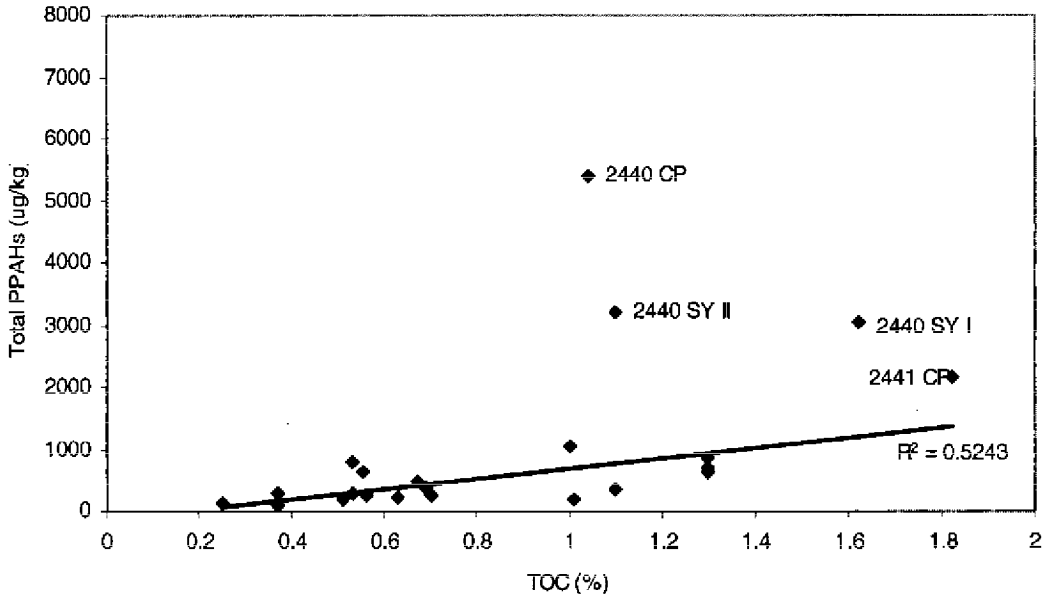

Figure 1. Relationship of total PPAHs to TOC for 2001/2002 reference sites.

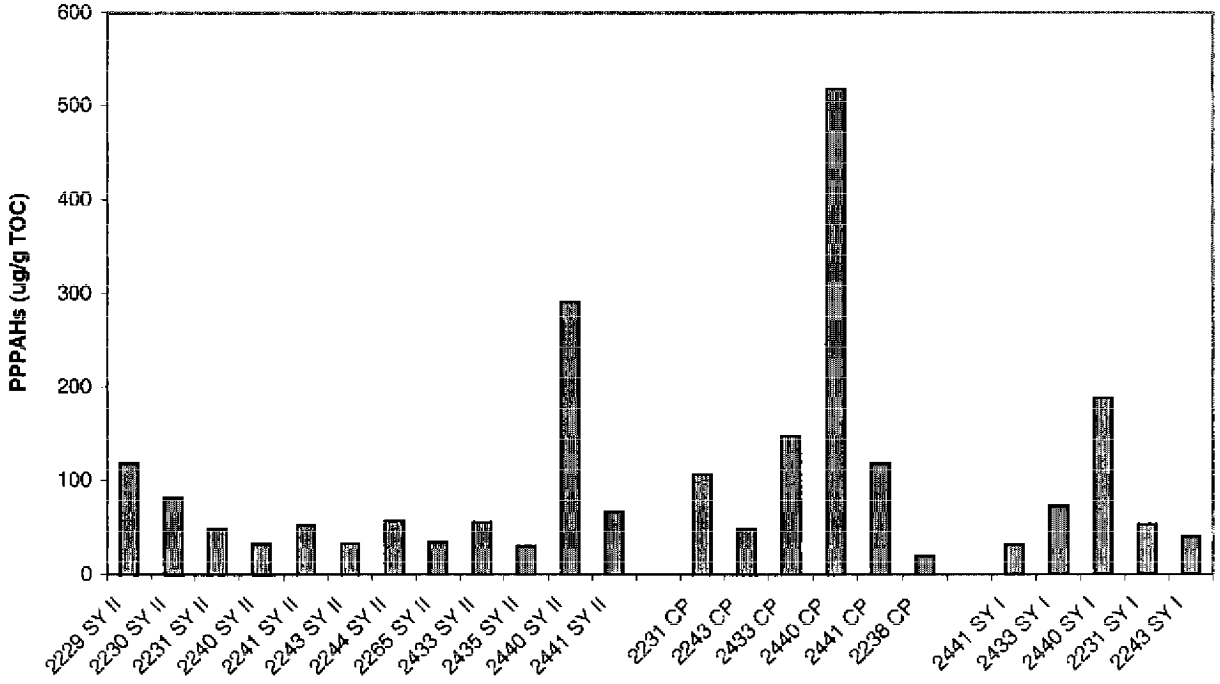

Figure 2. TOC-normalized total PPAHs for the 2001/2002 reference sites.

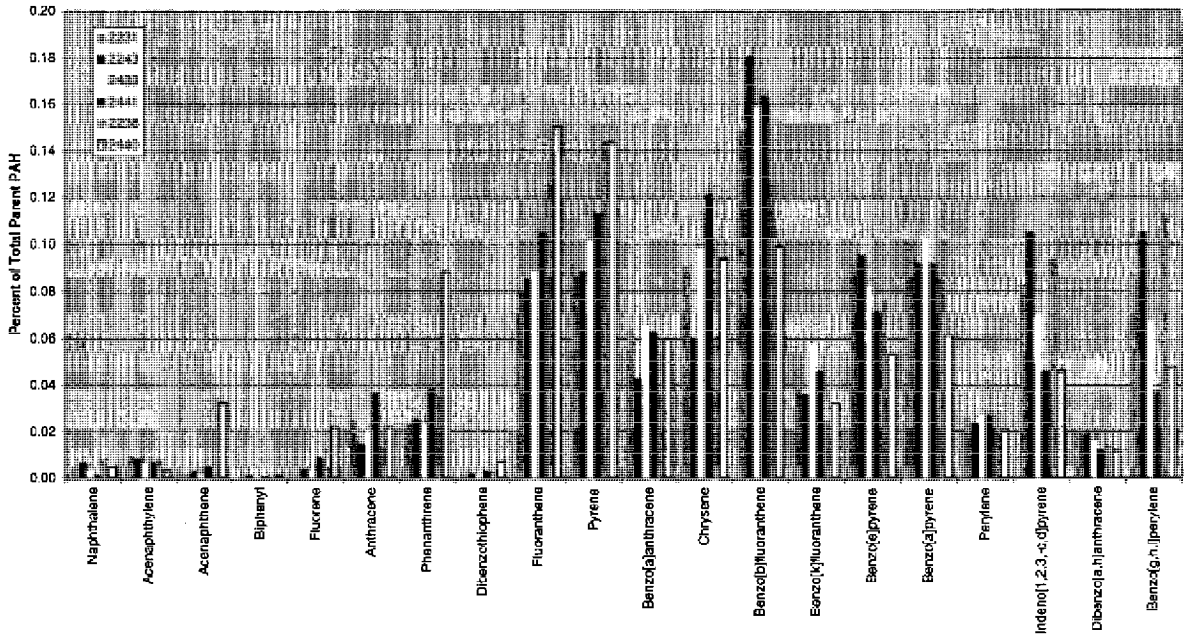

Figure 3. Relative composition of parent PAH compounds at the Cholias/Paleta reference sites.

Summary of Reference Data Pools

Methods

Calculations of the unadjusted/adjusted 95% PI and tolerance intervals were conducted using the same methods as for the evaluation of reference pool 2A (described previously). The adjusted PI calculations assumed that 31 station comparisons would be carried out, which is equivalent to the maximum number of stations at either the shipyard or Chollas/Paleta study sites. All calculations for As, Hg, and TBT were conducted using ln transformed data, but the results have been converted to the untransformed state for presentation in the tables. The calculations for pools 2A and 2B incorporate the recommendations for station inclusion described above. The workbook named "ReferenceEnvelope..." shows contains the calculations for all of the statistics.

Results

The descriptive statistics and prediction/tolerance intervals for each of the 4 reference pools is summarized in Table 4. Bar plots of the intervals for most of the parameters are contained in the sheet named "envelope summary" in the workbook "ReferenceEnvelope...".

Table 4. Descriptive statistics for the various reference data pools. Tolerance values could not be determined for some parameters in pools 1A or 2A due to a sample size less than 4.

Envelope		Ag norm	*As norm	Cd norm	Cr norm	Cu norm	*Hg norm	Ni norm	Pb norm	Zn norm	*TBT
1A	N	6	6	6	6	6	6	6	6	6	3
1B	N	28	28	28	28	28	28	28	28	28	3
2A	N	9	9	9	9	9	9	9	9	9	4
2B	N	31	31	31	31	31	31	31	31	31	4
1A	Mean	1.2	13.9	0.5	87.1	126.3	0.6	24.8	59.5	295.6	3.2
1B	Mean	1.4	13.8	0.3	78.6	147.8	0.6	23.4	62.8	293.5	3.2
2A	Mean	1.0	14.4	0.4	87.0	134.1	0.6	24.4	64.4	280.6	4.7
2B	Mean	1.3	14.0	0.3	79.4	148.0	0.6	23.4	63.9	289.4	4.7
1A	SD	0.7	1.2	0.2	30.2	40.5	1.5	5.8	25.6	78.2	1.2
1B	SD	0.9	1.3	0.2	27.4	55.1	1.5	5.7	27.0	86.1	1.2
2A	SD	0.6	1.3	0.2	26.8	41.7	1.6	4.9	28.3	74.8	2.2
2B	SD	0.8	1.3	0.2	26.9	53.8	1.6	5.5	27.5	84.7	2.2
1A	95% PI Uncorr.	2.7	22.0	1.0	152.9	214.4	1.6	37.4	115.1	465.7	5.8
1B	95% PI Uncorr.	2.8	22.1	0.7	126.2	243.4	1.3	33.3	109.6	442.7	5.8
2A	95% PI Uncorr.	2.2	23.0	0.9	139.5	215.8	1.6	34.1	119.9	427.3	37.5
2B	95% PI Uncorr.	2.7	22.3	0.6	125.7	240.7	1.3	32.9	111.4	435.4	37.5
1A	95% PI Corr.	5.1	46.4	1.8	259.7	357.6	7.3	57.8	205.4	742.1	121.9
1B	95% PI Corr.	4.2	33.5	0.9	168.8	329.2	2.6	42.2	151.6	576.7	121.9
2A	95% PI Corr.	3.7	40.9	1.5	204.1	316.4	5.0	46.1	188.0	607.6	10054.7
2B	95% PI Corr.	4.0	33.8	0.9	166.8	322.9	2.6	41.3	153.5	564.9	10054.7
1A	Tolerance limit	5.6	55.6	2.0	285.7	392.5	10.6	62.8	227.4	809.4	
1B	Tolerance limit	3.6	27.6	0.8	149.1	289.5	1.9	38.0	132.2	514.7	
2A	Tolerance limit	3.7	39.4	1.5	200.0	310.0	4.6	45.3	183.7	596.2	1.2E12
2B	Tolerance limit	3.4	27.6	0.8	146.7	282.7	1.9	37.2	132.9	501.6	1.2E12

Table 4. Continued.

Envelope		FPPAHs	PCBs	Chlordane	DDT	Abundance	# Taxa	S-W Diversity	Survival
1A	N	6	6	3	3	6	6	6	6
1B	N	6	6	3	3	28	28	28	28
2A	N	9	9	5	5	9	9	9	9
2B	N	9	9	5	5	31	31	31	31
1A	Mean	379.7	18.8	0.3	1.6	577.8	65.5	2.6	90.2
1B	Mean	379.7	18.8	0.3	1.6	820.4	47.7	2.5	91.5
2A	Mean		29.6	0.5	3.9	563.3	65.6	2.6	87.1
2B	Mean	685.7	29.6	0.5	3.9	808.5	48.3	2.5	90.4
1A	SD	223.0	6.5	0.2	0.4	226.1	27.9	0.2	5.1
1B	SD	223.0	6.5	0.2	0.4	473.8	18.5	0.4	8.7
2A	SD	620.3	20.5	0.3	4.0	209.9	25.5	0.2	6.6
2B	SD	620.3	20.5	0.3	4.0	469.6	18.5	0.4	9.0
1A	95% PI Uncorr.	865.1	33.0	1.1	3.0	85.7	4.8	2.2	79.2
1B	95% PI Uncorr.	865.1	33.0	1.1	3.0	-0.8	15.6	1.9	76.3
2A	95% PI Uncorr.	1901.5	69.7	1.3	13.2	151.7	15.7	2.2	74.2
2B	95% PI Uncorr.	1901.5	69.7	1.3	13.2	-1.3	16.5	1.9	75.0
1A	95% PI Corr.	1653.3	56.0	4.7	10.0	-713.4	-93.8	1.5	61.2
1B	95% PI Corr.	1653.3	56.0	4.7	10.0	-738.2	-13.1	1.2	62.7
2A	95% PI Corr.	3396.5	119.0	2.9	31.5	-354.3	-45.7	1.7	58.3
2B	95% PI Corr.	3396.5	119.0	2.9	31.5	-719.0	-11.8	1.3	61.3
1A	Tolerance limit	1845.3	61.6			-908.0	-117.8	1.4	56.8
1B	Tolerance limit	1845.3	61.6			-397.0	0.2	1.5	69.0
2A	Tolerance limit	3301.4	115.9	3.8	42.4	-322.1	-41.8	1.8	59.3
2B	Tolerance limit	3301.4	115.9	3.8	42.4	-368.1	2.0	1.6	68.0

APPENDIX 5
OF ATTACHMENT C

Regional Board Screening Criteria Used to Evaluate Reference Pool #2b

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

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FINAL SCREENING CRITERIA USED TO EVALUATE REFERENCE POOL #2b

The Regional Board's decision on a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations was provided to all stakeholders on June 9, 2003 (RWQCB, 2003a). The final reference pool, as shown below, is based on a modified version of Reference Pool #2b as proposed by SCCWRP, the Navy, and Exponent (Bay et. al., 2003). In other words, the Regional Board used Reference Pool #2b as a baseline pool and evaluated the stations in Reference Pool #2b to determine the final pool.

Table 1. Station Comparison Between Pool #2b and Regional Board Final Reference Pool.

Reference Pool #2b		Regional Board Final Reference Pool (modified Reference Pool #2b)	
CP	2231	CP	~~2231~~
	2243		~~2243~~
	2433		2433
	2441		~~2441~~
	2238		2238*
SY	2231	SY	~~2231~~
	2243		2243*
	2433		2433
	2441		2441
Bight'98	2231	Bight'98	2231
	2233		2233
	2235		~~2235~~
	2238		2238
	2240		2240
	2241		2241
	2242		2242
	2243		2243
	2244		2244
	2245		~~2245~~
	2247		2247
	2249		~~2249~~
	2252		2252

	2256		2256
	2257		2257
	2258		2258
	2260		2260
	2265		2265
	2433		2433
	2435		2435
	2436		2436
	2440		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 will not be used in the final reference pool.

Reference Pool #2b was primarily developed based on the comments and decisions made by the stakeholders present at the January 22-23 technical meeting held at the Regional Board (details provided in Attachment C - Regional Board response to Comment #3 - Status of Tasks (May 5, 2003 Letter)). These comments and decisions were documented and subsequently used to guide SCCWRP, the Navy, and Exponent in developing Reference Pool #2b (RWQCB, 2003b).

The Regional Board's modifications to Reference Pool #2b and rationale for selecting stations in the final reference pool was based on weight of evidence using the triad approach and best professional judgement. The triad of data (sediment chemistry, amphipod toxicity, and benthic community) analyzed at each of the proposed reference stations included in Reference Pool #2b were evaluated and a decision was made whether to accept or reject the proposed station. The screening criteria used by the Regional Board is provided below.

Sediment Chemistry

- ***Effects Range Median (ERM).*** The ERM is the median of the total number of data points identified with adverse biological effects as developed from a national database compiled by NOAA. These data points are associated with chemical data and are ordered via increasing concentrations. The database contains matched sediment chemistry and biological effects information generated from a variety of sediment quality approaches. According to NOAA, ERM values are considered better indicators of concentrations associated with biological effects than the Effects Range Low (ERL) (NOAA, 1999). However, there is no assurance that sediments in which ERM values are exceeded will be toxic.

- ***Sediment Quality Guideline Quotient (SQGQ1).*** Mean SQGQs were developed by Russell Fairey et. al. (2001) to represent the presence of chemical mixtures in sediment. The SQGQs are calculated by normalizing a specific group of chemicals to their respective numerical

sediment quality guidelines. The mean SQGQ that was most predictive of acute toxicity to amphipods was the SQGQ1 combination consisting of the following chemical mixtures: cadmium, copper, lead, silver, zinc, total chlordane, dieldrin, total PCBs, and total PAHs. It should be noted that the SQGQ1 is a updated version of the mean ERM-quotient (ERMQ) used in the Bay Protection and Toxic Cleanup Programs (BPTCP). An SQGQ1 threshold value of 0.50 was selected so that its corresponding amphipod survival rate (76%) would match up with the amphipod survival rate (75% for *Eohaustorius estuarius*) determined by the 90th Percentile Minimum Significant Difference (MSD) approach (discussed below).

- ***Consensus Sediment Quality Guidelines for PAHs.*** The consensus guidelines for PAHs were developed by Richard Swartz of USEPA (1999). These guidelines provide an integration of existing PAH SQGs, reflect casual rather than correlative effects, account for chemical mixtures, and predict sediment toxicity and benthic community effects at sites with PAH contamination. Consensus guidelines for PAHs consist of the Threshold Effects Concentrations (TEC), Median Effects Concentrations (MEC), and Extreme effects concentrations (EEC):

  - TEC = 290 milligrams per kilogram Organic Carbon normalized (mg/kg OC). PAH mixtures below the TEC indicate adverse effects on benthic communities are unlikely.
  - MEC = 1,800 mg/kg OC. The greatest uncertainty is between the TEC and the EEC. As such, it is recommended that the MEC should not be used to distinguish acceptable from unacceptable conditions.
  - EEC = 10,000 mg/kg OC. PAH mixtures above the EEC indicate adverse effects on benthic communities are likely.

- ***Consensus-Based Sediment Effect Concentrations (SECs) for PCBs.*** The consensus-based SECs were developed by Donald MacDonald et. al. (2000) to provide an integration and reconciliation of existing PCB SQGs. The SECs have been demonstrated to accurately predict both the presence and absence of toxicity in field-collected sediments. Consensus-based SECs for PCBs consist of the Threshold Effect Concentration (TEC), Midrange Effect Concentration (MEC), and the Extreme Effect Concentration (EEC):

  - TEC = 0.04 mg/kg. The TEC is used to identify sediments that are unlikely to adversely affect sediment-dwelling organisms due to PCBs; below which adverse effects are unlikely to occur.
  - MEC = 0.40 mg/kg. The MEC is used to identify sediments that are likely to adversely affect sediment-dwelling organisms due to PCBs; above which adverse effects frequently occur.
  - EEC = The EEC is used to identify sediments that are highly likely to adversely affect sediment-dwelling organisms due to PCBs; above which adverse effects usually or always occur.

Amphipod Toxicity

- ***90th Percentile Minimum Significant Difference (MSD).*** MSD threshold values were calculated from the BPTCP database by Phillips et. al. (2001) to determine a critical threshold for statistically significant sample toxicity. These MSD values were calculated similar to the method used by Thursby et. al. (1997) to calculate the most common amphipod threshold used in sediment investigations (80% of control). Samples are defined as toxic if the following two criteria are met: (1) There is a significant difference ($p < 0.05$) in mean organism response between a sample and the negative laboratory control, as determined using a separate-variance t-test, and (2) The difference in organism response between the sample and control was greater than the protocol-specific 90th-percentile MSD value. The MSD threshold for the amphipod *Eohaustorius estuarius* (test species used in the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations) is 75% of the control (Table 1 of Phillips et. al. 2001).

Benthic Community

- ***Benthic Response Index for Embayments (BRI-E).*** The BRI and BRI-E was developed by Ana Ranasinghe et. al. (2003) as screening tools that discriminate disturbed from undisturbed benthic communities. The BRI and BRI-E specifically assess Southern California coastal and embayment environments, respectively. These indices remove much of the subjectivity associated with interpreting benthic community data and also provide a means of communicating complex information to managers. The following thresholds were developed for the BRI-E:

Table 5. Threshold Values Established for the Benthic Response Index – Embayments (BRI-E).

Threshold	Index Value	
Reference	< 31	Reference threshold defined as a value toward the upper end of the range of index values for sites that had minimal known anthropogenic influence.
Response Level 1	31 to 42	> 5% of reference species lost
Response Level 2	42 to 53	> 25% of reference species lost
Response Level 3	53 to 73	> 50% of reference species lost
Response Level 4	> 73	> 80% of reference species lost

The Regional Board accepted stations in the final reference pool based on the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure) and best professional judgement, as mentioned above. In evaluating the benthic community, we accepted stations that had BRI scores in the Reference threshold (< 31) and Response Level 1 (31 to 42) classifications. The Regional Board extended the BRI-E cutoff score into Response Level 1 because:

- Benthic species respond to natural and anthropogenic disturbances similarly as recognized by those that developed the BRI-E (Ranasinghe et. al., 2003). Thus, for stations with BRI scores within Response Level 1 it cannot be determined if benthic community variations are due to natural factors (e.g., seasonal effects), pollution, or physical disturbances (e.g., propeller wash and dredging).
- The difference between the stations with a benthic community classified as meeting the Reference threshold versus those with Response level 1 is very slight and cannot be attributed to pollution (RWQCB, 2003c).
- Accepting stations with Response Level 1 allows the Regional Board to account for natural variability in the bay with respect to benthic community changes.

Of the 22 reference stations in the final pool, 10 stations have BRI-scores in the Reference threshold classification (< 31) and 10 stations have BRI-E scores in Response Level 1 (31 to 42). The remaining two stations (CP 2238 and SY 2243) in the final pool have BRI-scores greater than Response Level 1 (60.3 and 45.1, respectively). These two stations were accepted into the final pool based on their respective sediment chemistry and amphipod toxicity results (for details see Appendix 5 of Attachment C). The weight-of-evidence suggests that the high BRI-scores for CP 2238 and SY 2243 may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. As such, the Regional Board instructed NASSCO and Southwest Marine to not use the benthic community data including the BRI scores for CP 2238 and SY 2243 in the final reference pool.

In summary, all of the stations in the Regional Board's final reference pool meet the screening criteria used to evaluate sediment chemistry, amphipod toxicity, and benthic community structure. The weight-of-evidence, therefore, concludes that each station included in the Regional Board's final reference pool is not impacted by sediment contamination (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and is supportive of aquatic life beneficial uses.

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APPENDIX 6
OF ATTACHMENT C

Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
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June 9, 2003

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Dear Messrs. Chee, Halvax, Chadwick, and Bay:

REGIONAL BOARD FINAL POSITION ON A REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

The Regional Board's final decision on a reference pool is provided below and should be used to determine statistically significant differences between site sediment quality conditions (at NASSCO, Southwest Marine, mouth of Chollas Creek, and 7th Street Channel) and reference sediment quality conditions. The final pool is based on a modified version of Reference Pool #2b.

We considered all stakeholder input received during the technical meetings held on December 12, 2002 and January 22-23, 2003, and have also considered all additional stakeholder input provided via written comments and conference calls subsequent to the technical meetings. The

following descriptive statistics should be calculated on the final reference pool lines-of-evidence (sediment chemistry, toxicity, and benthic community structure):

General

- Calculate one-tailed 95% prediction limits (PL) on each line-of-evidence.
- Each reference pool line-of-evidence should be tested for normality and be transformed accordingly prior to calculating the 95% PL.

Sediment Chemistry

- Calculate upper 95% PL for organic and inorganic chemicals of concern (COCs).
- Use un-normalized data for organics.
- Perform two separate site-versus-reference evaluations using non-normalized data and normalized data for metals. The metals data should be normalized to percent fines and the upper 95% PL should be determined by graphing the metals concentrations against percent fines and then calculating an upper PL on the slope of the metals-to-fines regression line. The coefficients of determination (R-squared values) and p-values should be determined for each regression line and the strength and significance of each correlation should be assessed to determine the applicability of the metals-to-fines normalization. Recommendations concerning the applicability of normalization for each metal should be made based on the results.

Toxicity

- Calculate lower 95% PL for the amphipod survival test.
- Calculate lower 95% PL for the fertilization test.
- Calculate lower 95% PL for the development test.

Benthic Community Structure

- Calculate upper 95% PL using the Benthic Response Index (BRI) scores.
- Other benthic metrics may be considered in addition to the BRI to evaluate the health of the benthic community.

FINAL REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2441	2231
2238*	2433	2233
	2243*	2238
		2240
		2241
		2242
		2243
		2244
		2247
		2252
		2256
		2257
		2265
		2433
		2435
		2436
		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 should not be used in this final reference pool.

If you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

[Original Signed]

David Barker, P.E.
Supervising Water Resource Control Engineer

DTB:clc:tca

cc: Dreas Nielsen, Exponent
Tom Ginn, Exponent
Chuck Katz, SPAWAR Systems Center San Diego
Michael Martin, Department of Fish and Game
Denise Klimas, National Oceanic and Atmospheric Administration
Scott Sobiech, U.S. Fish and Wildlife
Donald MacDonald, National Oceanic and Atmospheric Administration
Michael Anderson, Department of Toxic Substances Control
Laura Hunter, Environmental Health Coalition
Ed Kimura, Sierra Club
Jim Peugh, San Diego Audubon Society
Bruce Reznik, San Diego Baykeeper
Elaine Carlin, Representative for San Diego Bay Council
Brian Anderson, UC Davis - Marine Pollution Studies Laboratory
Russell Fairey, Moss Landing Marine Laboratories

NASSCO File No.: 03-0066.05
Southwest Marine File No.: 03-0137.05

Table 1
Station Comparison Between Pool 2b and Final Reference Pool

Pool 2b		Regional Board Final Reference Pool (modified Pool 2b)	
CP	2231	CP	~~2231~~
	2243		~~2243~~
	2433		2433
	2441		~~2441~~
	2238		2238*
SY	2231	SY	~~2231~~
	2243		2243*
	2433		2433
	2441		2441
Bight'98	2231	Bight'98	2231
	2233		2233
	2235		~~2235~~
	2238		2238
	2240		2240
	2241		2241
	2242		2242
	2243		2243
	2244		2244
	2245		~~2245~~
	2247		2247
	2249		~~2249~~
	2252		2252
	2256		2256
	2257		2257
	2258		~~2258~~
	2260		~~2260~~
	2265		2265
	2433		2433
	2435		2435
	2436		2436
	2440		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 will not be used in the final reference pool.

Table 2
Summary Evaluations on 2001 Cholias/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2231	Out	Rationale: Remove CP 2231 based on 38% amphipod survival rate and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated PAH concentrations in sediment (1,063 ppb, TOC = 1.0%), however, uptake of PAHs in Macoma tissue is within reference station range (see Figure 1). Amphipod Toxicity[2]: Control-adjusted survival rate = 38% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 39.45 (Response Level 1 - Greater than 5% of reference species lost).
CP	2243	Out	Rationale: Remove CP 2243 based on 55% amphipod survival rate and BRI score of 55.05. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity[2]: Control-adjusted survival rate = 55% Benthic Community: BRI score = 55.05 (Response Level 3 - Greater than 50% of reference species lost).
CP	2433	In	Rationale: Retain CP 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 22.85 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2238	In	Rationale: Retain CP 2238 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 60.29 (Response Level 3 - Greater than 50% of reference species lost).
CP	2441	Out	Rationale: Remove CP 2441 based on elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (2,143 ppb, TOC = 1.82%) and in Macoma tissue (see Figure 1). Amphipod Toxicity: Control-adjusted survival rate = 78% Benthic Community: BRI score = 30.04 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2440	Out	Rationale: Remove CP 2440 based on elevated PCBs in sediment and elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (5,387 ppb, TOC = 1.04%) and in Macoma tissue (see Figure 1). Elevated PCB concentrations in sediment (283 ppb). Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 30.38 (Reference Level).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) Amphipod survival rates for CP 2231 and CP 2243 were previously adjusted based on SCCWRP's "mussel hypothesis" to remove amphipod toxicity replicate sample outliers. CP 2231 was adjusted from 38% to 84% survival and CP 2243 was adjusted from 55% to 83% survival. However, given the atypical benthic community in CP 2231, the relatively high BRI score for CP 2243, and uncertainties associated with the mussel hypothesis, the Regional Board decided to not apply the mussel hypothesis to adjust the amphipod toxicity results for these stations (and other Chollas site stations where the hypothesis was applied).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2231	Out	Rationale: Remove SY 2231 based on elevated PCBs in sediment and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated total PCB concentration in sediment (77 ppb) as compared to the other reference stations included in the pool. Amphipod Toxicity: Control-adjusted survival rate = 84% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 31 (Reference Level).
SY	2243	In	Rationale: Retain SY 2243 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 45.1 (Response Level 2 - Greater than 25% of reference species lost).
SY	2433	In	Rationale: Retain SY 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 16.8 (Reference Level).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2441	In	Rationale: Retain SY 2441 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 95% Benthic Community: BRI score = 19.9 (Reference Level).
SY	2440	Out	Rationale: Remove SY 2440 based on elevated lead, PAHs, and PCBs in sediment. Sediment Chemistry: Elevated lead (77 ppm), PAH (3,048 ppb), and PCB (117 ppb) concentrations in sediment. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 32.2 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2231	In	Rationale: Retain B'98 2231 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 94% Benthic Community: BRI score = 16 (Reference Level).
Bight'98	2233	In	Rationale: Retain B'98 2233 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2235	Out	Rationale: Remove B'98 2235 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 42.1 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2238	In	Rationale: Retain B'98 2238 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 87% Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2240	In	Rationale: Retain B'98 2240 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2241	In	Rationale: Retain B'98 2241 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 98% Benthic Community: BRI score = 35 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2242	In	Rationale: Retain B'98 2242 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 37 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2243	In	Rationale: Retain B'98 2243 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 36 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2244	In	Rationale: Retain B'98 2244 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 31.2 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2245	Out	Rationale: Remove B'98 2245 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity[2]: Control-adjusted survival rate = 82%. Benthic Community: BRI score = 42.6 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2247	In	Rationale: Retain B'98 2247 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 34 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2249	Out	Rationale: Remove B'98 2249 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 76% Benthic Community: BRI score = 45 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[(i)]	Regional Board Evaluation
Bight'98	2252	In	Rationale: Retain B'98 2252 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 104% Benthic Community: BRI score = 4.3 (Reference Level).
Bight'98	2256	In	Rationale: Retain B'98 2256 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2257	In	Rationale: Retain B'98 2257 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2258	Out	Rationale: Remove B'98 2258 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 43 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2260	Out	Rationale: Remove B'98 2260 based on amphipod toxicity results. The 90th percentile minimum significant difference (MSD) approach was applied and the amphipod survival data met two criteria for being defined as toxic: (1) there was a significant difference ($p < 0.05$) in mean organism response between a sample and the negative control survival, as determined using a separate-variance t test, and (2) the difference in organism response between the sample and control was greater than the protocol-specific 90th percentile MSD value. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 73%. Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2265	In	Rationale: Retain B'98 2265 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 85% Benthic Community: BRI score = 27 (Reference Level).
Bight'98	2433	In	Rationale: Retain B'98 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 97% Benthic Community: BRI score = 21 (Reference Level).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2435	In	Rationale: Retain B'98 2435 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 102% Benthic Community: BRI score = -1.1 (Reference Level).
Bight'98	2436	In	Rationale: Retain B'98 2436 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 19 (Reference Level).
Bight'98	2440	In	Rationale: Retain B'98 2440 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 103% Benthic Community: BRI score = 32 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) The Regional Board adjusted the amphipod survival rate for B'98 2245 from 66% to 82%. The adjustment was made based on the results of the 5 replicate samples. Four of the replicate samples had relatively similar survival rates of 90%, 80%, 80%, and 75%, respectively, and one replicate had an anomolous survival rate of 0%. The 0% survival rate replicate was removed and the amphipod survival rate for B'98 2245 was adjusted accordingly.

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REC'D OCT 09 2003

October 7, 2003

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Mr. Bruce Reznik
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Mr. Marco Gonzalez
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Mr. Ed Kimura
Sierra Club
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Dear Ms. Hunter and Messrs. Reznik, Kimura, Peugh, and Gonzalez:

REGIONAL BOARD DETAILED RESPONSES TO SAN DIEGO BAY COUNCIL'S MAY 5, 2003 AND AUGUST 12, 2003 LETTERS COMMENTING ON THE SELECTION OF REFERENCE STATIONS FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

The Regional Board received your written comments dated May 5, 2003 and August 12, 2003 regarding the Regional Board's selection of reference stations for the National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Inc. (Southwest Marine), Mouth of Chollas Creek, and 7th Street Channel sediment investigations. We appreciate the time and effort San Diego Bay Council has taken to provide us with views on the reference station issue.

We provided an initial response in a letter dated September 5, 2003 (Attachment A). My staff has spent a considerable amount of time reviewing your comments in detail. Prior to finalizing the reference pool we carefully considered your input, including that provided in your letter dated May 5, 2003. The Regional Board's decision on a final reference pool is provided in Attachment B as emailed to you on June 9, 2003. Staff's detailed written responses to your May 5 and August 12 letters are provided in Attachment C.

Should you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

JOHN H. ROBERTUS
Executive Officer

JHR:dtb:clc:tca

Attachments:
A. Regional Board Response to Comment Letters from San Diego Bay Council Regarding the Selection of Reference Stations for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations (September 5, 2003)

B. Regional Board Decision on Final Reference Pool

C. Regional Board Detailed Responses to San Diego Bay Council's May 5, 2003 and August 12, 2003 Letters

cc: Elaine Carlin, Representative for San Diego Bay Council
Mike Chee, NASSCO
Shaun Halvax, Southwest Marine
Dreas Nielsen, Exponent
Michael Martin, CA Department of Fish and Game
Scott Sobiech, U.S. Fish and Wildlife
Denise Klimas, National Oceanic and Atmospheric Administration
Donald MacDonald, National Oceanic and Atmospheric Administration
Steve Bay, Southern California Coastal Water Research Project
Bart Chadwick, SPAWAR Systems Center San Diego
Chuck Katz, SPAWAR Systems Center San Diego
Brian Anderson, UC Davis – Marine Pollution Studies Laboratory
John Hunt, UC Davis – Marine Pollution Studies Laboratory
Russell Fairey, San Jose State University – Moss Landing Marine Laboratories

ATTACHMENT A

Regional Board Response to Comment Letters from San Diego Bay Council Regarding the Selection of Reference Stations for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations (September 5, 2003)

California Regional Water Quality Control Board

San Diego Region

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September 5, 2003

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Mr. Ed Kimura
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Dear Ms. Hunter and Messrs. Reznik, Kimura, Peugh, and Gonzalez:

REGIONAL BOARD RESPONSE TO COMMENT LETTERS FROM SAN DIEGO BAY COUNCIL REGARDING THE SELECTION OF REFERENCE STATIONS FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

This is in response to the San Diego Bay Council's letters of May 5, 2003 and August 12, 2003 regarding the Regional Board's final selection of reference stations for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations. We were in the process of finalizing our response to your May 5, 2003 letters when we received your August 12 letter. I elected to delay our original response to your May 5 letter in order to address all of your concerns with the reference stations from both of your letters. We are now drafting detailed written response to both your May 5, 2003 and August 12, 2003 letters, and will issue those responses under separate cover in the near future.

As you know the Regional Board has been considering for some time how to deal with the reference pool issue. I appreciate the time and effort the San Diego Bay Council has taken to provide the Regional Board with comments and perspective on selecting appropriate reference stations for inclusion in the reference pool. I do not agree with your characterization of the Regional Board's selected reference pool, your critique of the decision making process, your

recommendation that the Board use the reference pool favored by San Diego Bay Council, and in particular your comments that my staff excluded you from critical deliberations on the reference pool.

In our deliberations on this issue we have considered a significant amount of information and comment from all stakeholders, including San Diego Bay Council, regarding the NASSCO, Southwest Marine, Chollas Creek and Seventh Street Channel contaminated marine sediment investigations. We have also consulted with a number of recognized technical experts in the sediment quality assessment field. At the conclusion of a final extensive two day January 22-23, 2003 technical meeting on the reference pool issue (attended by technical experts, the Natural Resource Trustee Agencies, NASSCO, Southwest Marine, the Navy, and the Bay Council) David Barker of my staff announced that it was the Regional Board's intent to consider all of the information and perspectives presented by the stakeholders and make a decision on the reference pool.

The staff spent a considerable amount of time following the January meetings, pouring over the data and evaluating various reference pool options favored by different stakeholders, including San Diego Bay Council, from a number of different perspectives. We think we arrived at a decision on a suitable reference pool that will provide a sound scientific basis for developing protective cleanup levels. On June 9, 2003 we informed you of our decision on the reference station pool and our intent to direct NASSCO and Southwest Marineto move forward with finalizing the technical report using that reference station pool.

In June 2003 my staff instructed NASSCO and Southwest Marine to proceed with completing their technical report on the sediment quality investigation using the reference pool selected by my staff. NASSCO and Southwest Marine are well into preparing the report and it is due to be submitted in approximately two weeks on September 30, 2003. I cannot support delaying the submission of this report and further delaying a Regional Board decision on cleanup in order to continue the debate on the relative technical merits of alternative reference station pool approaches.

I think we are at the point where it would be useful to apply the Regional Board's reference pool and appropriate statistical procedures to the NASSCO and Southwest Marine sediment site data and see what the various cleanup scenarios are. There is lot of good solid information that has been collected on multiple lines of evidence on this project. Therefore I am anticipating that there will be sufficient information in the technical report to ensure that the Regional Board will be able to evaluate options and make a cleanup decision that is protective of beneficial uses. Staff resource considerations and competing work on other priority projects are also pressing issues for us.

At this juncture I believe that the efficacious course for the Regional Board to conclude the investigation and determine cleanup levels is to obtain the technical report from NASSCO and Southwest Marine on September 30, 2003. The technical report will be available for public review upon our receipt of the document. My staff will review the report to determine its adequacy to develop appropriate cleanup levels and has tentatively scheduled the Regional Board's consideration of cleanup and abatement orders for NASSCO and Southwest Marine at the February 2004 Regional Board meeting. The Regional Board will provide ample opportunity for public comment on the cleanup and abatement orders, including the recommended cleanup levels as well as the reference station pool used in deriving the cleanup levels, during the public review process for the cleanup and abatement orders.

Should you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

JOHN H. ROBERTUS
Executive Officer

ATTACHMENT B

Regional Board Decision on Final Reference Pool

California Regional Water Quality Control Board

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REGIONAL BOARD DECISION ON FINAL REFERENCE POOL

The goal of the sediment quality assessment at National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Inc. (Southwest Marine), Mouth of Chollas Creek, and 7th Street Channel is to identify polluted marine sediment areas that may require cleanup in order to protect or restore beneficial uses. In accordance with State Water Resources Control Board – Resolution No. 92-49 (SWRCB, 1996), the Regional Board reference pool was selected to represent the pre-discharge condition at these sites (i.e., the current sediment quality condition absent these sites) and protection of aquatic life beneficial uses. The purpose of the reference pool is to determine if there are statistically significant differences between site sediment quality conditions (NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel) and reference sediment quality conditions with respect to sediment chemistry, toxicity, and benthic community structure. The results of the statistical comparisons will be used in a weight-of-evidence approach to determine whether site stations exhibit impacts to aquatic-life beneficial uses.

The Regional Board's decision on a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations was provided to all stakeholders on June 9, 2003 (RWQCB, 2003a). The final reference pool, as shown below, is based on a modified version of Reference Pool #2b as proposed by SCCWRP, the Navy, and Exponent (Bay et. al., 2003). Reference Pool #2b was primarily developed based on the comments and decisions made by the stakeholders present at the January 22-23 technical meeting held at the Regional Board (details provided in Attachment C - Regional Board response to Comment #3 - Status of Tasks (May 5, 2003 Letter)). These comments and decisions were documented and subsequently used to guide SCCWRP, the Navy, and Exponent in developing Reference Pool #2b (RWQCB, 2003b).

Table 1. Regional Board Final Reference Pool.

2001 Chollas/Paleta (CP) Reference Station Data	2001 Shipyard (SY) Reference Station Data	1998 Bight'98 Station Data
2433	2441	2231
2238*	2433	2233
	2243*	2238
		2240
		2241
		2242
		2243
		2244
		2247
		2252
		2256
		2257
		2265
		2433
		2435
		2436
		2440

* The benthic community data including the Benthic Response Index (BRI) scores for CP Station 2238 and SY Station 2243 should not be used in this final reference pool.

The Regional Board's modifications to Reference Pool #2b and rationale for selecting stations in the final reference pool are provided in Appendix 5 of Attachment C. In summary, the approach we used to modify Reference Pool #2b was based on weight of evidence using the triad approach and best professional judgement. The triad of data (sediment chemistry, amphipod toxicity, and benthic community) analyzed at each of the proposed reference stations included in Reference Pool #2b were evaluated and a decision was made whether to accept or reject the proposed station. The results of the final screening evaluation are provided in Appendix 6 of Attachment C.

REFERENCES

Bay, S., B. Chadwick, and D. Neilsen. 2003. Consensus Evaluation of Candidate Reference Sites for Use in Evaluating Data from the NASSCO/SWM Shipyard and Chollas/Paleta Creek THS Areas. Southern California Coastal Water Research Project, Westminster, CA, SPAWAR System Center, U.S. Navy, San Diego, CA, and Exponent, Bellevue, WA.

RWQCB. 2003a. Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations. California Regional Water Quality Control Board, San Diego Region.

RWQCB. 2003b. Personal Communication (Email to S. Bay (SCCWRP), B. Chadwick (Navy) and D. Neilsen (Exponent)] regarding instructions to evaluate 4 candidate reference pools). California Regional Water Quality Control Board, San Diego Region.

SWRCB. 1996. Resolution 92-49: Policies and Procedures for Investigation and Cleanup and Abatement of Discharges Under Water Code Section 13304. State Water Resources Control Board, Sacramento, CA.

ATTACHMENT C

Regional Board Detailed Responses to San Diego Bay Council's May 5, 2003 and August 12, 2003 Letters

California Regional Water Quality Control Board

San Diego Region

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REGIONAL BOARD RESPONSES TO SAN DIEGO BAY COUNCIL'S MAY 5, 2003 AND AUGUST 12, 2003 LETTERS

REGIONAL BOARD RESPONSES TO MAY 5, 2003 LETTER

1. EPA Definition of Reference Conditions and Reference Sites

Comment from San Diego Bay Council:
One of the most critical steps – and the step that has held up progress toward cleanup of San Diego Bay – is the *selection of reference sites* for the Bay that will establish background levels, and thus, determine how clean San Diego Bay will ever get. There are EPA guidelines for this process that are readily achievable in San Diego Bay. We wish to re-emphasize that these are widely accepted practices; the selection of reference sites is a relatively simple, straightforward exercise when executed properly. The real basis is simply common sense. Reference stations are those that represent relatively undisturbed conditions within the Bay or within a study area.

Regional Board Response:
The Regional Board recognizes that there are various documents (from EPA and the Department of Interior (DOI)) that provide definitions on reference conditions. The definitions provided in these documents have some similarities and some differences. In making our reference pool decision for the National Steel and Shipbuilding Company (NASSCO), Southwest Marine, Inc. (Southwest Marine), Mouth of Chollas Creek, and 7th Street Channel sediment investigations, the Regional Board managed to balance these differences by selecting reference stations based on the following key criteria:

- Located within San Diego Bay away from known point sources;
- Physical characteristics similar to study sites (sediment grain size, total organic carbon, and water depth);
- Level of sensitivity that separates the effects on organisms due to natural non-pollutant factors (e.g., grain size, unionized ammonia, and sulfides) from the effects due to pollutants.
- Protective of aquatic life beneficial uses (i.e., relatively low sediment chemistry, lack of acute toxicity, and relatively healthy benthic community); and
- Representative of the pre-discharge conditions at these sites.

In addition to the EPA document cited by Bay Council (U.S. EPA, 2000) there are several other EPA and DOI documents that provide definitions on reference conditions. Reference definitions from these other documents are provided below:

"The degree of sediment contamination in a particular area is often evaluated by comparing the structure of benthic communities, levels of pollutants, or bioassay test results in sediments collected from the area being investigated with those in the surrounding area. The terms used to describe the different sediments in the comparisons are test sediments, control sediments, and reference sediments. As used in sediment assays and assessments, a test sediment is sampled from the area whose quality is being assessed. A control sediment is a pristine (or nearly so) sediment, free from localized anthropogenic inputs of pollutants with contamination present only because of inputs from the global spread of pollutants. A reference sediment, on the other hand, is collected from a location that may contain low to moderate levels of pollutants resulting from both the global inputs and some localized anthropogenic sources, representing the background levels of pollutants in an area. The reference sediment is to be as similar as possible to the test sediments in grain size, total organic carbon (TOC), and other physical characteristics." (U.S. EPA, 1992)

"A general guideline is to select reference locations that reflect the overall environmental conditions that can reasonably be expected in the site area given current uses other than those associated with the contamination under investigation." (U.S. EPA, 1994)

"Baseline data should reflect conditions that would be expected at the assessment area had the discharge of oil or release of hazardous substances not occurred, taking into account both natural processes and those that are the result of human activities." (U.S. DOI, 1996)

"A relatively uncontaminated site used for comparison to contaminated sites in environmental monitoring studies ... Reference biological samples may be taken from a reference area outside the influence of the site ... The reference area should be close to the site. It should have habitats, size, and terrain similar to the site under investigation ... The reference site need not be pristine." (U.S. EPA, 1997)

"The reference area should have the same physical, chemical, geological, and biological characteristics as the site being investigated, but has not been affected by activities on the site." (U.S. EPA, 2002)

2. Bay Council Participation in Regional Board Workshops

Comment from San Diego Bay Council:
There have been at least two lengthy workshops held by staff to discuss the selection of reference sites, however, we have only been included in the second of these.

Regional Board Response:
The Regional Board has received and considered numerous comments from Bay Council regarding the suitability of the 5 reference stations originally selected for the shipyard sediment investigations. Consequently, the Regional Board decided to hold a meeting on December 12, 2002 to solicit the assistance of various technical experts to address and respond to Bay Council's concerns with the reference stations. The technical experts included representatives from the Department of Fish and Game (DFG), U.S. Fish and Wildlife (USFW), National Oceanic and Atmospheric Administration (NOAA), Southern California Coastal Water Research Project (SCCWRP), San Jose State University - Moss Landing Marine Laboratories (San Jose State), UC Davis - Marine Pollution Studies Laboratory (UC Davis), SPAWAR Systems Center – Marine Environmental Quality Branch (SPAWAR), and Exponent. Representatives from NASSCO and Southwest Marine shipyards were also present at the meeting to listen to the concerns raised on the 5 reference stations selected for their sediment investigations.

Bay Council was not included in this meeting because it was a "technical" meeting and not a "public" meeting. The purpose of the technical meeting was to allow Regional Board staff to consult with other technical experts regarding the selection of a suitable reference pool and the reference station concerns raised by Bay Council. It was always our intention to present the Regional Board's response to comments on the reference stations to Bay Council and others following the December 12 meeting. We were informed of Bay Council's desire to provide additional input to us on the reference stations rather than wait on our response to comments. As such, we invited Bay Council to attend the technical meeting on January 22-23, 2003.

3. Status of Tasks

Comment from San Diego Bay Council:
Our expectation was that these tasks would be carried out in a transparent manner with all participants informed, provided with the necessary data, and provided the opportunity to offer input. We are very unclear as to the status of these overarching tasks and are concerned that decisions are being made with discharger input but not with the other interests represented.

Regional Board Response:
The Regional Board disagrees with Bay Council that decisions are being made without input from other interested stakeholders. The Regional Board has followed a lengthy and open process in considering the views of all stakeholders on the reference station issue. We have included all key stakeholders in the reference pool decision process as evidenced by participation in the technical meetings we held on December 12, 2002 and January 22-23, 2003. We received a significant amount of input at these technical meetings from NASSCO and Southwest Marine as well as groups representing:

- the interests of the public (San Diego Bay Council);
- the protection and conservation of State and Federal natural resources (DFG, USFW, and NOAA); and
- the scientific community (SCCWRP, San Jose State, UC Davis, and SPAWAR).

We have also considered all additional stakeholder input provided via written comments and conference calls subsequent to the technical meetings.

Following these meetings, it remained for the Regional Board to decide on how to proceed forward in selecting the reference pool for the NASSCO, Southwest Marine, Chollas Creek and 7th Street Channel sediment investigations . We announced our intent to do that at the conclusion of the January 2003 meetings and took on that task using the weight-of-evidence tables (sediment chemistry and toxicity only) and criteria developed by all stakeholders present during the January meetings. Accordingly, the Regional Board decided to narrow the reference pool options to the four alternatives listed below. It should be noted that Reference Pools #1a and #1b are based on the weight-of-evidence tables and Reference Pools #2a and #2b are based on the criteria developed by the group to evaluate the suitability of the 2001 Shipyard (and Chollas/Paleta) reference stations.

(1) Reference Pool #1a - 6 Reference Stations from 2001 data

(2) Reference Pool #1b - Reference Pool #1a + 22 Bight'98 stations selected from the Distance-From-Shore approach (Appendix 3 of Attachment C)

(3) Reference Pool #2a - Reference Stations selected from the criteria established at the January 23 meeting

(4) Reference Pool #2b - Reference Pool #2a + 22 Bight'98 stations selected from the Distance-From-Shore approach

On February 3 we requested that SCCWRP, Navy, and Exponent calculate the descriptive statistics for each of these four candidate reference pools (Appendix 1 of Attachment C). We would like to clarify that the April 10, 2003 document produced by SCCWRP, Navy, and Exponent was developed in accordance with the instructions prepared by the Regional Board (Appendix 4 of Attachment C). Furthermore, the Regional Board instructions were prepared based on the comments received from the entire stakeholder group present at the January 22-23 meeting.

The Regional Board has gone to great lengths to afford an opportunity for all stakeholders to participate in the shipyard investigation decision making process. We have held numerous meetings and teleconferences with Bay Council, the Natural Resource Trustee Agencies,

NASSCO, Southwest Marine, and other stakeholders to discuss concerns and technical issues associated with the investigation. At times we have had daylong meetings with Bay Council and others to ensure that all issues and input have been considered and discussed. The Regional Board has also provided detailed written responses to comments received from stakeholders such as the Bay Council regarding the shipyard investigation and has held several workshops to update the public including the Regional Board members on current sediment investigation and cleanup projects in San Diego Bay. A list of the key technical meetings, Regional Board written responses, and public workshops involving Bay Council is provided in Table 1 below.

Table 1. Regional Board's Commitment to Involve Bay Council in the Shipyard Sediment Investigation Process.

Type	Date	Purpose	Participants
Public Workshop	Aug 3, 2001	Public workshop held by the Regional Board to receive public comment on current sediment investigation and cleanup projects in San Diego Bay.	Public (including representatives from the **Bay Council**).
Meeting	Aug 14, 2001	Meeting with **Bay Council** to discuss technical issues identified by Bay Council on the Shipyard workplan.	Regional Board and **Bay Council**.
Meeting	Oct 12, 2001	Joint meeting to provide a forum for discussion and resolution of the technical issues raised by **Bay Council** on the Shipyard workplan.	Regional Board, **Bay Council**, NASSCO, Southwest Marine, Exponent, SCCWRP, and SPAWAR Systems Center – Marine Environmental Quality Branch (Navy).
Letter	Jan 15, 2002	Regional Board response to comments on 8/21/01 letter and 10/10/01 list of questions from **Bay Council** regarding the Shipyard sediment investigation workplan.	Not applicable.

Meeting	Jan 30, 2002	Formal presentation on the Phase 1 sampling results and receive comments.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, Exponent, NASSCO, Southwest Marine, SCCWRP, and Navy.
Meeting	Mar 29, 2002	Discuss issues raised in **Bay Council's** March 6, 2002 letter regarding the Shipyard sediment investigation.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, and SCCWRP.
Public Workshop	Jun 18, 2002	Update the Board Members and the public on current sediment investigation and cleanup projects in San Diego Bay. As part of the workshop agenda, **Bay Council** presented their opinions on the Shipyard investigation.	Regional Board members and the Public (including **Bay Council**.
Meeting	Aug 22, 2002	Formal presentation on the Shipyard draft Phase 2 workplan and receive comments.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, Exponent, NASSCO, and Southwest Marine.
Letter	Nov 14, 2002	Regional Board response to comments on 8/28/02 letter from **Bay Council** regarding the Shipyard draft Phase 2 field sampling plan.	Not applicable.
Meeting	Dec 12, 2002	Technical meeting to solicit the assistance of various technical experts to address and respond to **Bay Council's** reference station comments.	Regional Board, Natural Resource Trustee Agencies, SCCWRP, Moss Landing Marine Laboratories, UC Davis - Marine Pollution Studies Laboratory, SPAWAR Systems Center – Marine Environmental Quality Branch, Exponent, NASSCO, and Southwest Marine.

Meeting	Jan 22-23, 2003	Technical meeting to solicit the assistance of various technical experts to address and respond to **Bay Council's** reference station comments.	Regional Board, **Bay Council**, Natural Resource Trustee Agencies, SCCWRP, UC Davis - Marine Pollution Studies Laboratory, SPAWAR Systems Center – Marine Environmental Quality Branch, Exponent, NASSCO, and Southwest Marine.
Meeting	Jul 31, 2003	Meeting to discuss **Bay Council's** concerns on the Regional Board's final reference pool.	Regional Board and **Bay Council**.
Meeting	Aug 8, 2003	Meeting to discuss **Bay Council's** concerns on the statistical procedures.	Regional Board and **Bay Council**.

In addition to the above list of meetings, letters, and workshops, the Regional Board has communicated extensively with Bay Council and other stakeholders via telephone conversations, conference calls, and email.

4. Access to Data

Comment from San Diego Bay Council:
Access to the data sets being used is critical for our meaningful participation. As you know, despite repeated requests for data – data that staff, the industry, and Navy have been using for quite some time – we were only provided access after the second meeting, in January of 2003. This has put us at a considerable disadvantage. We are concerned that it was indicated that the input we provided before we had access to the data, is what you are considering the full extent of our input. It is not.

Regional Board Response:
The Regional Board provided all available data requested by your scientific consultant, Ms. Elaine Carlin, prior to the January 2003 technical meetings. The only requested data that we could not provide was SCCWRP's complete Bight'98 data set. At that time the Regional Board did not have all of the sediment quality data electronically (incomplete sediment chemistry data set and no benthic community data) and suggested that Ms. Carlin contact SCCWRP directly for

the complete Bight'98 data set. We understand that SCCWRP provided you with the data needed to complete your analysis following the January 2003 meetings.

We carefully reviewed and considered the full extent of your input in making our final reference pool decision. For example, as you pointed out in your approach, the benthic community data is considered an important criterion that should be used to select reference stations. The Regional Board, as a final screen of the reference stations in Reference Pool #2b, used the Benthic Response Index for Embayments (BRI-E) developed by SCCWRP to evaluate the benthic community (Ranasinghe et. al., 2003). By incorporating the BRI-E we removed stations with disturbed benthic communities from the reference pool. Additionally, the Regional Board has essentially used the same weight of evidence approach used by Bay Council to select stations in the final reference pool. Details are provided in Regional Board response to Comment #6 – Identification of a Set of Relatively Clean Sites (May 5, 2003 Letter).

5. Request for Working Group Meeting

Comment from San Diego Bay Council:
To expedite action we request that the staff hold a full working group meeting to address the various proposals and the action items identified at the last work group meeting. We request that the Regional Board solicit and distribute written comments on the pool of reference stations we have proposed here as well as other proposals such as NOAA's 14 and the Regional Board's set of 12 stations used to set background levels in March 2002 from the various entities and individuals participating in this process prior to the working group meeting.

Regional Board Response:
The Regional Board disagrees that written comments be solicited on various reference pool proposals including the Regional Board's March 6, 2002 letter establishing background conditions for NASSCO and Southwest Marine, and that another technical workgroup meeting be held to discuss these proposals. The Regional Board has thoroughly reviewed and considered all proposals, including comments received on these proposals, in the selection process of the final reference stations. The proposals received to date include those from NOAA (MacDonald and Klimas, 2003) and the Bay Council (Carlin, 2003). In addition, the background sediment concentrations defined in the Regional Board's March 6 letter is being replaced with the background sediment concentrations established by the final reference pool (n = 22) selected by the Regional Board. The Regional Board has already instructed NASSCO and Southwest Marine to use the final reference pool in determining areas exceeding background conditions within and adjacent to their respective leaseholds. We have requested that these areas be depicted in maps provided in the comprehensive technical report. The comprehensive technical report will be submitted to the Regional Board in mid October 2003 and will be available for public review and comment.

The NOAA reference pool approach was distributed to the technical workgroup for review and was formerly presented by NOAA at the January 22-23 meeting. The approach was discussed extensively at the meeting and comments were provided by the workgroup. We would like to clarify that the NOAA approach does not specifically recommend using just the 14 Bight'98 stations as you stated in your letter. Rather, NOAA suggested the possible use of 6 reference stations sampled in the 2001 sediment investigations (NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel) plus the 14 Bight'98 stations; for a total of 20 recommended stations.

Even though Bay Council submitted their proposed reference pool approach after the January 22-23 technical meeting, the Regional Board spent a significant amount of time reviewing their approach prior to issuing our decision on a final reference pool. In fact, both the Regional Board and Bay Council used the same weight-of-evidence approach to select reference stations by considering the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure). The screening criteria differed as shown in Appendix 5 of Attachment C.

The Regional Board's reference station pool includes reference stations recommended in the NOAA and Bay Council approaches. The reference pool includes 13 of 20 NOAA reference stations and 3 of 7 Bay Council reference stations. These stations are shown in Tables 2 and 3 below.

Table 2. 13 of 20 NOAA Reference Stations Included in Regional Board Final Pool (bold and shaded).

2001 Chollas/Paleta Reference Stations	2001 Shipyard Reference Stations	Bight'98 Reference Stations
2433	**2243**	2224
2238	**2433**	2239
2243	**2441**	**2436**
		2231
		2434
		2228
		2243
		2229
		2433
		2227
		2242
		2440
		2233
		2435

Table 3. 3 of 7 Bay Council Reference Stations Included in Regional Board Final Pool (bold and shaded).

2001 Chollas/Paleta Reference Stations	2001 Shipyard Reference Stations	Bight'98 Reference Stations
Not Applicable	Not Applicable	**2252**
		2435
		2229
		2433
		2227
		2434
		2441

The Regional Board also compared the mean values between the Regional Board reference pool and the reference pools proposed by NOAA and Bay Council to determine the similarities and differences. The mean values were used because it allows for a simple, baseline comparison between all of the various pools. The Regional Board recognizes that there are a variety of statistical methods to compare the various reference pools and that the mean is not the statistics used to compare reference to site stations.

As shown in Table 4 below, the reference pools are generally not significantly different from one another with respect to sediment chemistry (except for total priority pollutant PAHs [PP-PAHs]) and amphipod toxicity. The Regional Board's pool for total PP-PAHs is significantly lower (i.e., more protective) than both Bay Council's pool and NOAA's pool. The Bay Council's pool and NOAA's pool are approximately 50% and 30% higher, respectively, in PP-PAH concentrations.

Another significant difference is the mean Benthic Response Index Embayment (BRI-E) scores for the reference pools. Bay Council's pool for the BRI-E score is significantly lower, as expected, because the Regional Board's pool included stations within the BRI-E Response Level 1 threshold (details provided in Appendix 5 of Attachment C). Bay Council's pool only included stations within the BRI-E Reference Level threshold. Also worth noting is that the mean BRI-E scores for the Regional Board's pool and NOAA's pool are similar.

Table 4. Comparison of Mean Values Between the Regional Board, Bay Council, and NOAA Reference Pools.

		Mean Values[1]		
		Regional Board Pool	**Bay Council Pool**	**NOAA Pool**
		n = 22	n = 7	n = 20
Sediment Chemistry[2]	**Units**			
Arsenic	mg/kg	5.45	6.76	5.45
Cadmium	mg/kg	0.14	0.16	0.15
Chromium	mg/kg	30.8	31.8	32.3
Copper	mg/kg	56.7	54.9	54.9
Lead	mg/kg	23.5	19.7	23.1
Mercury	mg/kg	0.26	0.18	0.28
Nickel	mg/kg	9.37	11.1	9.87
Silver	mg/kg	0.52	0.56	0.50
Zinc	mg/kg	112	103	109
Total PP-PAHs[3]	**ug/kg**	**346**	**803**	**513**
Total PCBs	ug/kg	43.3	51.3	42.0
Toxicity				
Amphipod Survival (control-adjusted)	%	95	98	95
Benthic Community				
BRI-E[4]	**unitless**	**27.6**	**15.1**	**26.0**

Notes: (1) Sediment quality data taken from April 10, 2003 document produced by SCCWRP, Navy, and Exponent (Bay et. al., 2003).

(2) One-half of the method detection limit was substituted for nondetect values, except for the Shipyard data, where one-half of the reporting was used (Bay et. al., 2003).

(3) Total PP-PAHs = Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benz[a]anthracene, Chrysene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Benzo[a]pyrene, Indeno[1,2,3-cd]pyrene, Dibenz[a,h]anthracene, and Benzo[ghi]perylene.

(4) BRI-E = Benthic Response Index - Embayments

6. Identification of a Set of Relatively Clean Sites

Comment from San Diego Bay Council:
To move the process forward, and because of profound concerns about how this selection process appears to be unfolding, (and now that we have the necessary data), we have identified a set of relatively clean sites, with relatively healthy benthic communities, to be used as a reference pool for the Bay (enclosed). We had the following in mind as we proceeded:

- *Select a Pool of Reference Stations that will define background (ambient) conditions in San Diego Bay.*
- *This pool can be used for general assessments of whether areas of the Bay are degraded.*
- *This pool, or a subset of this Pool, can be used as reference for site-specific cleanups, including clean-up of the NASSCO and Southwest Marine Shipyards sites.*
- *Recommend that the stations that make up this pool be protected from degradation.*

Regional Board Response:
The criteria the Regional Board had in mind when selecting the reference pool is provided in our response to Comment #1 – EPA Definition on Reference Conditions and Reference Sites (May 5, 2003 letter). The Regional Board believes that the best way to move the project forward is to apply the Regional Board's reference pool and appropriate statistical procedures to the NASSCO and Southwest Marine sediment site data and evaluate the resultant cleanup scenarios. A lot of good solid information that has been collected on multiple lines of evidence on this project. Therefore we are anticipating that there will be sufficient information in the technical report to ensure that the Regional Board will be able to evaluate options and make a cleanup decision that is protective of beneficial uses.

The Regional Board has considered all stakeholder input, including the Bay Council's proposed reference pool, and believes we have arrived at a decision on a suitable reference pool that will provide a sound scientific basis for identifying site stations exceeding reference conditions. All of the stations in the Regional Board's final reference pool meet the screening criteria used to evaluate sediment chemistry, amphipod toxicity, and benthic community structure. The weight-of-evidence, therefore, concludes that each station included in the Regional Board's final reference pool is not impacted by sediment contamination (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and is supportive of aquatic life beneficial uses. Consequently, we are confident that the Regional Board's reference pool is suitable for the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations.

The screening criteria used by the Regional Board to select stations in the final reference pool and the results are provided in Appendices 5 and 6 of Attachment C, respectively.

REGIONAL BOARD RESPONSES TO AUGUST 12, 2003 LETTER

1. Precedent for Cleanup in San Diego Bay and California

Comment from San Diego Bay Council:
We have invested very significant time and resources in this, and we believe that the outcome of the Regional Board process, and your ultimate decision will provide a very significant precedent for clean up, not only of San Diego Bay, but for sediments in the rest of the State.

Regional Board Response:
We appreciate the time and resources the Bay Council has spent on this project and we have fully considered all of your input. The Regional Board process on the NASSCO and Southwest Marine projects do not set a binding precedent for current and future sediment investigations in San Diego Bay and throughout the State of California.

We have stated repeatedly in our technical meetings and workshops, the framework we developed to assess the contaminated sediments at NASSCO and Southwest Marine Chollas Creek and Seventh Street Channel is an evolving process. The Regional Board will continue to consult with stakeholders representing the interests of the public, the protection of State and Federal natural resources, and the scientific community to improve the decision-making process for other current and future sediment projects in San Diego Bay.

The Regional Board will not be setting a precedent for the entire state of California. The State Water Resources Control Board (SWRCB) is conducting an independent effort to establish sediment quality objectives (SQOs) and an implementation policy for California's enclosed bays and estuaries. The SWRCB has already initiated the process. A workplan was adopted by the SWRCB at its May 21, 2003 Board meeting which describes the approach and key tasks that will be implemented to develop SQOs for California (SWRCB, 2003). It is anticipated that the process through adoption of the SQOs will take approximately four years to complete (Year 2007). Also worth noting is that the SQOs will only provide protection to aquatic life (i.e., benthic community). A framework for the calculation of sediment objectives based on fish bioaccumulation and consumption by humans or wildlife will be developed and illustrated through its application in a case study. This framework and case study will serve to illustrate the methods and data needed to develop bioaccumulation-based sediment objectives by regulatory agencies.

2. Problems Identified by the Natural Resource Trustee Agencies

Comment from San Diego Bay Council:
We would like to take this opportunity to update you regarding serious concerns we have about how the cleanup effort is proceeding, particularly as it relates to the pool of reference stations

selected and recently released by your staff. These problems with the selection and approach used have also been identified by the natural resource trustee agencies, including the National Oceanic and Atmospheric Administration (NOAA), the U.S. Fish and Wildlife Service, and California Fish and Game.

Regional Board Response:
The Resource Agencies recently submitted comments on September 12, 2003 regarding the Regional Board's reference pool (Appendix 2 of Attachment C). Prior to issuing our final reference pool decision we consulted with the Resource Agencies extensively and took significant steps to address the Resource Agencies' concerns. While we recognize that there are a few issues that still need to be resolved with the Resource Agencies, we do not agree with Bay Council that the Resource Agencies have identified the same set of problems as the Bay Council with the reference pool selection.

3. NOAA and Bay Council Proposed Reference Pools

Comment from San Diego Bay Council:
Previously NOAA and the San Diego Bay Council each submitted for consideration proposed pools of reference stations representing *the least impaired, or "cleanest" sites in San Diego Bay.* These approaches are based on widely accepted scientific practices used throughout the nation and supported by EPA Guidance (See for example, U.S. Environmental Protection Agency, Office of Water. December 2000. *Estuarine and Coastal Marine Waters: Bioassessment and Biocriteria Technical Guidance.* EPA-822-B-00-024).

Regional Board Response:
See Regional Board responses to Comment #1 – EPA Definition of Reference Conditions and Reference Sites (May 5, 2003 Letter) and Comment #5 – Request for Working Group Meeting (May 5, 2003 Letter).

4. Pristine Levels not required for Cleanup

Comment from San Diego Bay Council:
Using reference sites within San Diego Bay takes into account that while the Shipyards must cleanup contamination they contributed to the Bay, cleanup cannot be required to pristine levels.

Regional Board Response:
Water Code Section 13304 provides that ... "any person who has discharged or discharges waste into waters of the state in violation of any waste discharge requirement or other order or prohibition issued by a Regional Water Board or the State Water Board ... may be required to clean up the discharge and abate the effects thereof." This section authorizes the Regional

Board to require complete cleanup of all waste discharged and restoration of affected water to background conditions (i.e., the water quality that existed before the discharge).

5. Solicit Comments on Bay Council and NOAA Proposals

Comment from San Diego Bay Council:
The Bay Council requested that the staff solicit comment on our proposal from members of the working group. We have also inquired about the status of NOAA's proposal, a proposal we could support, and requested a meeting at which both of these proposals along with others could be fully considered. These requests were denied, and we have received no response to our proposal, or to request that comment be solicited from members of the working group.

Regional Board Response:
See Regional Board responses to Comment #3 – Status of Tasks (May 5, 2003 Letter) and Comment #5 – Request for Working Group Meeting (May 5, 2003 Letter).

6. Bay Council Proposal used by the Navy and Regional Board Staff

Comment from San Diego Bay Council:
In the meantime, our proposal has received very favorable review from several individuals and agency representatives both prominent in the field and familiar with San Diego Bay. Our proposal has been used in the selection of reference stations by the Navy and by other members of your staff for TMDL and other cleanup projects in the Bay.

Regional Board Response:
The Regional Board is not aware of any sediment investigation projects in San Diego Bay that has used the Bay Council's approach in selecting reference stations. In fact, we are puzzled with your comment that Staff has used the Bay Council approach for TMDL sediment investigations. The Regional Board has not used the Bay Council approach in determining a reference pool for any of the TMDL sites in San Diego Bay. We recognize that we are using three of the same Bight'98 stations (2435, 2441, and 2229) identified in the Bay Council approach in the Switzer Creek, Downtown Anchorage, and B Street/Broadway Piers TMDLs. However, Bay Council's approach was not used to select these three stations. These three stations were selected based on the results of previous studies (Bight'98, BPTCP, Shipyard Investigation) and specific criteria:

- Location (i.e., not located in a marina);
- Low sediment chemistry;
- Lack of acute toxicity;
- Healthy benthic community;
- Similar physical characteristics to study sites (total organic carbon and sediment grain size); and

- Level of sensitivity that separates the effects on organisms due to natural non-pollutant factors (e.g., grain size, unionized ammonia, and sulfides) from the effects due to pollutants.

The Regional Board requests that the Bay Council provide us a list of sediment projects in San Diego Bay that have used the Bay Council approach in selecting reference stations, including detailed information on how the approach was applied. In addition, the Regional Board requests that the Bay Council provide us a separate list of the agencies and sediment experts that have reviewed the Bay Council reference pool approach. Please include their name, title, organization, and phone number when providing us this list. We would like to contact them to receive additional input on the Bay Council approach for potential application to future sediment investigations in San Diego Bay.

7. Excluded from First Key Meeting

Comment from San Diego Bay Council:
Despite our deep involvement and commitment to this process from the beginning, and our provision of valuable scientific input, we were excluded from the first key meeting of the reference pool working group.

Regional Board Response:
See Regional Board response to Comment #2 – Bay Council Participation in Regional Board Workshops (May 5, 2003 Letter).

8. Lack of Balanced Input

Comment from San Diego Bay Council:
We, along with other parties involved in the process, are fundamentally concerned about the lack of balanced input and heavy access and influence afforded by the dischargers – staff has worked very closely with the Navy and shipyards and their consultants in selecting an approach, selecting the pool of stations, and the statistical approach. We have been excluded from these critical deliberations.

Regional Board Response:
The Regional Board is disappointed in Bay Council's assertions that we have not provided equal attention to all stakeholders interested in the reference pool selection process and that we have excluded Bay Council from "critical deliberations" we have had with the Shipyards and the Navy. The Regional Board has maintained an open process to ensure that we have considered the views of all key stakeholders on the reference station issue. We have held three day-long technical meetings to discuss the approach and selection of reference stations and have also considered all additional stakeholder input provided to us before and after these technical

meetings. The Regional Board had several discussions separately with the Shipyards and the Navy following the technical meetings to provide further clarification on the instructions we provided to them and because they had questions regarding the candidate reference pools identified in the instructions. As a reminder, the Regional Board instructions including the candidate reference pools were prepared based on the input received from the entire stakeholder group present at the January 22-23 technical meeting (RWQCB, 2003a). There were no "critical deliberations" following the technical meetings that warranted the inclusion of the entire stakeholder group. The purpose of the limited discussions between the Regional Board and the Shipyards/Navy were to keep the reference pool analysis proceeding forward.

9. Process Deserves Full Stakeholder Participation

Comment from San Diego Bay Council:
As a result, the staff's proposed reference pool and approach were determined without full stakeholder participation and despite the fact that stakeholders were providing high caliber scientific input. Management of the San Diego Bay contaminated sediment clean up process deserves transparency and full participation of the stakeholders including the public.

Regional Board Response:
See Regional Board responses to Comment #3 – Status of Tasks (May 5, 2003 letter) and Comment #8 – Lack of Balanced Input (August 12, 2003 letter).

10. Regional Board Reference Pool not Protective of Beneficial Uses

Comment from San Diego Bay Council:
The approach and reference pool decided upon your staff does not appear to be scientifically defensible, and no evidence has been presented that beneficial uses will be protected.

Regional Board Response:
The Regional Board disagrees with Bay Council that the approach used to select the reference pool is scientifically indefensible and that the final pool does not protect beneficial uses. As we stated in Regional Response to Comment #6 – Identification of a Set of Relatively Clean Sites (May 5, 2003 letter), the final reference pool is based on a final screening evaluation using the triad approach and best professional judgement. The triad approach is a widely-accepted approach that is used throughout the United States to evaluate sediment quality. In fact, Bay Council in selecting a proposed reference pool also used the triad approach. Based on the final screening evaluation, the reference stations in the Regional Board's final pool are not impacted by sediment contamination and are supportive of aquatic life beneficial uses (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community). The evaluation results are provided in Appendix 6 of Attachment C.

11. Distance-From-Shore Approach

Comment from San Diego Bay Council:
The approach is based on the concept that the contamination levels decrease with the distance from shore – despite the fact that some of the cleanest sites are relatively close to shore. The Trustee Agencies and sediment experts experienced in the Bay rejected this method when it was first proposed last January. It has not been peer-reviewed, and to our knowledge has never been used before.

Regional Board Response:
The Regional Board recognizes that the Bay Council does not agree with the approach used to identify additional reference stations for the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations (distance-from-shore approach). We also recognize that the Resource Agencies are not in full agreement with the use of the distance-from-shore approach and need further clarification on its development and application (Appendix 2 of Attachment C).

The Regional Board disagrees with Bay Council that the distance-from-shore approach is an inappropriate approach because it does not consider "clean" stations close to shore. In order to clear up confusion on the approach provided below is a brief summary of the distance-from-shore approach. Also discussed are why it was developed, how it accounts for near-shore (and far from shore) Bight'98 stations, and how the remaining distance-from-shore stations are protective of beneficial uses.

Distance-From-Shore Approach (Appendix 3 of Attachment C):

One of the concerns raised by some of the participants in the technical workgroup was the number of reference stations (n) used to calculate the parametric statistics for sediment chemistry, toxicity, and benthic community structure. The Regional Board, among others, decided that it was important to increase n to improve the power of the statistical procedures for the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations. As a first step, the reference stations from these investigations were combined to increase n to 11 (five from NASSCO and Southwest Marine, and six from Chollas Creek and 7th Street Channel). It was appropriate to combine these reference stations because they: (1) are the same stations with respect to location (with the exception of one station), (2) were sampled within the same time frame (July and August 2001), (3) were sampled for the same sediment quality data, and (4) followed the Bight'98 sampling and analysis protocols. Because the chemical and biological results from some of these reference stations were considered to be unsuitable for representing reference conditions; thus decreasing n, the Regional Board and others decided that it was necessary to supplement the combined reference stations. Consequently, SCCWRP identified additional reference stations in San Diego Bay from the Bight'98 data set. The approach used by SCCWRP is based on the

premise that contaminant concentrations in sediments decrease away from shore (i.e., away from point and non-point sources). SCCWRP determined that concentrations of copper, chromium, mercury, lead, zinc, total PAHs, and total PCBs (common chemicals of concern) appeared to level off at approximately 290 meters from shore. Threshold chemical concentrations for each of these constituents were then calculated using only stations greater than or equal to 290 meters from shore. All 46 Bight'98 stations in San Diego Bay were compared to these threshold values (regardless of distance from shore) and stations below these threshold values were identified as suitable reference stations. Twenty-two stations from the Bight'98 data set were below the threshold values ranging from 10 to 1,080 meters from shore. These stations were, therefore, considered as candidate supplemental reference stations.

The Regional Board, as a final screen of these additional 22 stations, evaluated the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure) using the criteria specified in Appendix 5 of Attachment C. Based on the results of the Regional Board's screening evaluation (Appendix 6 of Attachment C), 5 of 22 stations were removed based on their respective BRI scores. The remaining 17 stations were retained in the final reference pool because they met all screening criteria. The weight-of-evidence, therefore, concludes that the 17 stations are not impacted by sediment contamination (based on weight-of-evidence: relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and are therefore supportive of aquatic life beneficial uses.

12. Number of Reference Stations in Final Pool

Comment from San Diego Bay Council:
The pool is exceptionally large, and as a result contains stations that are too contaminated or impaired to be used to establish the bar to which cleanup will be required – the pool has over 20 stations, where other reference pools for San Diego Bay have 5 or 6 stations. It has been demonstrated that much smaller pools – if selected properly – provide the necessary range of physical characteristics and statistical power, and importantly, allow for a cleaner reference condition.

Regional Board Response:
From a statistical standpoint, a large pool is typically preferable to a small pool, yet the comment suggests otherwise. The Bay Council's standard being used to justify a "smaller pool" is that it allows for a "cleaner reference condition". The goal in choosing reference sites is not to choose the cleanest reference condition. It is to choose reference conditions that represent the pre-discharge conditions at the site.

The Regional Board disagrees with Bay Council that the reference stations in the final pool are "too contaminated or impaired." Each reference station in the final pool has relatively low

sediment chemistry, lack of acute toxicity, and a healthy benthic community. See response to Comment #6 – Identification of a Set of Relatively Clean Sites (May 5, 2003 letter). Furthermore, the reference stations included in the final pool provide the necessary range of physical characteristics at NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel: Fines content (13% - 77%), Total Organic Carbon (0.30% - 1.63%), and Depth (3 – 12 meters).

The Regional Board is familiar with only one site in San Diego Bay that has used 5 reference stations: Site 12 - Boat Channel at the Former Naval Training Center (Bechtel, 1999). The Regional Board requests that Bay Council provide a list of San Diego Bay sites that have used 5 or 6 reference stations and include a detailed rationale with supporting documentation on how these sites demonstrate that "much smaller pools – if selected properly – provide the necessary range of physical characteristics and statistical power, and importantly, allow for a cleaner reference condition."

Finally, Bay Council's above comment recommending the use of "much smaller pools" is not consistent with the Bay Council's endorsement of the NOAA reference pool, which recommends a total of 20 reference stations (2 reference stations less than the Regional Board's final pool). We request that Bay Council clarify their position on the number of stations in the large NOAA pool.

13. Choice of Statistical Techniques

Comment from San Diego Bay Council:
The second major set of problems involves the choice of statistical techniques which apparently will result in a less protective level of cleanup. Commonly used, simpler, and much more transparent statistics are the appropriate tools to use and would be expected to result in significantly more protection for the Bay. These simpler techniques are entirely consistent with the triad approach to selecting reference sites.

Regional Board Response:
The Regional Board is unclear as to which statistics Bay Council is referring to that is "commonly used, simpler, and much more transparent ... and would be expected to result in significantly more protection for the Bay". Therefore, we cannot respond specifically to your suggestion.

The Regional Board is aware that the Bay Council used the 95% upper confidence limit (UCL) on the mean as the statistic for evaluating their proposed reference pool. We disagree with Bay Council in using UCL's when comparing a reference pool to individual site stations because it is technically incorrect. The Regional Board recommends using the 95% upper predictive limit

(UPL) as specified in our June 9, 2003 letter to the Shipyards (RWQCB, 2003). A detailed discussion on the UCL and UPL is provided below.

A confidence limit on the mean is an estimate of the value for which there is a specific chance that the true mean of a population is less than this value (e.g. 95%). The 95% UCL is a population statistic because it describes a characteristic of the entire population. For example, one could use the UCL to represent a reference condition to evaluate dissolved phase concentrations in a pond. Since it is the pond as a whole that one is concerned with and the mean concentration of a chemical represents this pond, the 95% UCL may be used to estimate if the pond concentrations exceed reference.

A predictive limit (e.g. the 95% UPL) is an estimate of the value for which there is a 95% chance that a future selected sample will not exceed this value if it is actually a member of the population (or site) being studied. The 95% UPL is a statistic that applies to individual samples. When we evaluate exceedences of sediment quality, we look at individual sediment samples. We are interested in knowing whether or not there is impairment in the immediate vicinity of the sample. Therefore, we want to know if the individual sample is a member of the reference sampling population and the UPL is the appropriate statistic to use.

Confidence limits and predictive limits are generically referred to as interval estimates. According to Dennis Helsel and Robert Hirsch (authors of "Statistical Methods in Water Resources") (Helsel and Hirsh, 2002) there are two types of interval estimates:

> "Interval estimates can provide two pieces of information which point estimates cannot:
>
> 1. A statement of the probability or likelihood that the interval contains the true population value (its reliability).
> 2. A statement that the likelihood that a single data point with specified magnitude comes from the population under study.
>
> Interval estimates for the first purpose are called confidence intervals; intervals for the second purpose are called prediction intervals. Though related, the two types of interval estimates are not identical and cannot be interchanged."

The authors further describe how prediction intervals are appropriate for evaluating individual data points and confidence intervals are not:

> "Prediction intervals are computed for a different purpose than confidence intervals – they deal with individual data values as opposed to a summary statistic such as the mean. A prediction interval is wider than the corresponding confidence interval, because an individual observation is more variable than is a summary statistic computed from several observations.

Unlike a confidence interval, a prediction interval takes into account the variability of single data points around the median or mean, in addition to the error in estimating the center of the distribution. When the mean +/- 2 standard deviations are mistakenly used to estimate the width of a prediction interval, new data are asserted as being from a different population more frequently than should."

Some notable investigations in which the UPL was used to differentiate contaminated sediments from reference station conditions include:

- Southern California Bight 1998 Regional Monitoring Program (Noblet et. al., 2003)
- Natural Trace Metals Concentrations in Estuarine and Coastal Marine Sediments of the Southeastern United States (Windom et al., 1989)
- Statistical Approach for Discrimination of Background and Impacted Areas for Midnite Mine RI/FS (URS Greiner, 2001)
- Remedial Investigation, Naval Air Station, North Island, San Diego, California (SPAWAR, 1999)
- Sediment Quality in Puget Sound (Long et. al., 2000)

It should be noted that the above are the only investigations identified by the Regional Board, thus far, that have used the UPL. There may be more investigations.

14. Calculations on the Regional Board Reference Pool

Comment from San Diego Bay Council:
Staff has indicated that we should wait until the shipyards make these calculations or run them ourselves, and that even the staff has not run these calculations on the pool they selected. This is confusing – how has staff evaluated its final pool and approach as to whether it is protective of beneficial uses, and how will staff evaluate the shipyard's work?

Regional Board Response:
The Regional Board met with Ms. Elaine Carlin (Bay Council's scientific consultant) and Mr. Ed Kimura of Sierra Club on July 31, 2003 to discuss Bay Council's comments on the final reference pool. At that meeting, we indicated that we did not need to perform the statistical calculations on the final pool because: (1) we directed the Shipyards to conduct the calculations (RWQCB, 2003b), (2) the calculations would be available in the Shipyard's comprehensive report due in mid October 2003, and (3) the Regional Board had limited time and resources. The Regional Board, however, has evaluated the final pool by using the triad approach to screen and select the final reference stations (for details see Regional Board response to Comment #6 – Identification of a Set of Relatively Clean Sites). We evaluated the sediment chemistry, amphipod toxicity, and benthic community structure data in each of the reference stations included in Reference Pool #2b (Bay et. al., 2003) and removed stations that did not meet our

criteria. The final remaining stations are stations that are not impacted by sediment contamination (based on weight-of-evidence: relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and are therefore supportive of aquatic life beneficial uses.

Finally, the Regional Board has the necessary resources to review the Shipyard's comprehensive sediment investigation report, which includes the statistical calculations. We will also seek assistance, as necessary, from the Natural Resource Trustee Agencies and others that have the technical expertise on issues such as risks to human health and wildlife. Furthermore, we will consider all input received from interested stakeholders on the comprehensive technical report.

15. Site-Specific Approach to Select Reference Stations

Comment from San Diego Bay Council:
Each of these problems has also been identified by the Trustee agencies, and you should know that the Trustees and the San Diego Bay Council have gone to extraordinary lengths to identify, communicate, and provide assistance with these problems as we have become aware of them. In response to these efforts, staff has indicated that the approach they are using will only be used for the commercial shipyard cleanup, a response that belies the precedent-setting nature of the staff's decision, and the fact that the approach is already being cited by other dischargers in their work on other cleanup sites in the Bay.

Regional Board Response:
See Regional Board response on Comment #1 - Precedent for Cleanup in San Diego Bay and California (August 12, 2003 Letter).

16. Request for Hearing on Reference Pool Issue

Comment from San Diego Bay Council:
By this letter we are appealing to you to schedule this issue for a hearing so that the Board can provide direction on selection of the pool of reference stations and so that all information and scientifically credible proposals – including those by NOAA and by the Bay Council – can be brought before the decision-makers.

Regional Board Response:
The Regional Board disagrees with Bay Council that a hearing be held specifically to discuss the reference station issues. As we pointed out in our above responses we have already gone through extensive discussions with all key stakeholders on the process to select a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations. The Regional Board has held three day-long technical meetings with groups representing:

- the interests of the public (Bay Council),
- the protection and conservation of State and Federal natural resources (DFG, USFW, and NOAA),
- the scientific community (SCCWRP, San Jose State, UC Davis, and SPAWAR), and
- the potential responsible parties (NASSCO, Southwest Marine, and Navy).

In addition, we have held numerous meetings and teleconferences separately with most of the groups mentioned above. The Regional Board has considered all stakeholder input not only from these technical workgroup meetings and teleconferences, but also from input provided via written comments (e.g., proposed approaches and comments received on these approaches).

In June 2003 Regional Board staff instructed NASSCO and Southwest Marine to proceed with completing their technical report on the sediment quality investigation using the reference pool selected by staff. NASSCO and Southwest Marine's consultant is already well into preparing the technical report and it is due to be submitted in mid October 2003. It should be noted that the Regional Board will be scheduling a day-long workshop in November 2003 to: (1) present an overview of the technical report, (2) provide an opportunity for the public to provide comments on the technical report, and (3) solicit input on the development of the Cleanup and Abatement Orders (CAOs) for NASSCO and Southwest Marine.

The purpose of the technical report is to present the data and findings of the comprehensive sediment investigation conducted within and adjacent to the NASSCO and Southwest Marine leaseholds. The technical report will, at a minimum, include the following:

- Sediment quality data collected at each shipyard. The data consists of bulk sediment and pore water chemistry, sediment and pore water toxicity, benthic community structure, and bioaccumulation.
- Nature and areal extent of sediment contamination resulting from current and historical waste discharges from the shipyards.
- Biological effects and risks to San Diego Bay beneficial uses (aquatic life, aquatic-dependent wildlife, and human health) associated with sediment contamination at the shipyards.
- Determination and evaluation of cleanup levels protective of beneficial uses, including cleanup levels representing background conditions in San Diego Bay.
- Analysis of sediment remedial alternatives.

Staff does not support delaying the submission of this report and further delaying a Regional Board decision on cleanup in order to continue the debate on the relative technical merits of alternative reference station approaches. At this juncture the efficacious course for the Regional Board to conclude the investigation and determine cleanup levels is to obtain the technical report

from the shipyards in mid October 2003. Staff will review the report to determine appropriate cleanup levels and has tentatively scheduled the Regional Board's consideration of CAOs for NASSCO and Southwest Marine at the February 2004 Regional Board meeting. The CAOs will include directives to cleanup and abate the effects of the discharges in accordance with the final cleanup levels and include a time schedule for compliance with the directives. The Regional Board will provide ample opportunity for public comment on the CAOs, including the recommended cleanup levels as well as the reference station pool used in deriving the cleanup during the public review process for the CAOs.

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APPENDIX 1
OF ATTACHMENT C

Regional Board Instructions to Evaluate 4 Candidate Reference Pools

< Modified: February 7, 2003 >

I. CANDIDATE REFERENCE POOLS #1A & #1B

The tables provided below indicate which stations should be included in candidate reference pools #1a and #1b.

Reference Pool #1a – 6 Reference Stations from 2001 Data

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2231	None
2238	2243	
	2433	
	2441	

Reference pool #1a is a modified version of the pool that was developed during the January 23 meeting using a weight-of-evidence approach (plus and minus table for chemistry and toxicity). Regional Board staff modified the agreed pool by removing Chollas/Paleta Station 2243 because of the 55% amphipod survival rate. We will, however, consider retaining Chollas/Paleta Station 2243 if information is presented to establish a much h` gher survival rate.

< Modified: February 7, 2003 >

Reference Pool #1b – Reference Pool #1a + 18 Bight'98 Stations

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2231	2238
2238	2243	2440
	2433	2433
	2441	2231
		2252
		2265
		2435
		2258
		2257
		2240
		2436
		2256
		2247
		2242
		2233
		2244
		2243
		2241

Reference pool #1b is a combination of the stations in Reference pool #1a and 18 of 22 Bight'98 stations selected in the distance-from-shore approach developed by SCCWRP. Regional Board staff removed four Bight'98 stations due to the low amphipod survival rates. Stations 2249, 2245, 2235, and 2260 had survival rates of 75%, 66%, 71%, and 73%, respectively.

Descriptive Statistics for Reference Pools #1a and #1b

Descriptive statistics should be performed on the following parameters: sediment chemistry, amphipod toxicity, benthic community, and physical characteristics (% fines, % TOC). The sediment quality data and statistical results should be summarized in a table similar to the table provided in the NOAA document titled "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations" (January 16, 2003).

< Modified: February 7, 2003 >

- **Sediment Chemistry**

Statistics
- Mean
- Standard Deviation
- Upper one-tail 95% prediction interval (not adjusted)
- Upper one-tail 95% prediction interval (adjusted)

Details
- Provide statistical results for all contaminants of concern identified for Chollas/Paleta and NASSCO/SWM. A list of the combined COCs is provided in Attachment #5.
- Provide statistical results for ERMq. The ERMq should be calculated based on the same contaminant suite used in the November 8, 2002 document titled "Evaluation of Reference Station Data Obtained During the Shipyard or Chollas/Paleta Spatial Survey" prepared by Steve Bay et. al.
- For non-detects use ½ the detection limit reported by the analytical laboratory. USEPA 2002 guidance should be followed for summing ½ detection limit values (EPA 540-R-01-003, Guidance for Comparing Background and Chemical Concentrations in Soil for CERCLA sites, September 2002). Do you want to cite the EPA document discussed at the meeting as a possible reference?
- Total PCBs should be calculated using the 18 specific congeners recommended by NOAA (Attachment #2).
- Total PAHs should be calculated using the 23 specific PAHs used by NOAA in the document titled "An Approach for Selecting a San Diego Bay Reference Envelope to Evaluate Site-Specific Reference Stations" (January 16, 2003).
- Total DDTs should be calculated using ...
- Total chlordanes should be calculated using ...
- Include the ERM and ERL for each COC in the table.

- **Toxicity**

  Statistics
  - Mean
  - Standard Deviation
  - Lower one-tail 95% prediction interval (not adjusted)
  - Lower one-tail 95% prediction interval (adjusted)

  Details
  - Provide statistical results for % amphipod survival.

- **Benthic Community**

  Statistics
  - Mean
  - Standard Deviation
  - ?Lower/upper? one tail 95% prediction interval (not adjusted)
  - ?Lower/upper? one tail 95% prediction interval (adjusted)

  Details
  - Provide statistical results for number of taxa, abundance, and Shannon-Wiener diversity.
  - Provide an interpretation of the statistical results using best professional judgement.

- **Physical Characteristics**

  Statistics
  - Provide % fines and % TOC ranges.

  Details
  - Provide statistical results for % fines and % TOC.

II. CANDIDATE REFERENCE POOLS #2A & #2B

Reference pools #2a and #2b will be based on the criteria established at the January 23 meeting. Please use these criteria to establish candidate reference pools #2a and #2b. The criteria, as typed by Steve Bay at the meeting, are provided in Attachment #5. Please note that in the attachment we included some instruction/direction on a few criteria (red text and underlined).

< Modified: February 7, 2003 >

Reference Pool #2a – Reference Stations selected from 2001 Data

The following two tables should be developed prior to identifying potential suitable stations for reference pool #2a:

- Table A – Identify Outliers

  The purpose of this table is to identify outliers in the 2001 reference station data from the NASSCO/Southwest Marine and Chollas/Paleta investigations. Table 1 should be formatted similar to the table provided in the November 8, 2002 document titled ""Evaluation of Reference Station Data Obtained During the Shipyard or Chollas/Paleta Spatial Survey" prepared by Steve Bay et. al.

- Table B – Weight-of-Evidence

  The purpose of this table is to identify potential suitable reference stations from the Table A results using best professional judgement (i.e., weight-of-evidence approach). Table B should be formatted similar to the table with the pluses and minuses developed at the January 23 meeting (See Attachment #5). Additionally, Table B should include a column that provides a brief rationale for accepting or rejecting the station.

The selected stations from Table B should be placed in the following table:

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
Table B Results	Table B Results	None

< Modified: February 7, 2003 >

Reference Pool #2b – Reference Pool #2a + 18 Bight'98 Stations

The selected stations from Table B should be placed in the following table:

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
Table B Results	Table B Results	2238
		2440
		2433
		2231
		2252
		2265
		2435
		2258
		2257
		2240
		2436
		2256
		2247
		2242
		2233
		2244
		2243
		2241

Descriptive Statistics for Reference Pools #2a and #2b

Descriptive statistics should be performed on the following parameters: sediment chemistry, amphipod toxicity, benthic community, and physical characteristics (% fines and % TOC). Please follow the instructions provided above in the descriptive statistics for reference pools #1a and #1b (if applicable).

"WORKING DRAFT – FOR DISCUSSION PURPOSES ONLY"

< Modified: February 7, 2003 >

Issues and Decisions

What process should be used to evaluate suitability of 2001 reference station data?

1. Bight'98 comparison data set to use: 10 stations identified in 2001 Chollas/Paleta SAP (may use phase II data also).
2. Confirm normal distribution or do appropriate transformation
3. Calculate upper (lower) one tail 95% prediction interval, nonadjusted for multiple comparisons (or nonparametric substitute).
4. Compare to each 2001 station for chemistry, toxicity (% amphipod survival), and benthos (abundance, number of taxa, Shannon-wiener diversity) data using PI approach. Use chemistry contaminants of concern list.

	Shipyard	Chollas/Paleta		
As	X	X		
Cd	X	X		
Cu	X	X		
Cr	X	X		
Pb	X	X		
Hg	X	X		
Ag	X	X		
Ni	X	X		
Zn,	X	X		
(Butylytin)	X			
PCB/(PCT)	X	X		
PAH	X	X		
DDT		X		
Chlordane		X		
(Tot petrol)	X			

( ) not in Bight'98 dataset

Nondetects: use ½ detection limit reported by the analytical lab. Follow USEPA guidance (2002) guidance for summing ½ detection limit values and determining use of data.

-Consider Use Phase II Shipyard data for TBT, PCB and PAH comparisons.

- **The Bight'98 study had either detection limit issues or had a majority of non-detects for total PCBs and total PAHs. Do not use the Bight'98 data for these contaminants. Use the PCB and PAH data from the 12 Bight'98 stations resampled by the Shipyards in 2001 (` ttachment #3).**
- **The Bight'98 study did not analyze for TBT and TPH. Use the TBT and TPH data from the 12 Bight'98 stations resampled by the Shipyards in 2001 (Attachment #3).**

Do a separate statistical comparison using the 12 phase II stations.

- **Perform comparison to 10 Bight'98 Stations using upper one tail 95% prediction interval, nonadjusted to determine if sediment chemistry data is suitable for use in the reference pool. For contaminants not anaylyzed in Bight'98 (include PCBs too because of the detection limit issues in Bight'98) use the 7 BPTCP reference sites located in SD Bay.)**

Obtain BPTCP data for 7 established SD Bay reference sites and use for prediction interval analyses for contaminants of concern

not represented in Bight'98 dataset (10 stations) and shipyard Phase II dataset.

- **The Bight'98 study had either detection limit issues or had a majority of non-detects for total DDT and total chlordane. Do not use the Bight'98 data for these contaminants. Use the DDT and chlordane data from the 7 BPTCP reference stations located in San Diego Bay (Attachment #4).**

5. Do a best professional judgment evaluation of chemistry, benthos and toxicity data.
6. Use results of 4 & 5 to decide on suitability of each station's data.

Conditional exclusion, based on the type of outlier?

Action items:
a. Mike M. will provide EPA guidance document on nondetect chemistry data treatment. Jan 31.
b. Circulate Phase II shipyard data for potential use in steps 1-6 analyses and make a decision regarding its use and specific stations to include (e.g, 2441). ~~Get data by Jan 31, agencies provide comments to Regional Board by Feb. 5 COB.~~
c. Do steps 1-4 and circulate results (SCCWRP, NAVY, exponent). ~~2 weeks after decision on inclusion of shipyard Phase II data.~~
d. Complete steps 1-6 and provide recommendations to Regional Board. ~~Submit within 4 weeks of decision on item c.~~

e. Draft final decision regarding inclusion/acceptability of 2001 data will be made by Regional Board. Decision will be circulated to interested parties for comment by email.

What data sets should be included in the analysis data pool? To be used in evaluating the study site stations for differences relative to the pool.

Step 7. Skip steps 1-6 and use best professional judgment

			C/P								
	c-n/ noaa	c- fws	c-	t-n/ noaa	t-fws	c-n/ noaa	c- fws	c-	t-n/ noaa	t- fws	
2231	+	-		-	-	+	+		+	+	
2243	+	+		-(+)	+	+	+		+	+	
2433	+	+		+	+	+	+		+	+	
2440	-	-		+	-	-	-		+	-	
2441	(+)	-		+	-	+	+		+	+	
2238	+	+		+	+						

~~Acceptable 2001 data~~
~~Bight'98 subset~~
~~Shipyard Phase II data (acceptable data, judged using a similar process to that applied to the 2001 data)~~

~~How to select the additional Bight'98 data for inclusion?~~
- ~~Include the 10 identified previously?~~
- ~~Include the 14 identified by NOAA?~~
- ~~Include the 22 identified with the distance approach?~~
- ~~Use a combination of PCA and distance from shore?~~
- ~~Use a combination of NOAA and distance approaches?~~

~~Outliers in Chollas/Paleta toxicity data?~~

~~What statistics/technique will be used to make comparisons between the reference data pool and the study site station?~~

~~1. Treat each sample as an independent replicate for statistical purposes (n=7 or 8).~~

~~2. Follow steps 1-6 previously identified for the evaluation of the 2001 reference site data.~~

~~3. Adjustment for multiple comparisons: to be determined later.~~

~~4. Use a limited list of constituents for the statistical comparisons in order to minimize the need to adjust for multiple corrections.~~

APPENDIX 2
OF ATTACHMENT C

Comment Letter from Natural Resource Trustee Agencies
(September 12, 2003)

U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
NATIONAL OCEAN SERVICE
OFFICE OF RESPONSE & RESTORATION
COASTAL PROTECTION & RESTORATION DIVISION
c/o California Department of Toxic Substance Control,
Human and Ecological Risk Division
8800 Cal Center Drive
Sacramento, CA 95826

September 12, 2003

Mr. John Robertus
California Regional Water Quality Control Board
San Diego Region
9174 Sky Park Court, Suite 100
San Diego, California 92123

Dear Mr. Robertus,

As you are aware, representatives from affected Federal and State natural resource trustees have been working with the Board staff as part of a multi-stakeholder work group to develop a process to evaluate sediment contamination at the National Steel and Shipbuilding Company (NASSCO), the South West Marine Shipyard, and the Chollas and Paleta Creek TMDL. On behalf of the natural resource trustee representatives, the National Oceanic and Atmospheric Administration (NOAA), would like to address the role of the natural resources trustees related to the cleanup of contaminated sites, and also present the trustees comments on the selected reference pool approach and it's implementation.

The Natural Resource Trustees derive their authority from the Clean Water Act (CWA) §311, the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and the CERCLA enabling regulations in the National Contingency Plan (NCP) §300.600. In the event of a release of a hazardous substance into the environment, the natural resource trustees act on behalf of the public to protect natural resources that may be impacted by the hazardous substance releases, and the trustees ensure that the impacted resource, and the human and ecological services that the resource provides, are appropriately restored. The trustees carry out their designated responsibilities for protection and restoration by first working cooperatively within the cleanup process with the regulatory agencies and the parties responsible for the release. This cooperation, which includes technical support to the regulatory agencies, is specifically intended to lead to establishing cleanup numbers that will eliminate or limit future harm to trust resources and will allow for the restoration of the impacted habitat.

The trustees also have an expressed interest in negotiating with the responsible party in order to grant them a release from future natural resource liability under the authorized Federal acts. This release from future liability can only occur if the trustees determine that the cleanup protects trust resources, and that restoration of the resource is achieved. Working in close partnership with the regulatory agencies is the most direct and productive avenue by which the trustees can fulfill their

obligation to the public under the designated statutes and regulations. The trustees do have the option of working independently with the responsible party to achieve both a protective cleanup and restoration for the site, but it is clearly more timely, and in the best interest of the resources for all parties to work in a cooperative manner.

Each trustee agency named in the NCP has designated natural resources that they are tasked with protecting. Many times these natural resources co-exist, are contiguous, and/or have concurrent jurisdictions. In these cases, the trustees work together as co-trustees to carry out their designated responsibilities. For the investigation and remediation of the Shipyards, the Federal trustees with jurisdiction are NOAA, and the Department of the Interior, represented by the United States Fish and Wildlife Service (USFWS). The State of California is also a co-trustee for this site. As stated in the NCP, the Governor of the state has the authority to appoint the trustee(s). The designated natural resource trustees for the State of California are the Department of Fish and Game, trustee for all state fish and wildlife resources; the Regional Water Quality Control Board for surface water, groundwater and sediment; and the Department of Toxics Substances Control for soils.

The trustees have been involved in the ecological risk assessment process for the Shipyards since 2001 and have worked closely with the Board staff on development of several work plans associated with the risk assessment. The trustees participated in technical workshops in December 2002, and January 2003 to determine a reference pool to help evaluate site-related contaminants. During the January 2003 meeting, NOAA, along with the Navy, the Southern California Coastal Water Research Program (SCCWRP), and the Shipyards, submitted different approaches for establishing a reference pool and determining the appropriate statistics to use in analysis of the data. The San Diego Bay Council also submitted an approach after the January meeting. In the months since the January meeting, the trustees have provided significant, additional technical information to the Board staff regarding methodologies for selecting and statistically evaluating a reference pool. Given that the trustees and the Board have complementary authorities for protecting the public resources, the trustees believe that there should be more conferring with, and reliance on the technical guidance and expertise of the trustees.

The trustees recognize that this has been a difficult process and, given any complex problem, there are multiple approaches for addressing the issues. The trustees had the opportunity to attend a meeting on September 3rd where the Board staff explained the process they used to select the final reference pool, and describe the statistical approach that was selected to evaluate the pool. Based on those discussions, and the trustee's current understanding of the approach, the trustees would like to provide you with the following comments.

"Distance from Shore" Approach

The trustees have previously expressed concern to the Board staff regarding the selection of the "Distance from Shore" approach to establish the reference pool. Little scientific justification has been provided for the initial screening process used to establish the pivotal threshold chemical concentrations. These threshold chemical concentrations were used to determine the initial reference pool, and there is some question as to whether all qualifying stations were included in the pool. In light of the precedent setting nature of this exercise, it is essential to ensure that the process is scientifically sound. Until the various questions surrounding this approach can be answered and validated, the trustees recommend that the Board staff not adopt the "Distance from Shore" approach for establishing a reference pool for any future site investigations in San Diego Bay.

Statistical Approach

Despite the fact that there are several uncertainties associated with the initial "Distance from Shore" approach, the Board staff utilized additional selection criteria, and selected a reference pool for the shipyards that appears to be reasonable. The average concentration of contaminants in sediment are close to NOAA's conservative screening values (Effects Range-Low), the average survival of organisms exposed to the reference pool sediments is 95%, and the average benthic community index for the reference pool stations is within the acceptable impact category. However, these averaged, apparently protective numbers are not the criteria that will be used to determine whether a location at the shipyard will be remediated.

An additional statistical approach will be applied to the reference pool to evaluate the differences between contaminant levels in shipyard samples and those in the reference pool. The trustees have had discussions with the Board staff with regard to choosing the appropriate statistic to apply to this data set, particularly when taking into consideration the inherent non-random and non-normal distribution of the selected reference pool. The trustees welcome the opportunity to assist the Board staff in their further determination of the appropriate statistical method for evaluating whether individual sites (i.e., samples) are considered different from the reference pool. We also anticipate working closely with the Board staff to: 1) assess the risk the impacted sites may pose to the trust resources that utilize the area; and 2) determine if the designated beneficial uses are being impacted by releases from the site.

Use of the Reference Pool

It is the understanding of the trustees that the Board staff is proposing to use the reference pool in the risk assessment for the shipyards. It is important to

separate the risk assessment process from the risk management process (selecting the appropriate cleanup level). The risk the shipyards pose to exposed ecological receptors must be evaluated first. Once this risk is assessed, site specific data (shipyard samples) should be compared with the reference pool to determine if those risks are site-related and warrant further consideration.

Although there are still several questions and levels of uncertainty around the selection of the reference pool, and the statistics that will be applied to the pool, the trustees believe that these issues can be resolved to arrive at cleanup levels that will reduce risk and lead to restoration. The trustees also believe that the public interest can best be served and protected by having an open and deliberative process involving the input of all stakeholders. The Board staff has invested considerable effort and capital into putting forward this approach for determining a reference pool, and they are to be recognized for embracing a difficult and complex task.

In recognition of the shared vision, that in the future, San Diego Bay will meet all designated beneficial uses established under the Porter-Cologne Act, the trustees would like to have the Board ensure that a close partnership, which is reliant and built upon all the appropriate, invested authorities, is established between the trustees and the San Diego Regional Water Quality Control Board staff. The trustees look forward to enhanced coordination with the Board and Board staff in working toward our mutual goal of protecting and restoring San Diego Bay. The trustees also appreciate your time and effort in responding to our aforementioned concerns. If you have any questions regarding these comments and concerns, please feel free to contact me at (916) 255-6686.

Thank you for your consideration.

Sincerely,

Denise M. Klimas

Denise M. Klimas
NOAA Coastal Resource Coordinator
Office of Response and Restoration
Coastal Protection and Restoration Division

Attachment included

Reviewed by:

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APPENDIX 3
OF ATTACHMENT C

Distance-From-Shore Approach

Distance-from-shore approach to identify Bight'98 reference sites in San Diego Bay

Steve Bay and Jeff Brown, SCCWRP
January 8, 2003

Introduction

An approach to identify potential reference stations in San Diego Bay was created with the assumption that most contaminants in the bay's sediments originate from land-based discharges. Following this assumption, contaminant concentrations in sediments should diminish with distance from land, and eventually reach levels consistent with bay-wide ambient levels. By identifying background levels of contaminants, stations with contamination below the concentration threshold (regardless of distance from shore) can be used as appropriate reference sites. This summary describes the distance-from-shore approach that was used with Bight'98 data to identify reference sites in San Diego Bay.

Methods

The relationship between contaminant concentration and distance from shore was examined for 38 non-marina stations in San Diego Bay sampled during Bight'98. Seven contaminants were examined, including five metals (Cu, Cr, Hg, Pb, Zn) and two organics (total PAHs, total PCBs). Metal concentrations were iron-normalized and plotted versus distance from shore. Iron normalization was used in order to minimize the bias of selecting only stations with larger grain sizes, since concentrations of metals tend to increase naturally in finer grain sediments. Iron has been shown to be a conservative tracer that can help differentiate natural from anthropogenic concentrations of metals in the Southern California Bight. Iron normalization consists of dividing the concentration of a given metal (mg/kg) by the concentration of iron present (mg/kg). The organics data were not normalized. Non-detect values were substituted with the method detection limit.

Results

Each of the seven constituents tended to have diminished concentrations with distance from shore (Figures 1-7). For metals, concentrations appeared to level off at around 240 m for Cu, 160 m for Cr, and 150 m for Hg, Pb and Zn. For the organics, concentrations leveled off at around 290 m and 170 m for PAHs and PCBs, respectively.

Based on the plots, stations that are 290 m or greater from shore were determined to represent ambient conditions. An upper threshold concentration was developed for Cu, Cr, Hg, Pb, Zn, and PAHs by using the mean concentration + 1.64 standard deviations for stations that are $\geq$290 m from shore (equivalent to the one-tailed upper 95% confidence limit). The threshold for PCBs was derived from the maximum value for stations $\geq$290 m because PCB values were below the detection limit at a majority of sites, and the upper 95% confidence limit could not be calculated. The following upper threshold values were obtained: PAHs = 1040 ng/g, PCBs = 101.6 ng/g, Fe normalized Cr = 0.0022, Fe normalized Cu = 0.0044, Fe normalized Hg = 2.3×10^{-5}, Fe normalized Pb = 0.0020, Fe normalized Zn = 0.0073. All stations below the threshold levels for any of the seven indicator contaminants were then identified, regardless of distance from shore (Table 1). Those stations with constituents below the threshold concentrations for all of the indicators (Cr, Cu, Hg, Pb, Zn, PAHs, and PCBs) were considered to be representative of bay-wide ambient conditions. Twenty two stations were identified as revised reference sites, ranging from 10-1080 m from shore (Table 1). The location of these sites in San Diego Bay is shown in Figure 8.

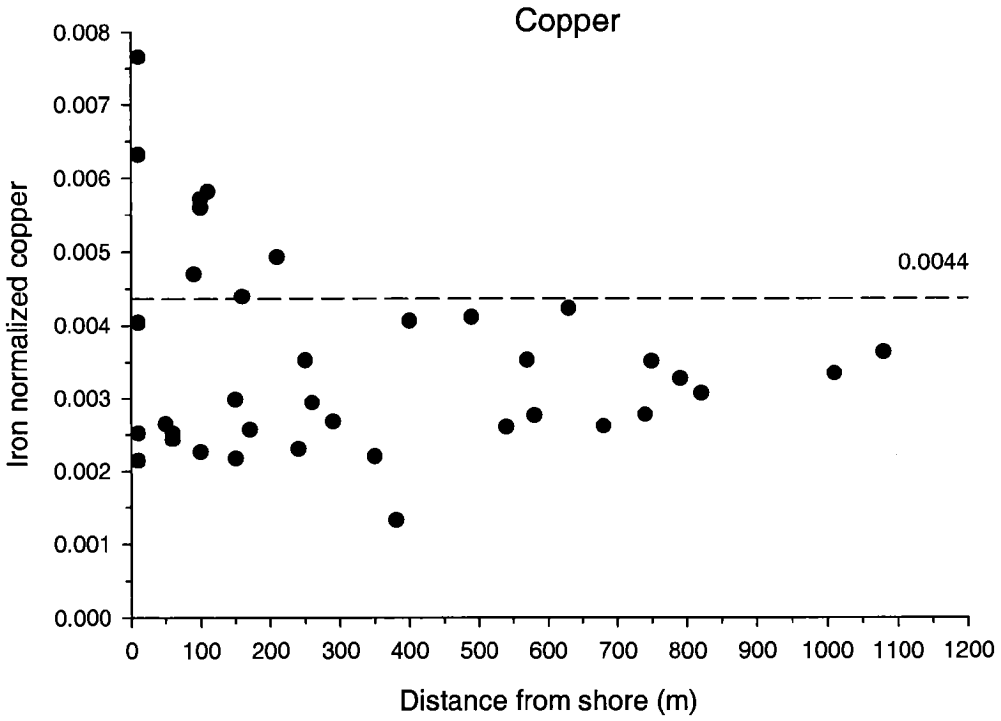

Figure 1. Relationship between the concentration of iron normalized copper and distance from shore. The dashed line indicates the upper threshold concentration.

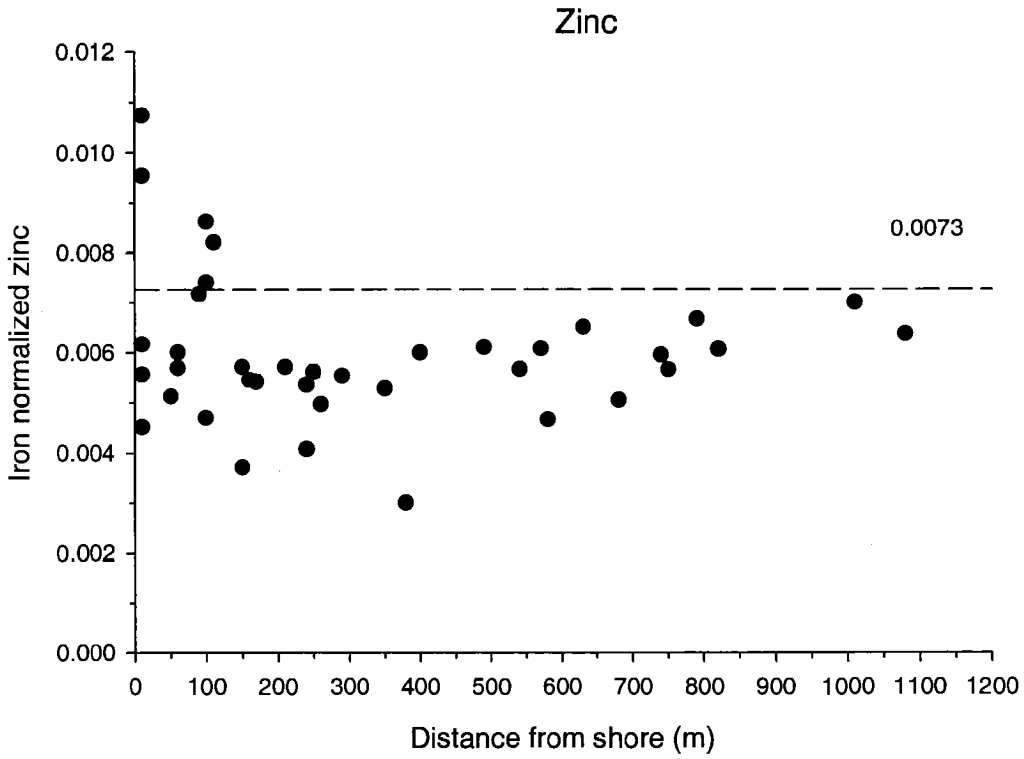

Figure 2. Relationship between the concentration of iron normalized zinc and distance from shore. The dashed line indicates the upper threshold concentration.

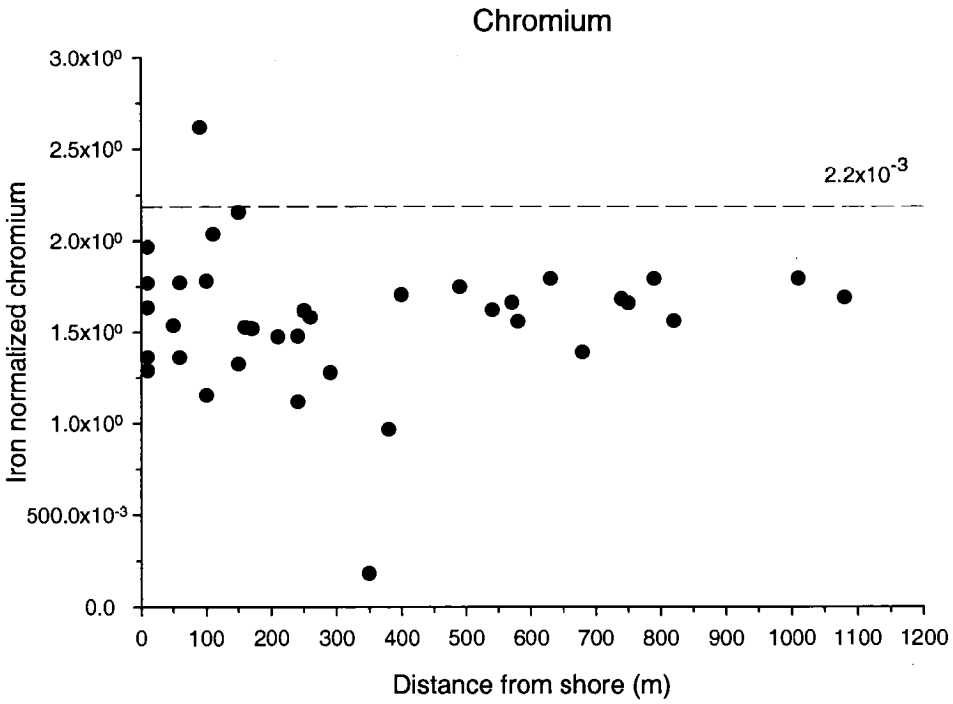

Figure 3. Relationship between the concentration of iron normalized chromium and distance from shore. The dashed line indicates the upper threshold concentration.

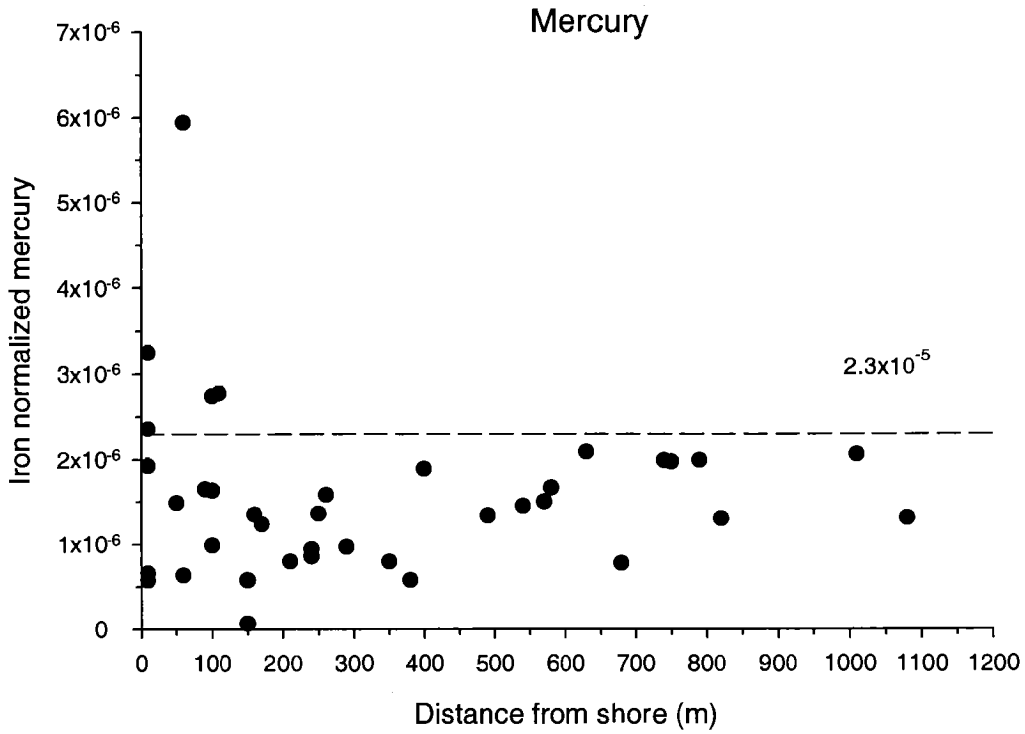

Figure 4. Relationship between the concentration of iron normalized mercury and distance from shore. The dashed line indicates the upper threshold concentration.

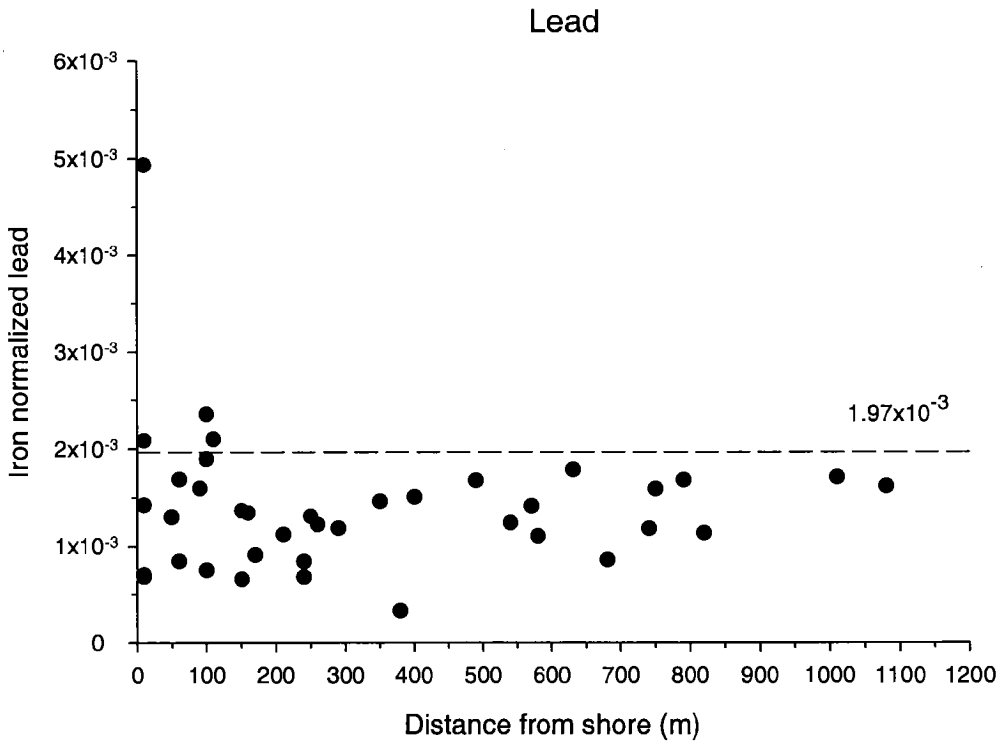

Figure 5. Relationship between the concentration of iron normalized lead and distance from shore. The dashed line indicates the upper threshold concentration.

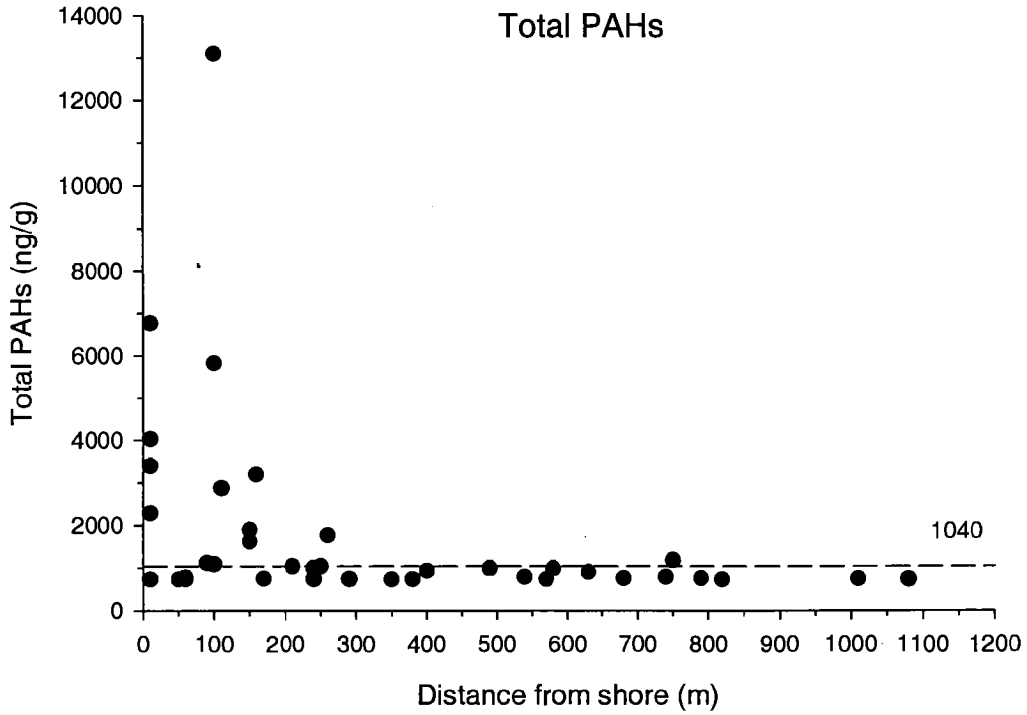

Figure 6. Relationship between the concentration of total PAHs and distance from shore. The dashed line indicates the upper threshold concentration. Non-detects were treated as equal to the method detection limit.

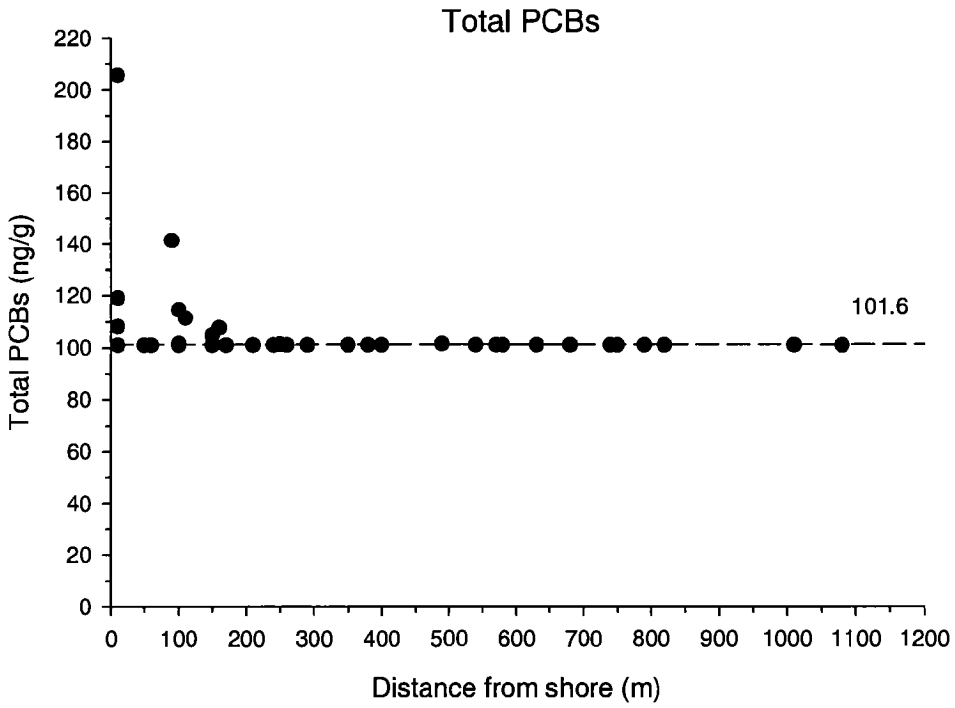

Figure 7. Relationship between the concentration of total PCBs and distance from shore. The dashed line indicates the threshold concentration. Non-detects were treated as equal to the method detection limit.

Table 1. Data used for selection of reference stations from the Bight'98 survey. Concentrations of Cu, Cr, Hg, Pb, Zn, PAHs or PCBs below the upper thresholds are indicated in grey. Stations where the concentrations are below the threshold for each of these constituents are considered to represent bay-wide ambient conditions; these stations are indicated with a Y in the Revised Reference site column. Iron normalized data have been multiplied by 1000 for convenience. The method detection limit was substituted for non-detect values.

Station	Distance from nearest shore (m)	Sampling Plan Reference site	Revised Reference site	Cu/Fe $x10^3$	Cr/Fe $x10^3$	Hg/Fe $x10^3$	Pb/Fe $x10^3$	Zn/Fe $x10^3$	Total PAHs ng/g	Total PCBs ng/g	Fe mg/kg	% Fines	% TOC
2238	10	Y	Y	2.1	1.29	0.007	0.70	5.6	735	101.1	25700	57	0.96
2253	10			7.7	1.64	0.032	2.09	9.5	2279	205.7	32900	66	1.57
2263	10			4.0	1.97	0.024	1.42	6.2	3389	108.1	29200	73	1.25
2264	10			6.3	1.77	0.019	4.94	10.7	4020	119.1	39100	73	2.01
2442	10			2.5	1.36	0.006	0.69	4.5	6771	101.1	30800	79	1.99
2440	50	Y	Y	2.6	1.54	0.015	1.30	5.1	735	101.1	15800	38	0.50
2230	60			2.5	1.77	0.059	1.69	6.0	735	101.1	6380	10	0.20
2249	60		Y	2.4	1.36	0.006	0.84	5.7	778	101.1	34600	72	1.35
2439	90			4.7	2.62	0.017	1.60	7.2	1119	141.3	28300	53	1.03
2227	100	Y		2.3	1.15	0.010	0.75	4.7	1088	101.1	23800	50	0.93
2251	100			5.6	1.78	0.016	2.36	7.4	5825	114.5	35000	72	1.99
2254	100			5.7	1.78	0.027	1.90	8.6	13087	101.7	13100	35	0.66
2255	110			5.8	2.04	0.028	2.10	8.2	2871	111.4	25100	59	1.18
2434	150			3.0	2.16	0.001	1.37	5.7	1614	104.8	23100	45	0.71
2441	150	Y		2.2	1.33	0.006	0.66	3.7	1890	101.1	33100	79	1.97
2259	160			4.4	1.53	0.013	1.35	5.5	3182	107.7	33000	68	1.24
2245	170		Y	2.6	1.52	0.012	0.92	5.4	745	101.1	26850	60	0.78
2262	210			4.9	1.47	0.008	1.12	5.7	1036	101.1	40600	74	1.64
2235	240		Y	2.3	1.48	0.009	0.84	5.4	735	101.1	25400	45	0.64
2433	240	Y	Y	2.3	1.12	0.009	0.68	4.1	994	101.1	30900	71	1.17
2231	250	Y	Y	3.5	1.62	0.014	1.31	5.6	1037	101.4	16500	31	0.64

Table 1 continued.

Station	Distance from nearest shore (m)	Sampling Plan Reference site	Revised Reference site	Cu/Fe $x10^3$	Cr/Fe $x10^3$	Hg/Fe $x10^3$	Pb/Fe $x10^3$	Zn/Fe $x10^3$	Total PAHs ng/g	Total PCBs ng/g	Fe mg/kg	% Fines	% TOC
2229	260	Y		2.9	1.58	0.016	1.23	5.0	1753	101.1	20000	43	0.92
2252	290		Y	2.7	1.28	0.010	1.19	5.5	737	101.1	11600	16	0.59
2265	350		Y	2.2	0.18	0.008	1.47	5.3	735	101.1	8190	13	0.35
2435	380	Y	Y	1.3	0.96	0.006	0.33	3.0	735	101.1	21400	49	0.55
2258	400		Y	4.1	1.70	0.019	1.51	6.0	925	101.1	35200	71	1.44
2257	490		Y	4.1	1.75	0.013	1.68	6.1	987	101.6	38200	77	1.63
2240	540	Y	Y	2.6	1.62	0.014	1.24	5.7	777	101.1	18200	44	0.55
2260	570		Y	3.5	1.66	0.015	1.42	6.1	735	101.1	14400	27	0.51
2436	580		Y	2.8	1.56	0.017	1.10	4.7	977	101.1	31133	55	1.36
2256	630		Y	4.2	1.79	0.021	1.79	6.5	895	101.1	30300	67	1.26
2247	680		Y	2.6	1.39	0.008	0.85	5.0	738	101.1	20400	44	0.58
2242	740		Y	2.8	1.68	0.020	1.18	5.9	791	101.1	15100	31	0.74
2239	750			3.5	1.66	0.020	1.59	5.7	1178	101.1	21400	34	0.72
2233	790		Y	3.3	1.79	0.020	1.69	6.7	738	101.1	15900	36	0.45
2244	820		Y	3.1	1.56	0.013	1.13	6.1	735	101.1	13600	20	0.30
2243	1010	Y	Y	3.3	1.79	0.021	1.72	7.0	735	101.1	11600	35	0.49
2241	1080		Y	3.6	1.69	0.013	1.62	6.4	735	101.1	16290	18	0.52

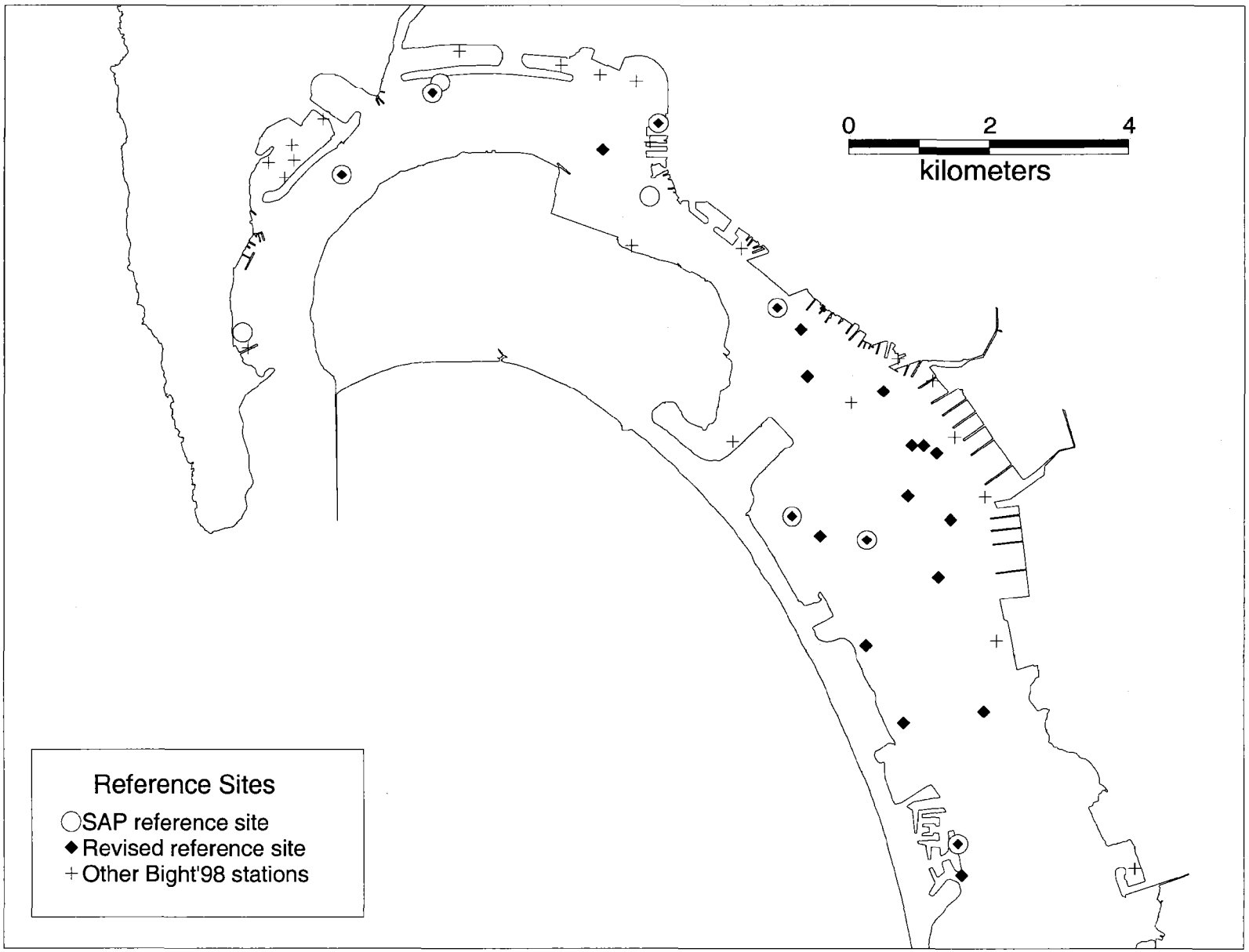

Figure 8. Bight'98 stations in San Diego Bay. Stations that represent bay-wide ambient conditions, based on the distance-from-shore approach, are indicated by diamonds. The ten reference sites identified in the Chollas/Paleta Sampling and Analysis Plan (SAP) are indicated by open circles. The remaining Bight'98 stations in San Diego Bay are indicated by crosses.

APPENDIX 4
OF ATTACHMENT C

Consensus Evaluation of Candidate Reference Sites for Use in Evaluating Data from the NASSCO/SWM Shipyard and Chollas/Paleta Creek THS Areas

[Data Not Provided in Appendix]

Consensus Evaluation of Candidate Reference Sites for Use in Evaluating Data from the NASSCO/SWM Shipyard and Chollas/Paleta Creek THS Areas

Steve Bay, SCCWRP
April 10, 2003

Background

This document summarizes the analyses conducted by SCCWRP, SSC, and Exponent in response to the 2/3/03 request by the San Diego Regional Water Quality Control Board to evaluate various reference data pools. These analyses had two objectives: to provide recommendations regarding the inclusion of candidate reference stations sampled in 2001 into an analysis pool (2A) and to summarize the characteristics of several combinations of reference stations using various measures of variability and prediction.

The information presented here represents the combined recommendations of SCCWRP, SSC, and Exponent specifically with regard to the evaluation of data from the NASSCO/SWM Shipyard and Chollas/Paleta Toxic Hot Spot (THS) assessment studies. While these recommendations may be applicable to the establishment of a regional reference data pool for other areas of San Diego Bay, decisions regarding the establishment of a regional reference data pool should include consideration of additional data and factors that have not been included here.

Candidate Reference Pool 2A

Methods

Statistical analyses were conducted in order to describe the similarity of chemical, biological, and toxicological characteristics of the 2001 reference sites to expectations based on prior data. These analyses followed steps 1-6 of the process developed during the January 22-23 2003 meeting on reference sites, as modified on February 7. These steps were:

Step 1. Compile data from the relevant studies. Data for the contaminants of concern (specified in the 2/3/03 instructions from the Regional Board), benthos (abundance, number of taxa, and diversity), and toxicity (amphipod survival) were compiled for the six 2001 Chollas/Paleta reference sites, five 2001 (phase I) and 12 2002 (phase II) Shipyard reference sites, selected Bight'98 candidate reference sites, and seven BPTCP reference sites. One-half of the method detection limit was substituted for nondetect values, except for the shipyard data, where one-half of the reporting limit was used. Sums of some organic contaminant groups were calculated as follows: total PCB = sum of measured congeners, total DDT or Chlordane = sum of measured isomers/metabolites, total PPAH = sum of priority pollutant PAHs. The individual constituents comprising each of these sums and the raw data are shown in the enclosed workbook (ReferenceEnvelope_Sc_Nv_Ex.xls). Amphipod survival data are expressed as a percentage of the control sample to facilitate comparisons among datasets. In addition, the survival data for the CP stations has been modified by the removal of outlier replicates as endorsed by the Regional Board.

Step 2. Confirm normal distribution of the chemistry data. The Bight'98 chemistry data for non-marina stations within San Diego Bay were analyzed using the Kolmogorov-Smirnov (K-S) test for normality. Separate tests were conducted for untransformed and natural log transformed data.

Step 3. Calculate one-tailed 95% prediction intervals for the Bight98, phase II, or BPTCP data. Three types of prediction intervals were calculated. The 95% one-tailed prediction interval was calculated without adjustment for multiple comparisons. A multiple comparison prediction interval was also calculated by adjusting the alpha level of the test for the number of expected comparisons to the 2001 reference sites. In most cases, this adjustment was accomplished by using an alpha of 0.004 (0.05/11) for the prediction interval calculation.

Finally, the tolerance limit was calculated for each parameter in order to resolve uncertainty regarding the appropriate adjustment of the prediction interval for multiple comparisons. Whereas the prediction interval gives us a concentration that the next sample (or next n samples) will not exceed (with a given level of confidence), the tolerance limit gives us a concentration that a specified fraction of the population will not exceed (with a given level of confidence). Because the number of candidate reference stations that may ultimately be compared to the screening level is indefinite, the tolerance limit is most appropriate to characterize the expected results of an indefinite number of future comparisons to the reference area population. Use of tolerance limits to screen data requires an explicit recognition that there is a specific expected error rate, which is analogous to the type I and II errors associated with other statistical tests. The parameters used here represent 95% coverage of reference area conditions (i.e. an alpha of 0.05), with 99% confidence. These parameters produce tolerance limits that are, in most cases, comparable to the multiple-comparison-corrected upper prediction limit. Calculations of the tolerance interval are based on: Natrella, M.G. 1963. Experimental Statistics. National Bureau of Standards Handbook 91. National Bureau of Standards., U.S. Department of Commerce, Washington, D.C.

All metals data were normalized to the percent fines before statistical analysis.

Step 4. Compare the prediction/tolerance intervals to the 2001 data. The number of exceedences for each of the identified parameters was tabulated for each station using each of the three types of intervals. Comparisons involving the shipyard phase II data set excluded station 2440 since this station has been identified in previous discussions as probably not representative of ambient reference conditions in San Diego Bay.

Steps 5 & 6. Use best professional judgment to evaluate the statistical comparison results and decide on the suitability of each 2001 reference site. Factors considered in the evaluation included: the number and type of intervals exceeded (e.g. unadjusted/adjusted prediction interval and tolerance interval) and the magnitude of the deviation in relation to ER-M/ER-L sediment guidelines or to the mean of the data. Separate evaluations were conducted for the chemistry, benthos, and toxicity data.

Results

Step 1. The compiled data is shown in the sheet named "total .5mdl" of the "ReferenceEnvelope.." workbook. Additional sheets showing each individual data sheet are also included.

Step 2. The results of the K-S normality test of the Bight'98 data are shown in Table 1. Analyses are shown only for metal constituents of concern. Analyses could not be conducted for PAHs, DDTs, Chlordane, or PCBs due to the presence of multiple nondetect values in the dataset. Nonnormality was indicated for arsenic and mercury. A retest of natural log transformed data resulted in a better fit to a normal distribution for As and Hg ($p>0.05$). Consequently all subsequent analyses were conducted with transformed data for these two metals. Data for tributyltin was also natural log transformed, based on prior studies by Exponent indicating that this constituent usually had a log normal distribution in environmental samples. No transformation was applied to any of the other chemical constituents because there was no conclusive indication from the Bight98 San Diego Bay dataset indicating nonnormality.

Table 1. Results of K-S normality test on Bight'98 data (marina stations excluded). Boxed cells indicate parameters where nonnormality is indicated in nontransformed data. Normality of organics data could not be evaluated due to the relatively high number of nondetect values.

	Non-transformed	Natural log transformed
Ag	>0.15	<0.0100
As	**0.0259**	**>0.15**
Cd	0.0811	<0.0100
Cr	>0.15	0.0373
Cu	>0.15	>0.15
Hg	**<0.0100**	**0.072**
Ni	>0.15	0.1045
Pb	>0.15	>0.15
Zn	0.0983	>0.15

Step 3. The data and resulting prediction interval calculations are shown (magenta highlight) in the sheet named "calcs as per 23 jan meeting" of the "ReferenceEnvelope..." workbook. The tolerance interval calculations are shown (yellow highlight) in the "data for calcs" sheet. A summary of the prediction/tolerance intervals and a tabulation of the number of exceedences for each station is shown in the sheet named "site comparisons". The total number of interval exceedences is summarized in Table 2.

Each of the stations, except for CP 2238, had at least one exceedence of the nonadjusted prediction interval. The number of exceedences declined for the adjusted PI and tolerance interval, indicating that some of these exceedences may be due to random variability in the data. Station 2440 for both the CP and SY datasets demonstrated the highest number of exceedences for each type of interval. Almost all of the interval exceedences were due to elevated chemistry. Benthic parameter intervals were only exceeded for reduced diversity at station 2231, which has

been identified previously as having an atypical fauna dominated by a crustacean species. Several stations exceeded the unadjusted PI for reduced amphipod survival (2231, CP 2433, and CP 2441), but no exceedences for toxicity using the adjusted PI or tolerance interval were present.

Table 2. Results of prediction and tolerance limit comparison for each 2001 reference site.

Study	Station	# over Unadjusted PI	# over Adjusted PI	# over Tolerance Interval	# total possible
CP	2231	8	3	2	17
CP	2243	8	3	1	17
CP	2433	5	1	1	17
CP	2440	10	9	8	17
CP	2441	3	1	1	17
CP	2238	0	0	0	17
SY I	2231	7	1	1	16
SY I	2243	2	0	0	16
SY I	2433	1	1	1	16
SY I	2440	6	5	4	16
SY I	2441	1	1	1	16

Steps 4 & 5. The consensus results of the evaluation of the data regarding inclusion of the reference sites in pool 2A are summarized in Table 3. The pool 2A recommendations agree with the pool 1A recommendations for 8 of 11 stations and no additional discussion of these stations is therefore needed. Discussion of the three stations showing different recommendations is provided below.

CP 2231: The pool 2A recommendation is to include this station in the dataset. The benthos community at this station is atypical of other reference areas and those data should be excluded from a general reference data pool. However, the chemistry and toxicity data are consistent with other reference areas and these data should be retained because this station has high temporal and method comparability with the CP study sites. Examination of the number of unadjusted and adjusted PI exceedences shows that the concentrations of Cd, Cr, Ni, and DDT are relatively small; equal to or less than the adjusted PI. Thus, these exceedences are likely due to low variability in the data and the application of multiple statistical comparisons, not the presence of site-specific contamination. Similarly, the reduced amphipod survival reported for this station (76% of control) is a marginal decrease that is within the test-to-test variability observed in other studies. The concentration of PPAH at CP 2231 is substantially elevated relative to the comparison dataset. However, the PPAH concentration is well below the ERL, indicating a low potential for toxicity, and within a factor of 2 of the concentration reported for SY 2231. It is concluded that the CP 2231 PPAH is a marginal exceedence that may be due to analytical lab variability and not of sufficient biological significance to outweigh the benefits of including the data.

CP 2441: The pool 2A recommendation is to include this station in the dataset. This station shows exceedences of the unadjusted PI for Cd, PPAH, and toxicity. The Cd and toxicity deviations are small and likely due to statistical artifacts (low data variability and multiple comparisons) since they do not exceed the adjusted PI. The PPAH concentration of 2143 ug/kg is above the tolerance interval and is considered a substantial elevation relative to the dataset. However, this station contains a relatively high TOC content that is likely to account for the elevated concentration. Figure 1 shows the relationship of PPAH concentration to TOC. A general direct relationship is evident and station CP 2441 lies close to the apparent regression line, while the points for the clearly contaminated stations CP 2440 and SY 2440 lie much further from the regression line. This plot shows that variation in TOC is a likely contributing factor to the PPAH data variation. A similar trend is also present for grain size, as shown in the plot in the enclosed workbook named "RefPAHAnalysis.xls". Normalization of the data to TOC (Figure 2) or percent fines shows that the PPAH concentration is similar to that of other stations with acceptable nonnormalized PPAH concentrations (e.g., 2433). An analysis of the pattern (i.e., fingerprint) of PAH compounds also indicates that CP 2441 is similar to other acceptable reference sites. The relative (%) concentration of each parent PAH to the total PPAH is shown in Figure 3. Station CP 2441 has a relative PAH concentration that is similar to the values for the three stations with the lowest total PPAH concentrations (2243, 2433, 2238) for 16 of 20 analytes, whereas CP 2440 is similar for only 9 analytes. This figure demonstrates that the source of PAH at CP 2441 is similar to that of other less contaminated stations, indicating that this station reflects ambient PAH exposure, not a site-specific source.

SY 2231: This station shows an atypical benthos community and those specific data should not be included in a general reference pool. Exceedences of the unadjusted PI were also present for As, Pb, PPAH, PCB, toxicity, and TBT, but these parameters did not exceed the adjusted PI, which indicates that statistical artifacts were likely responsible. The chemistry and toxicity data for this station should be included in the general data pool because the benefit of including data with high comparability to the CP and SY studies is greater than the negative impact of including a site with marginal elevated contaminants. This station also includes a relatively high TOC and fines content, which makes it valuable for data interpretation.

Table 3. Station inclusion recommendations for reference pool 2A based on Table 2 results and best professional judgment. Pool 1A inclusion based on results of Jan 23rd meeting as modified by the Regional Board. Areas of difference between pool 1A and 2A designations are highlighted within boxes.

Study	StationID	%FINES	%TOC	Chemistry	Toxicity	Benthos	Overall	Pool 1A Inclusion
CP	2231	41.24	1	yes	yes	N/A	*yes	no
CP	2243	30.25	0.56	yes	yes	yes	yes	yes
CP	2433	38.44	0.53	yes	yes	yes	yes	yes
CP	2440	26.4	1.04	no	yes	yes	no	no
CP	2441	82.83	1.82	yes	yes	yes	yes	no
CP	2238	69	1.01	yes	yes	yes	yes	yes
SY I	2231	45	1.3	yes	yes	N/A	*yes	no
SY I	2243	28	0.51	yes	yes	yes	yes	yes
SY I	2433	41	0.67	yes	yes	yes	yes	yes
SY I	2440	32	1.62	no	yes	yes	no	no
SY I	2441	41	1.1	yes	yes	yes	yes	yes

* Not suitable for overall benthos evaluation in this study.

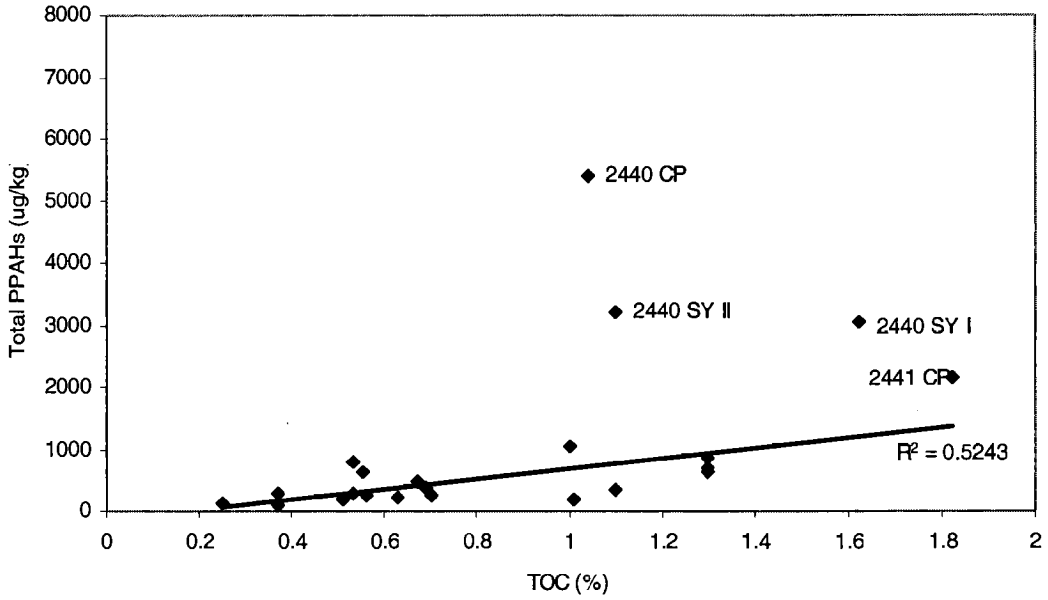

Figure 1. Relationship of total PPAHs to TOC for 2001/2002 reference sites.

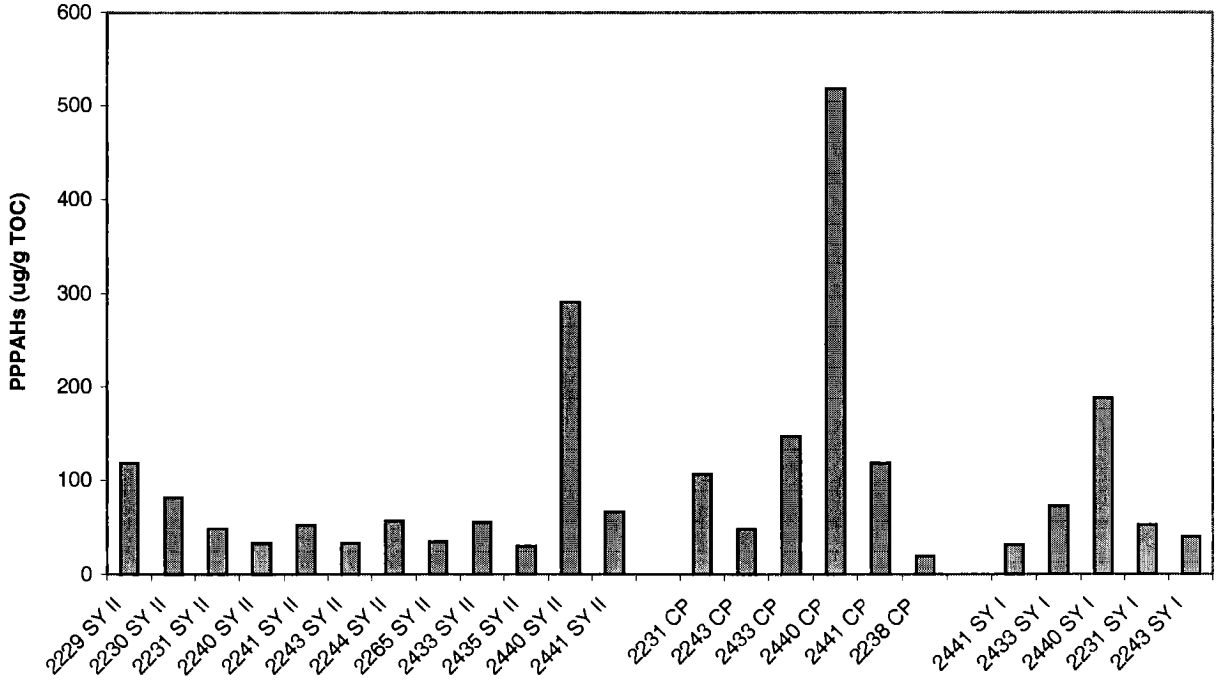

Figure 2. TOC-normalized total PPAHs for the 2001/2002 reference sites.

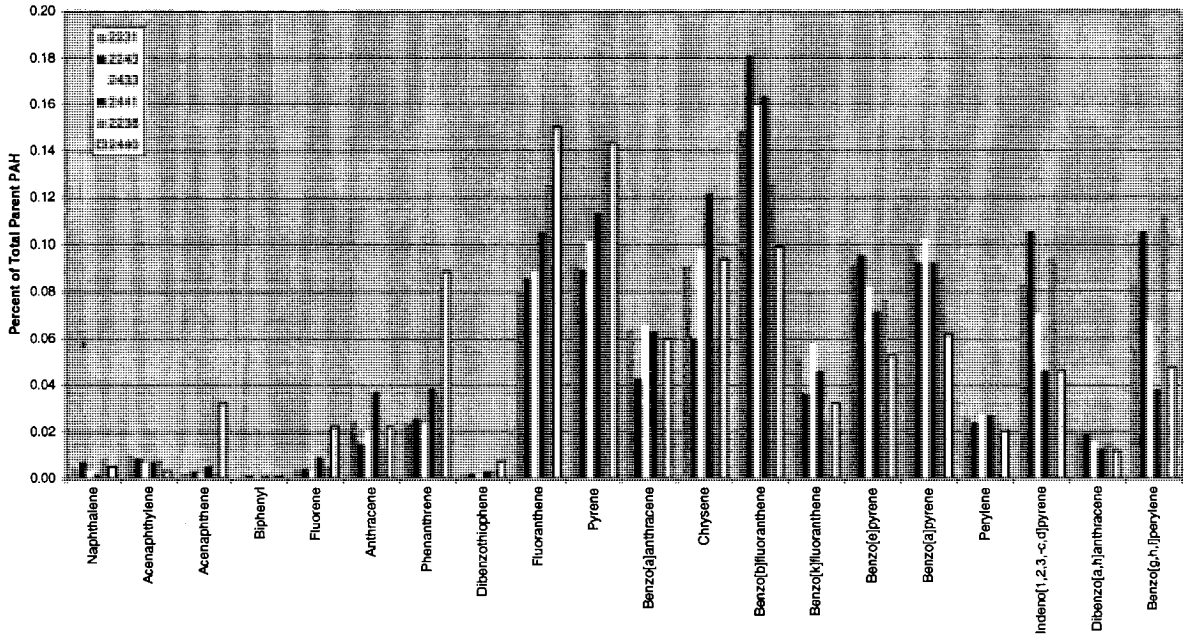

Figure 3. Relative composition of parent PAH compounds at the Chollas/Paleta reference sites.

Summary of Reference Data Pools

Methods

Calculations of the unadjusted/adjusted 95% PI and tolerance intervals were conducted using the same methods as for the evaluation of reference pool 2A (described previously). The adjusted PI calculations assumed that 31 station comparisons would be carried out, which is equivalent to the maximum number of stations at either the shipyard or Chollas/Paleta study sites. All calculations for As, Hg, and TBT were conducted using ln transformed data, but the results have been converted to the untransformed state for presentation in the tables. The calculations for pools 2A and 2B incorporate the recommendations for station inclusion described above. The workbook named "ReferenceEnvelope..." shows contains the calculations for all of the statistics.

Results

The descriptive statistics and prediction/tolerance intervals for each of the 4 reference pools is summarized in Table 4. Bar plots of the intervals for most of the parameters are contained in the sheet named "envelope summary" in the workbook "ReferenceEnvelope...".

Table 4. Descriptive statistics for the various reference data pools. Tolerance values could not be determined for some parameters in pools 1A or 2A due to a sample size less than 4.

Envelope		Ag norm	*As norm	Cd norm	Cr norm	Cu norm	*Hg norm	Ni norm	Pb norm	Zn norm	*TBT
1A	N	6	6	6	6	6	6	6	6	6	3
1B	N	28	28	28	28	28	28	28	28	28	3
2A	N	9	9	9	9	9	9	9	9	9	4
2B	N	31	31	31	31	31	31	31	31	31	4
1A	Mean	1.2	13.9	0.5	87.1	126.3	0.6	24.8	59.5	295.6	3.2
1B	Mean	1.4	13.8	0.3	78.6	147.8	0.6	23.4	62.8	293.5	3.2
2A	Mean	1.0	14.4	0.4	87.0	134.1	0.6	24.4	64.4	280.6	4.7
2B	Mean	1.3	14.0	0.3	79.4	148.0	0.6	23.4	63.9	289.4	4.7
1A	SD	0.7	1.2	0.2	30.2	40.5	1.5	5.8	25.6	78.2	1.2
1B	SD	0.9	1.3	0.2	27.4	55.1	1.5	5.7	27.0	86.1	1.2
2A	SD	0.6	1.3	0.2	26.8	41.7	1.6	4.9	28.3	74.8	2.2
2B	SD	0.8	1.3	0.2	26.9	53.8	1.6	5.5	27.5	84.7	2.2
1A	95% PI Uncorr.	2.7	22.0	1.0	152.9	214.4	1.6	37.4	115.1	465.7	5.8
1B	95% PI Uncorr.	2.8	22.1	0.7	126.2	243.4	1.3	33.3	109.6	442.7	5.8
2A	95% PI Uncorr.	2.2	23.0	0.9	139.5	215.8	1.6	34.1	119.9	427.3	37.5
2B	95% PI Uncorr.	2.7	22.3	0.6	125.7	240.7	1.3	32.9	111.4	435.4	37.5
1A	95% PI Corr.	5.1	46.4	1.8	259.7	357.6	7.3	57.8	205.4	742.1	121.9
1B	95% PI Corr.	4.2	33.5	0.9	168.8	329.2	2.6	42.2	151.6	576.7	121.9
2A	95% PI Corr.	3.7	40.9	1.5	204.1	316.4	5.0	46.1	188.0	607.6	10054.7
2B	95% PI Corr.	4.0	33.8	0.9	166.8	322.9	2.6	41.3	153.5	564.9	10054.7
1A	Tolerance limit	5.6	55.6	2.0	285.7	392.5	10.6	62.8	227.4	809.4	
1B	Tolerance limit	3.6	27.6	0.8	149.1	289.5	1.9	38.0	132.2	514.7	
2A	Tolerance limit	3.7	39.4	1.5	200.0	310.0	4.6	45.3	183.7	596.2	1.2E12
2B	Tolerance limit	3.4	27.6	0.8	146.7	282.7	1.9	37.2	132.9	501.6	1.2E12

Table 4. Continued.

Envelope		PPPAHs	PCBs	Chlordane	DDT	Abundance	# Taxa	S-W Diversity	Survival
1A	N	6	6	3	3	6	6	6	6
1B	N	6	6	3	3	28	28	28	28
2A	N	9	9	5	5	9	9	9	9
2B	N	9	9	5	5	31	31	31	31
1A	Mean	379.7	18.8	0.3	1.6	577.8	65.5	2.6	90.2
1B	Mean	379.7	18.8	0.3	1.6	820.4	47.7	2.5	91.5
2A	Mean		29.6	0.5	3.9	563.3	65.6	2.6	87.1
2B	Mean	685.7	29.6	0.5	3.9	808.5	48.3	2.5	90.4
1A	SD	223.0	6.5	0.2	0.4	226.1	27.9	0.2	5.1
1B	SD	223.0	6.5	0.2	0.4	473.8	18.5	0.4	8.7
2A	SD	620.3	20.5	0.3	4.0	209.9	25.5	0.2	6.6
2B	SD	620.3	20.5	0.3	4.0	469.6	18.5	0.4	9.0
1A	95% PI Uncorr.	865.1	33.0	1.1	3.0	85.7	4.8	2.2	79.2
1B	95% PI Uncorr.	865.1	33.0	1.1	3.0	-0.8	15.6	1.9	76.3
2A	95% PI Uncorr.	1901.5	69.7	1.3	13.2	151.7	15.7	2.2	74.2
2B	95% PI Uncorr.	1901.5	69.7	1.3	13.2	-1.3	16.5	1.9	75.0
1A	95% PI Corr.	1653.3	56.0	4.7	10.0	-713.4	-93.8	1.5	61.2
1B	95% PI Corr.	1653.3	56.0	4.7	10.0	-738.2	-13.1	1.2	62.7
2A	95% PI Corr.	3396.5	119.0	2.9	31.5	-354.3	-45.7	1.7	58.3
2B	95% PI Corr.	3396.5	119.0	2.9	31.5	-719.0	-11.8	1.3	61.3
1A	Tolerance limit	1845.3	61.6			-908.0	-117.8	1.4	56.8
1B	Tolerance limit	1845.3	61.6			-397.0	0.2	1.5	69.0
2A	Tolerance limit	3301.4	115.9	3.8	42.4	-322.1	-41.8	1.8	59.3
2B	Tolerance limit	3301.4	115.9	3.8	42.4	-368.1	2.0	1.6	68.0

APPENDIX 5
OF ATTACHMENT C

Regional Board Screening Criteria Used to Evaluate Reference Pool #2b

California Regional Water Quality Control Board

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FINAL SCREENING CRITERIA USED TO EVALUATE REFERENCE POOL #2b

The Regional Board's decision on a reference pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel sediment investigations was provided to all stakeholders on June 9, 2003 (RWQCB, 2003a). The final reference pool, as shown below, is based on a modified version of Reference Pool #2b as proposed by SCCWRP, the Navy, and Exponent (Bay et. al., 2003). In other words, the Regional Board used Reference Pool #2b as a baseline pool and evaluated the stations in Reference Pool #2b to determine the final pool.

Table 1. Station Comparison Between Pool #2b and Regional Board Final Reference Pool.

Reference Pool #2b		Regional Board Final Reference Pool (modified Reference Pool #2b)	
CP	2231	CP	~~2231~~
	2243		~~2243~~
	2433		2433
	2441		~~2441~~
	2238		2238*
SY	2231	SY	~~2231~~
	2243		2243*
	2433		2433
	2441		2441
Bight'98	2231	Bight'98	2231
	2233		2233
	2235		~~2235~~
	2238		2238
	2240		2240
	2241		2241
	2242		2242
	2243		2243
	2244		2244
	2245		~~2245~~
	2247		2247
	2249		~~2249~~
	2252		2252

	2256		2256
	2257		2257
	2258		~~2258~~
	2260		~~2260~~
	2265		2265
	2433		2433
	2435		2435
	2436		2436
	2440		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 will not be used in the final reference pool.

Reference Pool #2b was primarily developed based on the comments and decisions made by the stakeholders present at the January 22-23 technical meeting held at the Regional Board (details provided in Attachment C - Regional Board response to Comment #3 - Status of Tasks (May 5, 2003 Letter)). These comments and decisions were documented and subsequently used to guide SCCWRP, the Navy, and Exponent in developing Reference Pool #2b (RWQCB, 2003b).

The Regional Board's modifications to Reference Pool #2b and rationale for selecting stations in the final reference pool was based on weight of evidence using the triad approach and best professional judgement. The triad of data (sediment chemistry, amphipod toxicity, and benthic community) analyzed at each of the proposed reference stations included in Reference Pool #2b were evaluated and a decision was made whether to accept or reject the proposed station. The screening criteria used by the Regional Board is provided below.

Sediment Chemistry

- ***Effects Range Median (ERM).*** The ERM is the median of the total number of data points identified with adverse biological effects as developed from a national database compiled by NOAA. These data points are associated with chemical data and are ordered via increasing concentrations. The database contains matched sediment chemistry and biological effects information generated from a variety of sediment quality approaches. According to NOAA, ERM values are considered better indicators of concentrations associated with biological effects than the Effects Range Low (ERL) (NOAA, 1999). However, there is no assurance that sediments in which ERM values are exceeded will be toxic.

- ***Sediment Quality Guideline Quotient (SQGQ1).*** Mean SQGQs were developed by Russell Fairey et. al. (2001) to represent the presence of chemical mixtures in sediment. The SQGQs are calculated by normalizing a specific group of chemicals to their respective numerical

sediment quality guidelines. The mean SQGQ that was most predictive of acute toxicity to amphipods was the SQGQ1 combination consisting of the following chemical mixtures: cadmium, copper, lead, silver, zinc, total chlordane, dieldrin, total PCBs, and total PAHs. It should be noted that the SQGQ1 is a updated version of the mean ERM-quotient (ERMQ) used in the Bay Protection and Toxic Cleanup Programs (BPTCP). An SQGQ1 threshold value of 0.50 was selected so that its corresponding amphipod survival rate (76%) would match up with the amphipod survival rate (75% for *Eohaustorius estuarius*) determined by the 90th Percentile Minimum Significant Difference (MSD) approach (discussed below).

- ***Consensus Sediment Quality Guidelines for PAHs.*** The consensus guidelines for PAHs were developed by Richard Swartz of USEPA (1999). These guidelines provide an integration of existing PAH SQGs, reflect casual rather than correlative effects, account for chemical mixtures, and predict sediment toxicity and benthic community effects at sites with PAH contamination. Consensus guidelines for PAHs consist of the Threshold Effects Concentrations (TEC), Median Effects Concentrations (MEC), and Extreme effects concentrations (EEC):

  - TEC = 290 milligrams per kilogram Organic Carbon normalized (mg/kg OC). PAH mixtures below the TEC indicate adverse effects on benthic communities are unlikely.
  - MEC = 1,800 mg/kg OC. The greatest uncertainty is between the TEC and the EEC. As such, it is recommended that the MEC should not be used to distinguish acceptable from unacceptable conditions.
  - EEC = 10,000 mg/kg OC. PAH mixtures above the EEC indicate adverse effects on benthic communities are likely.

- ***Consensus-Based Sediment Effect Concentrations (SECs) for PCBs.*** The consensus-based SECs were developed by Donald MacDonald et. al. (2000) to provide an integration and reconciliation of existing PCB SQGs. The SECs have been demonstrated to accurately predict both the presence and absence of toxicity in field-collected sediments. Consensus-based SECs for PCBs consist of the Threshold Effect Concentration (TEC), Midrange Effect Concentration (MEC), and the Extreme Effect Concentration (EEC):

  - TEC = 0.04 mg/kg. The TEC is used to identify sediments that are unlikely to adversely affect sediment-dwelling organisms due to PCBs; below which adverse effects are unlikely to occur.
  - MEC = 0.40 mg/kg. The MEC is used to identify sediments that are likely to adversely affect sediment-dwelling organisms due to PCBs; above which adverse effects frequently occur.
  - EEC = The EEC is used to identify sediments that are highly likely to adversely affect sediment-dwelling organisms due to PCBs; above which adverse effects usually or always occur.

Amphipod Toxicity

- ***90th Percentile Minimum Significant Difference (MSD).*** MSD threshold values were calculated from the BPTCP database by Phillips et. al. (2001) to determine a critical threshold for statistically significant sample toxicity. These MSD values were calculated similar to the method used by Thursby et. al. (1997) to calculate the most common amphipod threshold used in sediment investigations (80% of control). Samples are defined as toxic if the following two criteria are met: (1) There is a significant difference ($p < 0.05$) in mean organism response between a sample and the negative laboratory control, as determined using a separate-variance t-test, and (2) The difference in organism response between the sample and control was greater than the protocol-specific 90th-percentile MSD value. The MSD threshold for the amphipod *Eohaustorius estuarius* (test species used in the NASSCO, Southwest Marine, Chollas Creek, and 7th Street Channel sediment investigations) is 75% of the control (Table 1 of Phillips et. al. 2001).

Benthic Community

- ***Benthic Response Index for Embayments (BRI-E).*** The BRI and BRI-E was developed by Ana Ranasinghe et. al. (2003) as screening tools that discriminate disturbed from undisturbed benthic communities. The BRI and BRI-E specifically assess Southern California coastal and embayment environments, respectively. These indices remove much of the subjectivity associated with interpreting benthic community data and also provide a means of communicating complex information to managers. The following thresholds were developed for the BRI-E:

Table 5. Threshold Values Established for the Benthic Response Index – Embayments (BRI-E).

Threshold	Index Value	
Reference	< 31	Reference threshold defined as a value toward the upper end of the range of index values for sites that had minimal known anthropogenic influence.
Response Level 1	31 to 42	> 5% of reference species lost
Response Level 2	42 to 53	> 25% of reference species lost
Response Level 3	53 to 73	> 50% of reference species lost
Response Level 4	> 73	> 80% of reference species lost

The Regional Board accepted stations in the final reference pool based on the triad of data (sediment chemistry, amphipod toxicity, and benthic community structure) and best professional judgement, as mentioned above. In evaluating the benthic community, we accepted stations that had BRI scores in the Reference threshold (< 31) and Response Level 1 (31 to 42) classifications. The Regional Board extended the BRI-E cutoff score into Response Level 1 because:

- Benthic species respond to natural and anthropogenic disturbances similarly as recognized by those that developed the BRI-E (Ranasinghe et. al., 2003). Thus, for stations with BRI scores within Response Level 1 it cannot be determined if benthic community variations are due to natural factors (e.g., seasonal effects), pollution, or physical disturbances (e.g., propeller wash and dredging).
- The difference between the stations with a benthic community classified as meeting the Reference threshold versus those with Response level 1 is very slight and cannot be attributed to pollution (RWQCB, 2003c).
- Accepting stations with Response Level 1 allows the Regional Board to account for natural variability in the bay with respect to benthic community changes.

Of the 22 reference stations in the final pool, 10 stations have BRI-scores in the Reference threshold classification (< 31) and 10 stations have BRI-E scores in Response Level 1 (31 to 42). The remaining two stations (CP 2238 and SY 2243) in the final pool have BRI-scores greater than Response Level 1 (60.3 and 45.1, respectively). These two stations were accepted into the final pool based on their respective sediment chemistry and amphipod toxicity results (for details see Appendix 5 of Attachment C). The weight-of-evidence suggests that the high BRI-scores for CP 2238 and SY 2243 may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. As such, the Regional Board instructed NASSCO and Southwest Marine to not use the benthic community data including the BRI scores for CP 2238 and SY 2243 in the final reference pool.

In summary, all of the stations in the Regional Board's final reference pool meet the screening criteria used to evaluate sediment chemistry, amphipod toxicity, and benthic community structure. The weight-of-evidence, therefore, concludes that each station included in the Regional Board's final reference pool is not impacted by sediment contamination (relatively low sediment chemistry, lack of acute toxicity, and a healthy benthic community) and is supportive of aquatic life beneficial uses.

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APPENDIX 6
OF ATTACHMENT C

Regional Board Final Position on a Reference Pool for the NASSCO, Southwest Marine, Mouth of Chollas Creek, and 7th Street Channel Sediment Investigations

California Regional Water Quality Control Board

San Diego Region

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Dear Messrs. Chee, Halvax, Chadwick, and Bay:

REGIONAL BOARD FINAL POSITION ON A REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

The Regional Board's final decision on a reference pool is provided below and should be used to determine statistically significant differences between site sediment quality conditions (at NASSCO, Southwest Marine, mouth of Chollas Creek, and 7th Street Channel) and reference sediment quality conditions. The final pool is based on a modified version of Reference Pool #2b.

We considered all stakeholder input received during the technical meetings held on December 12, 2002 and January 22-23, 2003, and have also considered all additional stakeholder input provided via written comments and conference calls subsequent to the technical meetings. The

following descriptive statistics should be calculated on the final reference pool lines-of-evidence (sediment chemistry, toxicity, and benthic community structure):

General

- Calculate one-tailed 95% prediction limits (PL) on each line-of-evidence.
- Each reference pool line-of-evidence should be tested for normality and be transformed accordingly prior to calculating the 95% PL.

Sediment Chemistry

- Calculate upper 95% PL for organic and inorganic chemicals of concern (COCs).
- Use un-normalized data for organics.
- Perform two separate site-versus-reference evaluations using non-normalized data and normalized data for metals. The metals data should be normalized to percent fines and the upper 95% PL should be determined by graphing the metals concentrations against percent fines and then calculating an upper PL on the slope of the metals-to-fines regression line. The coefficients of determination (R-squared values) and p-values should be determined for each regression line and the strength and significance of each correlation should be assessed to determine the applicability of the metals-to-fines normalization. Recommendations concerning the applicability of normalization for each metal should be made based on the results.

Toxicity

- Calculate lower 95% PL for the amphipod survival test.
- Calculate lower 95% PL for the fertilization test.
- Calculate lower 95% PL for the development test.

Benthic Community Structure

- Calculate upper 95% PL using the Benthic Response Index (BRI) scores.
- Other benthic metrics may be considered in addition to the BRI to evaluate the health of the benthic community.

FINAL REFERENCE POOL FOR THE NASSCO, SOUTHWEST MARINE, MOUTH OF CHOLLAS CREEK, AND 7TH STREET CHANNEL SEDIMENT INVESTIGATIONS

2001 Chollas/Paleta Reference Station Data	2001 Shipyard Reference Station Data	1998 Bight'98 Station Data
2433	2441	2231
2238*	2433	2233
	2243*	2238
		2240
		2241
		2242
		2243
		2244
		2247
		2252
		2256
		2257
		2265
		2433
		2435
		2436
		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 should not be used in this final reference pool.

If you have any questions, or require additional information, please contact either Mr. Tom Alo of my staff at (858) 636-3154 or Mr. Craig Carlisle of my staff at (858) 637-7119.

Sincerely,

[Original Signed]

David Barker, P.E.
Supervising Water Resource Control Engineer

DTB:clc:tca

cc: Dreas Nielsen, Exponent
Tom Ginn, Exponent
Chuck Katz, SPAWAR Systems Center San Diego
Michael Martin, Department of Fish and Game
Denise Klimas, National Oceanic and Atmospheric Administration
Scott Sobiech, U.S. Fish and Wildlife
Donald MacDonald, National Oceanic and Atmospheric Administration
Michael Anderson, Department of Toxic Substances Control
Laura Hunter, Environmental Health Coalition
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Jim Peugh, San Diego Audubon Society
Bruce Reznik, San Diego Baykeeper
Elaine Carlin, Representative for San Diego Bay Council
Brian Anderson, UC Davis - Marine Pollution Studies Laboratory
Russell Fairey, Moss Landing Marine Laboratories

NASSCO File No.: 03-0066.05
Southwest Marine File No.: 03-0137.05

Table 1
Station Comparison Between Pool 2b and Final Reference Pool

Pool 2b		Regional Board Final Reference Pool (modified Pool 2b)	
CP	2231	CP	~~2231~~
	2243		~~2243~~
	2433		2433
	2441		~~2441~~
	2238		2238*
SY	2231	SY	~~2231~~
	2243		2243*
	2433		2433
	2441		2441
Bight'98	2231	Bight'98	2231
	2233		2233
	2235		~~2235~~
	2238		2238
	2240		2240
	2241		2241
	2242		2242
	2243		2243
	2244		2244
	2245		~~2245~~
	2247		2247
	2249		~~2249~~
	2252		2252
	2256		2256
	2257		2257
	2258		~~2258~~
	2260		~~2260~~
	2265		2265
	2433		2433
	2435		2435
	2436		2436
	2440		2440

* The benthic community data including the BRI scores for CP Station 2238 and SY Station 2243 will not be used in the final reference pool.

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2231	Out	Rationale: Remove CP 2231 based on 38% amphipod survival rate and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated PAH concentrations in sediment (1,063 ppb, TOC = 1.0%), however, uptake of PAHs in Macoma tissue is within reference station range (see Figure 1). Amphipod Toxicity[2]: Control-adjusted survival rate = 38% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 39.45 (Response Level 1 - Greater than 5% of reference species lost).
CP	2243	Out	Rationale: Remove CP 2243 based on 55% amphipod survival rate and BRI score of 55.05. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity[2]: Control-adjusted survival rate = 55% Benthic Community: BRI score = 55.05 (Response Level 3 - Greater than 50% of reference species lost).
CP	2433	In	Rationale: Retain CP 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 22.85 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2238	In	Rationale: Retain CP 2238 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 60.29 (Response Level 3 - Greater than 50% of reference species lost).
CP	2441	Out	Rationale: Remove CP 2441 based on elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (2,143 ppb, TOC = 1.82%) and in Macoma tissue (see Figure 1). Amphipod Toxicity: Control-adjusted survival rate = 78% Benthic Community: BRI score = 30.04 (Reference Level).

Table 2
Summary Evaluations on 2001 Chollas/Paleta Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
CP	2440	Out	Rationale: Remove CP 2440 based on elevated PCBs in sediment and elevated PAHs in sediment and tissue. Sediment Chemistry: Elevated PAH concentrations in sediment (5,387 ppb, TOC = 1.04%) and in Macoma tissue (see Figure 1). Elevated PCB concentrations in sediment (283 ppb). Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 30.38 (Reference Level).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) Amphipod survival rates for CP 2231 and CP 2243 were previously adjusted based on SCCWRP's "mussel hypothesis" to remove amphipod toxicity replicate sample outliers. CP 2231 was adjusted from 38% to 84% survival and CP 2243 was adjusted from 55% to 83% survival. However, given the atypical benthic community in CP 2231, the relatively high BRI score for CP 2243, and uncertainties associated with the mussel hypothesis, the Regional Board decided to not apply the mussel hypothesis to adjust the amphipod toxicity results for these stations (and other Chollas site stations where the hypothesis was applied).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2231	Out	Rationale: Remove SY 2231 based on elevated PCBs in sediment and atypical benthos. It should be noted that less weight was given to the BRI score because K. Crassus was not factored into the score (p-value unavailable for K. Crassus). Sediment Chemistry: Elevated total PCB concentration in sediment (77 ppb) as compared to the other reference stations included in the pool. Amphipod Toxicity: Control-adjusted survival rate = 84% Benthic Community: Atypical benthos due to high abundance of K. Crassus, BRI score = 31 (Reference Level).
SY	2243	In	Rationale: Retain SY 2243 based on sediment chemistry and amphipod toxicity results (exclude benthos data only). Weight-of-evidence suggests that high BRI score may likely be caused by factors other than pollution (e.g., physical disturbance) and may not be representative of the natural variability in the bay. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 45.1 (Response Level 2 - Greater than 25% of reference species lost).
SY	2433	In	Rationale: Retain SY 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 16.8 (Reference Level).

Table 3
Summary Evaluations on 2001 Shipyard Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
SY	2441	In	Rationale: Retain SY 2441 based on triad results. Sediment Chemistry: Relatively low sediment chemistry. Amphipod Toxicity: Control-adjusted survival rate = 95% Benthic Community: BRI score = 19.9 (Reference Level).
SY	2440	Out	Rationale: Remove SY 2440 based on elevated lead, PAHs, and PCBs in sediment. Sediment Chemistry: Elevated lead (77 ppm), PAH (3,048 ppb), and PCB (117 ppb) concentrations in sediment. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 32.2 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2231	In	Rationale: Retain B'98 2231 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 94% Benthic Community: BRI score = 16 (Reference Level).
Bight'98	2233	In	Rationale: Retain B'98 2233 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2235	Out	Rationale: Remove B'98 2235 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 99% Benthic Community: BRI score = 42.1 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2238	In	Rationale: Retain B'98 2238 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 87% Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2240	In	Rationale: Retain B'98 2240 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 89% Benthic Community: BRI score = 29 (Reference Level).
Bight'98	2241	In	Rationale: Retain B'98 2241 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 98% Benthic Community: BRI score = 35 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2242	In	Rationale: Retain B'98 2242 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 37 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2243	In	Rationale: Retain B'98 2243 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 96% Benthic Community: BRI score = 36 (Response Level 1 - Greater than 5% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2244	In	Rationale: Retain B'98 2244 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 31.2 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2245	Out	Rationale: Remove B'98 2245 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity[2]: Control-adjusted survival rate = 82%. Benthic Community: BRI score = 42.6 (Response Level 2 - Greater than 25% of reference species lost).
Bight'98	2247	In	Rationale: Retain B'98 2247 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 90% Benthic Community: BRI score = 34 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2249	Out	Rationale: Remove B'98 2249 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 76% Benthic Community: BRI score = 45 (Response Level 2 - Greater than 25% of reference species lost).

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Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2252	In	Rationale: Retain B'98 2252 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 104% Benthic Community: BRI score = 4.3 (Reference Level).
Bight'98	2256	In	Rationale: Retain B'98 2256 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2257	In	Rationale: Retain B'98 2257 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 91% Benthic Community: BRI score = 38 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2258	Out	Rationale: Remove B'98 2258 based on BRI score. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 92% Benthic Community: BRI score = 43 (Response Level 2 - Greater than 25% of reference species lost).

Table 4
Summary Evaluations on 22 Bight'98 Reference Stations

Study	Station	Final Decision[1]	Regional Board Evaluation
Bight'98	2260	Out	Rationale: Remove B'98 2260 based on amphipod toxicity results. The 90th percentile minimum significant difference (MSD) approach was applied and the amphipod survival data met two criteria for being defined as toxic: (1) there was a significant difference ($p < 0.05$) in mean organism response between a sample and the negative control survival, as determined using a separate-variance t test, and (2) the difference in organism response between the sample and control was greater than the protocol-specific 90th percentile MSD value. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 73%. Benthic Community: BRI score = 39 (Response Level 1 - Greater than 5% of reference species lost).
Bight'98	2265	In	Rationale: Retain B'98 2265 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 85% Benthic Community: BRI score = 27 (Reference Level).
Bight'98	2433	In	Rationale: Retain B'98 2433 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 97% Benthic Community: BRI score = 21 (Reference Level).

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Summary Evaluations on 22 Bight'98 Reference Stations

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Bight'98	2435	In	Rationale: Retain B'98 2435 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 102% Benthic Community: BRI score = -1.1 (Reference Level).
Bight'98	2436	In	Rationale: Retain B'98 2436 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 100% Benthic Community: BRI score = 19 (Reference Level).
Bight'98	2440	In	Rationale: Retain B'98 2440 based on triad results. Sediment Chemistry: Relatively low sediment chemistry based on SCCWRP's distance-from-shore approach. Amphipod Toxicity: Control-adjusted survival rate = 103% Benthic Community: BRI score = 32 (Response Level 1 - Greater than 5% of reference species lost).

(1) The final decisions are based on weight of evidence using the triad approach and best professional judgement.

(2) The Regional Board adjusted the amphipod survival rate for B'98 2245 from 66% to 82%. The adjustment was made based on the results of the 5 replicate samples. Four of the replicate samples had relatively similar survival rates of 90%, 80%, 80%, and 75%, respectively, and one replicate had an anomolous survival rate of 0%. The 0% survival rate replicate was removed and the amphipod survival rate for B'98 2245 was adjusted accordingly.

Oct 14 - 10am

AGENDA

Conference Call on Statistical Issues with Reference Pool Comparisons
October 14, 2003 (10:00 – 12:00)

1. Introductions (All)

2. Purpose for Statistics: Compare Reference Pool to Individual Site Stations (T. Alo)

3. Main Issues

   - Proposed Statistics (T. Alo):

     1. Upper prediction Limit (UPL)
     2. Upper Tolerance Level (UTL)
     3. Upper Confidence Level (UCL) on Mean

   - Dataset Requirements for Parametric Calculations (D. Klimas)

   - Uncertainties with Log-transformation (D. Klimas)

   - Standard Deviations (D. Klimas)

4. Closing (All)

Laura Hunter

From: Tom Alo [alot@rb9.swrcb.ca.gov]
Sent: Thursday, October 09, 2003 2:27 PM
To: kerryr@sccwrp.org; nhwlab@wald.ucdavis.edu
Cc: elainecarlin@att.net; emkimura@earthlink.net; Laura Hunter; Denise.Klimas@noaa.gov; Donald.Macdonald@noaa.gov; MMARTIN@OSPR.DFG.CA.GOV; Katie_Zeeman@r1.fws.gov; Scott_Sobiech@r1.fws.gov; David Barker; Craig Carlisle; Alan Monji; Brennan Ott; Peter Peuron
Subject: Sediment Quality Data - Tuesday, October 14 Conference Call


Stat questions for Oct call


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B'98 SD Bay Data.xls


B98SDBData(1)_1.xls

Dr. Willits and Dr. Ritter,

Some of the participants in the upcoming conference call suggested that we send you our reference pool data (n=22), including the Bight'98 dataset (n=46) used to supplement our reference pool, to help you understand the distribution of the data and to help you respond to some of the questions/concerns that we have. It's understandable if you don't have the time to evaluate these data prior to the conference call ... short notice ... I'll take the blame! =) We may setup subsequent conference calls to further discuss the statistical issues and to give you an opportunity to "digest" the data if you feel that it's necessary.

The purpose of the conference call is to get feedback from you regarding the appropriate statistical procedure to compare a reference pool to individual site stations. The objective of the reference pool is to determine if there are statistically significant differences between site sediment quality conditions and reference sediment quality conditions with respect to sediment chemistry, toxicity, and benthic community structure. The results of the statistical comparisons will be used in a weight-of-evidence approach to determine whether site stations exhibit impacts to aquatic-life beneficial uses.

The statistical procedures proposed by various groups include the prediction limit, tolerance limit, and confidence limit on the mean. We recognize that the final determination of the appropriate stats procedure will be dependent on the dataset (e.g., distribution, randomness, etc.). Since we (Regional Board and others) have examined the data thoroughly for quite some time now and have made some statistical conclusions (e.g., regarding normality, applicability of parametric approaches, etc.) we will present them to you at the conference call ... get you up to speed. Attached are some of NOAA's conclusions on the data and main concerns, which will be presented and discussed at the conference call.

I will send you an agenda as soon as we finalize it (likely on Friday). If you have any questions, comments, or need additional information, please feel free to contact me.

Thank you very much for taking the time from your busy schedule to participate in this call.

--Tom

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From: Denise Klimas [Denise.Klimas@noaa.gov]
Sent: Wednesday, October 01, 2003 5:15 PM
To: Tom Alo
Cc: scott sobiech; Michael Martin; Craig Carlisle; Elaine Carlin; ed kimura; David Barker; pete peuron; Brennan Ott; Donald Macdonald; katie zeeman
Subject: Stat questions for Oct call

Tom,
I spoke with Don today to see if he had any questions for the statisticians. I am sure that he will be sitting in a pub somewhere in jolly ole England sipping a pint while we are conferencing!

Here are the main questions we have come up with:

1. Does Dr. Willits believe that the dataset meets the requirements to do parametric calculations (eg. normally distributed, random and independent, etc.)? We believe that the sub-sample used to determine the pool does not meet the randomly selected criterion. If the additional data were not collected on a random basis, how does this effect your interpretation? How is the non-random nature of the data being addressed within the context of this project? Is there anything that needs to change?

2. Since many of the constituents in the selected dataset do not appear to be normally distributed, it has been suggested that the data be log-transformed. Taking the mean of log-transformed data will result in a geometric mean for the constituent. Is it possible to take the anti-log to back calculate a concentration for the contaminant? If so, are there significant uncertainties arising from the log-transformation of the data? Conversely, does failure to log-transform the data introduce significant uncertainties in interpreting those data?

3. Two other reference pools submitted by other stakeholders have been evaluated by the RB staff. They concluded that the means for each of the constituents in the other pools were similar to the means in the pool selected by the RB; therefore, the pools are not different from each other. We did some calculations and found that the constituents in each of the pools have different standard deviations. The two parameters which describe a normal or a log-normal distribution are the mean and the variance. Is it true that if we compare only the means that we can be mislead? Can Dr. Willits comment on how different the SD needs to be before the pools are considered to be different even though the means are similar. What are the implications of that difference for evaluating the different pools that were submitted?

As an example, using the "raw" data, the mean for lead in the RB pool is 23.9 with a SD= 13.2; and the mean for lead in the NOAA pool is 22.7, but the SD=7.9.

Hopefully, these questions can be added to the agenda. I look forward to chatting with everyone.
Thanks, Tom.
d

Oct 14 - 10am

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Oct 14 - 10am

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Conference Call on Statistical Issues with Reference Pool Comparisons
October 14, 2003 (10:00 – 12:00)

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3. Main Issues

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     2. Upper Tolerance Level (UTL)
     3. Upper Confidence Level (UCL) on Mean

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   - Uncertainties with Log-transformation (D. Klimas)

   - Standard Deviations (D. Klimas)

4. Closing (All)

Laura Hunter

From: Tom Alo [alot@rb9.swrcb.ca.gov]
Sent: Thursday, October 09, 2003 2:27 PM
To: kerryr@sccwrp.org; nhwlab@wald.ucdavis.edu
Cc: elainecarlin@att.net; emkimura@earthlink.net; Laura Hunter; Denise.Klimas@noaa.gov; Donald.Macdonald@noaa.gov; MMARTIN@OSPR.DFG.CA.GOV; Katie_Zeeman@r1.fws.gov; Scott_Sobiech@r1.fws.gov; David Barker; Craig Carlisle; Alan Monji; Brennan Ott; Peter Peuron
Subject: Sediment Quality Data - Tuesday, October 14 Conference Call


Stat questions for Oct call


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California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego, California 92123
Phone (858) 467-2952 • FAX (858) 571-6972

Gray Davis
Governor

TO: Robert Brodberg
Senior Toxicologist
Office of Environmental Health Hazard Assessment

FROM: Tom Alo
Water Resource Control Engineer
San Diego Regional Water Quality Control Board

DATE: October 17, 2003

SUBJECT: OEHHA REVIEW OF NASSCO AND SOUTHWEST MARINE TECHNICAL REPORT – HUMAN HEALTH RISK ASSESSMENT

Enclosed is the technical report submitted by National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. (Southwest Marine). Please focus your review and written comments on the human health risk assessment located in Section 11 of the technical report. The deadline date that we set for accepting written comments from the public on the NASSCO and Southwest Marine technical report is December 5, 2003. If possible, we would like to receive your comments by this date.

If you have any questions or comments, please contact me at (858) 636-3154 or email me at alot@rb9.swrcb.ca.gov.

Enclosures: (1) State Water Resources Control Board – Work Transmittal Form
(2) NASSCO and Southwest Marine Detailed Sediment Investigation (Volumes I, II, and III)

Date SWRCB WTF Completed: _____

SWRCB WTF #: R9-03-04

OEHHA #: 880076-02

STATE WATER RESOURCES CONTROL BOARD (SWRCB)
WORK TRANSMITTAL FORM (WTF)

(CARRY-OVER SITE)

Requesting RWQCB: SAN DIEGO - R9 Date Rcvd in Div. of Financial Assistance (DFA): MAY 22, 2003

Site Project Manager: TOM ALO Phone: (858) 636-3154

Fax: (858) 571-6972 Email: glot@rb9.swrcb.ca.gov

Site Billing ID: 2090004 (NASSCO) 2090005 (SOUTH WEST) PCA #: 18091 Circle One: (SLIC) UST DOD

Site Name: NATIONAL STEEL AND SHIPBUILDING COMPANY & SOUTHWEST MARINE INC.

Documentation Submitted for Review: USE PREVIOUS DOCUMENTATION PROVIDED ON WTF R9-02-15 IN FY 02/03.

RWQCB Requested Completion Date: ON-CALL AS NEEDED Date WTF Submitted to OEHHA: 7/9/03

Estimate By OEHHA

Employee Classification:	Estimated Hours:	Estimated Cost:	Travel Per Diem:
Sr Tox (RB)	40	6,280	800
Sr Tox (JC)	4	628	
Office Tech	4	248	
AGPA	2	206	
		Total: $8,162	

Work is limited to the following document(s) received:

Provide on-call assistance to include but not limited to:
1.) Task 1 - Two site visits NASSCO and Southwest Marine Shipyard, San Diego; 2) Task 2 - Technical Review and Guidance; 3) Technical meetings and expert testimony.

Description of work to be performed:

Same as above.

Start Date: 7/10/2003 Estimated Completion Date: 6/30/2004

NOTE: Within 2-4 weeks of each WTF receipt, OEHHA is allowed to perform up to 10 hours initial review pending SWRCB/RWQCBs authorization. SWRCB shall reimburse OEHHA for said services with and/or without the SWRCB/RWQCBs final authorization. ('Blanket Approval', for up to 10 hours, was granted at the Regional Water Quality Control Board Roundtable meeting on July 9, 2002).

OEHHA agrees to perform only the work stated above. An amended WTF is required for additional hours and/or a completion date extension. An amendment is required on task(s) not expressly stated above, i.e., review/comment on supplemental documents, research, follow-up consultation, response to OEHHA comments, on-call assistance, participation in conference calls, and meeting attendance. SWRCB is under no obligation to pay for additional costs incurred by OEHHA if an amendment is not submitted and approved prior to the original estimates being overrun on this request.

OEHHA Project Analyst: _____ Date: 7/11/03
Arlene Nishimura

OEHHA Project Director: _____ Date: JUL 11 2003
James Carlisle or David Siegel

Approved By SWRCB / RWQCB

SWRCB agrees to pay OEHHA for work performed as stated above. An ar
amendment is not provided and approved SWRCB will not be obligated to p
submitted to SWRCB along with a copy of the memo sent to the RWQCB wh

SWRCB Contract Analyst: _____
Rafaela B. Padilla or M

Post-It™ brand fax transmittal memo 7671 | # of pages ▸ 1

To	From
JAN ANDERSON	RAFAELA
Co. RWQCB #9	Co. SWRCB
Dept.	Phone # 916 341-5772
Fax # (858) 571-6972	Fax #

TOTAL P.01

Date SWRCB WTF Completed:_____ cc: Bob K. SWRCB WTF #: R9-03-04

OEHHA #: 880076-02

STATE WATER RESOURCES CONTROL BOARD (SWRCB)
WORK TRANSMITTAL FORM (WTF)

(CARRY-OVER SITE)

Requesting RWQCB: SAN DIEGO - R16.9 Date Rcvd in Div. of Financial Assistance (DFA): MAY 22, 2003

Site Project Manager: TOM ALO Phone: (858) 636-3154

Fax: (858) 571-6972 Email: glot@rb9.swrcb.ca.gov

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Arlene Nishimura

OEHHA Project Director: J. C. Carlisle Date: JUL 11 2003
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Approved By SWRCB / RWQCB

SWRCB agrees to pay OEHHA for work performed as stated above. An amendment is required if OEHHA needs additional hours or time. If an amendment is not provided and approved SWRCB will not be obligated to pay the additional costs incurred by OEHHA. The original WTF will be submitted to SWRCB along with a copy of the memo sent to the RWQCB when this review is completed by OEHHA.

SWRCB Contract Analyst: Rafaela B. Padilla Date: JUL 15 2003
Rafaela B. Padilla or Mike Harper
for John Anderson

*Date SWRCB WTF Completed:*_____ *SWRCB WTF #:* _____

OEHHA #: _____

SWRCB / DFA - WTF AMENDMENT

Amendment No.: _____ Date Amendment Request Submitted to SWRCB-DFA: _____

Reason for Amendment:

Employee Classification:	Estimated Hours:	Estimated Cost:	Travel Per Diem:

Estimated Completion Date: _____ **Total Estimated Hours:** _____ **Total Estimated Cost:** _____

(Total Estimated Hours and Cost should reflect the original estimates plus the amendment estimates.)

OEHHA agrees to perform only the work as stated in the amendment above. A new SWRCB-DFA WTF authorizing additional hours and funding will be required for the performance of additional task(s) not expressly stated in the amendment above.

OEHHA Project Analyst: _____ Date: _____
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James Carlisle or David Siegel

---------- **Amendment Approved By SWRCB / RWQCB** ----------

If additional information is required from the requesting RWQCB and/or the review will take longer than the amendment estimated above it will be the responsibility of OEHHA to contact the SWRCB contact analyst. A new amendment must be submitted to provide the estimate of hours and cost. If a new amended estimate is not provided and approved, SWRCB will not be under any obligation to pay additional costs incurred by OEHHA.

SWRCB Contract Analyst: _____ Date: _____
Rafaela B. Padilla or Mike Harper

---------- **Monthly Costs per OEHHA Invoices** ----------

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Date WTF is Completed: Carry-Over to FY 03/04 WTF #: R9-02-149
15

SWRCB WORK TRANSMITTAL FORM (WTF)

Requesting Regional Board: San Diego - Reg.9 Date Received in CWP: MAY 22, 2002

Site Project Manager TOM ALO Phone: (858) 636-3154 Email:

Site ID No. * PCA #: 180-91 Circle One: (SLIC) AGST UST REDEV DOD Other:

Site Description/Address: NASSCO & SOUTHWEST MARINE SHIPYARD, SAN DIEGO CA

* NASSCO SITE ID# 2090004 & SOUTHWEST MARINE SITE ID# 2090005

Requested Completion Date: ASAP - CARRYOVER FY01/02 Date Sent to OEHHA: JULY 22, 2002

Estimate By OEHHA

Employee Classification:	Estimated Hours:	Estimated Cost:	Travel Per Diem:
TOXICOLOGIST, SENIOR	40	$5,640	$900
TOXICOLOGIST, SENIOR (JC)	4	$ 564	
OFFICE TECHNICIAN	2	$110	
AGPA	1 -0-	$ 92 -0-	-0-

Total: $7,306

Work is limited to the following document(s) received: See attached Region 9 memorandum dated 4/25/02 and e-mail of 7/23/02 from Tom Alo.

(1) Task 1 - Site Visits = 2 Site Visits NASSCO and Southwest Marine Shipyards, San Diego
(2) Task 2 - Technical Review and Guidance
(3) Technical Meetings and Expert Testimony

Description of work to be performed:

Same as above.

Start Date: 7/1/02 Estimated Completion Date: 6/30/03

NOTE: Within 2-4 weeks of each WTF receipt, OEHHA shall perform up to 10 hours initial review pending SWRCB authorization. SWRCB shall reimburse OEHHA for said services with and/or without the SWRCB final authorization. ('Blanket Approval', for up to 10 hours, was granted at the Regional Water Quality Control Board Roundtable meeting on July 9, 2002).

OEHHA agrees to perform only the work as stated above. A new SWRCB WTF authorizing additional hours and funding will be required for the performance of additional task(s) not expressly stated above, i.e., review and comment of supplemental documents/information, research services, follow-up consultation, response to OEHHA comments, etc.

OEHHA Project Analyst: A Nishimura Date: 7/24/02
Arlene Nishimura

OEHHA Project Director: Date: JUL 2 3 2002
James Carlisle or David Siegel

To Be Signed By SWRCB - CWP

If additional information is required from the Regional Board and/or the review will take more than originally estimated, it is the responsibility of OEHHA to contact the SWRCB Contract Manager and provide a new estimate of hours/costs in writing. If the new estimate is not provided and approved SWRCB will not be under any obligation to pay the additional costs. OEHHA will enter a completion date at the top of this form and send it to SWRCB upon completing the work as stated above.

SWRCB Contract Manager: Rafaela B Padilla Date: 7/26/02
Kathie Mowlem or Rafaela B. Padilla
per John Anderson

From: Robert Brodberg
To: Nishimura, Arlene
Date: 5/30/03 10:23AM
Subject: Re: It's Due By

Arlene,
my hours for Region 1 SPI site this month: 10.5
May 1: 2 hours
May 2: 6
May 6: 0.5
May 8: 0.5
May 15: 1
May 16: 0.5

They want some added information that I will finish next month. Too busy this month.

>>> Arlene Nishimura 05/29/03 10:45AM >>>
12:00n, Friday (5/30). Please submit your May Time and Absence reports to me. Your May reports should cover May 1-31; May 26th a state holiday; total at least 176 Hours. Thanks!

STATE OF CALIFORNIA -- ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT
OEH-009 (1/95) (FORMERLY DTSC 1001)

EMPLOYEE TIME SHEET

PAGE | OF

Org. Code	Department	Index	Index Title
3980	Office of Environmental Health Hazard Assessment	1300	Pesticide and Environmental Toxicology Section

Employee	Agcy	Unit	Class	Series	Employee No.	YY/MM	Section Use Only
R. Brodberg	811-160-9-7943-001				298-44-3665	02/10	Validated by: Date

Class title:	WW Group:	Salary:	Pay period: yy/mm/dd	yy/mm/dd	Fiscal Systems Section Use Only
Sr Tox			02/10/01	02/10/30	Entered by: Date

☐ Revised Time Sheet

DAILY ATTENDANCE

30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
		8.0	7.5	8.0	8.0			8.0	8.0	8.0	8.0	8.0				8.0	8.0	8.0	8.0			8.0	8.0	8.0	8.0	8.0			8.0	8.0	8.0			
			0.25																															
			0.25																															

ABSENCES

30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
															8																			

ADJUSTMENTS

30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2

Reason for Absence
☐ Medical Appointment ☐ Dental Appointment ☐ Doctor Statement Attached

Reason for extra hours worked

Project Time Reporting

Line No.	Hours	PCA	Site -	WP	MPC	Unused	Index
1	167.5	13100				PETS	1300
2	0.25	11300	880076	01		NASSCO Marin	1200
3	0.25	11300	880077	01		Southwest Mari	1200
4	0						
5	0						
6	0						
7	0						
8	0						
9	0						
10	0						
11	0						
12	0						
13	0						
14	0						
15	0						
16	168	Total Work Hours					

	Hours	Symbol	PCA	Description of Code
17	0	V/AL	13100	Vacation - Annual Leave
18	0	S	13100	Sick Leave - Self
19	0	SF	13100	Sick Leave - Family
20	8	PH H	13100	P.H. Taken Holiday
21	0	B SD	13100	Brv. Leave Brv. Sick
22	0	J SW	13100	Jury/Subpoenaed
23	0	ITO/ATO	13100	Other
24	8	Total Absences (Lines 17 Through 23)		
25	176	Total Hours This Month (Line 16 + 24)		
26	0	WO WE		CTO - Excess Hours Earned
27	0	P <A> <D> <N> <I>		Paid OT - AWOL - DOCK - NDI - IDL
28	0	TO TE		CTO - Excess Hours Taken
176	Total Normal Hours	Subtract line 26 and 27 and Add line 28 to Line 25 for total normal working hours		

( ) Jury duty ( ) Fees retained ( ) No fees ( ) Fees to be remitted
Received to State
( ) Subpoenaed witness Charge absence to
( ) party ( ) expert ( ) Vac ( ) CTO ( ) Absence without
Court City

CERTIFICATION OF EMPLOYEE: To the best of my knowledge the facts stated are accurate and in full compliance with legal requirements.
Signature Robert K. Brodberg Date 10-31-02

CERTIFICATION OF SUPERVISOR. Attendance, absences and overtime have been VERIFIED AND/OR AUTHORIZED in accordance with current rules.
Signature [signature] Date 10/31/02

Overtime Approved By:

PERSONNEL

BRODBERG 000017

Bob B.

STATE OF CALIFORNIA – ENVIRONMENTAL PROTECTION AGENCY
OFFICE OF ENVIRONMENTAL HEALTH HAZARD ASSESSMENT
OEH-009 (1/95) (FORMERLY DTSC 1001)

EMPLOYEE TIME SHEET

PAGE | OF

Org. Code	Department	Index	Index Title
3980	Office of Environmental Health Hazard Assessment	1300	Pesticide and Environmental Toxicology Section

Employee	Agcy	Unit	Class	Series	Employee No.	YY/MM	Section Use Only
R. Brodberg	811-160-9-7943-001				298-44-3665	02/08	Validated by: Date

Class title:	WW Group:	Salary:	Pay period: yy/mm/dd	yy/mm/dd	Fiscal Systems Section Use Only
Sr Tox			02/07/31	02/08/29	Entered by: Date

☐ Revised Time Sheet

DAILY ATTENDANCE

30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
						8.0		7.0	6.5	7.0			5.5	8.0	8.0	8.0	8.0			8.0	8.0	7.0	8.0	8.0			8.0	8.0	8.0	8.0				
								0.5	0.75	0.5			1.25									0.5												
								0.5	0.75	0.5			1.25									0.5												

ABSENCES

30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2
	8	8	8				8																											

ADJUSTMENTS

30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2

Reason for Absence
☐ Medical Appointment ☐ Dental Appointment ☐ Doctor Statement Attached

Reason for extra hours worked

Project Time Reporting

Line No.	Hours	PCA	Site -	WP	MPC	Unused	Index
1	137	13100				PETS	1300
2	3.5	11300	880076			NASSCO Marin	1200
3	3.5	11300	880077			Southwest Mari	1200
4	0						
5	0						
6	0						
7	0						
8	0						
9	0						
10	0						
11	0						
12	0						
13	0						
14	0						
15	0						
16	144	Total Work Hours					

	Hours	Symbol	PCA	Description of Code
17	32	V/AL	13100	Vacation - Annual Leave
18	0	S	13100	Sick Leave - Self
19	0	SF	13100	Sick Leave - Family
20	0	PH H	13100	P.H. Taken Holiday
21	0	B SD	13100	Brv. Leave Brv. Sick
22	0	J SW	13100	Jury/Subpoenaed
23	0	ITO/ATO	13100	Other
24	32	Total Absences (Lines 17 Through 23)		
25	176	Total Hours This Month (Line 16 + 24)		
26	0	WO WE		CTO - Excess Hours Earned
27	0	P <A> <D> <N> <I>		Paid OT - AWOL - DOCK - NDI - IDL
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( ) Jury duty ( ) Fees retained ( ) No fees ( ) Fees to be remitted
Received to State
( ) Subpoenaed witness Charge absence to
( ) party ( ) expert ( ) Vac ( ) CTO ( ) Absence without
Court City

CERTIFICATION OF EMPLOYEE: To the best of my knowledge the facts stated are accurate and in full compliance with legal requirements.
Signature Robert K Brodberg Date 8-30-02

CERTIFICATION OF SUPERVISOR. Attendance, absences and overtime have been VERIFIED AND/OR AUTHORIZED in accordance with current rules.
Signature for D. Siegel Date 9-3-02

Overtime Approved By:

PERSONNEL

BRODBERG 000018

From: Robert Brodberg
To: Nishimura, Arlene
Date: 8/22/02 2:14PM
Subject: time for August

Arlene,
unless something else comes up here are my billable hours in August for Region 9 NASCO/Southwest Marine:

Aug 7- 1 hour
Aug 8- 1.5 hours
Aug 9- 1 hour
Aug 12- 2.5 hours
Aug 21- 1 hour

Do you want my annual leave too? Usually I send this to Oakland and Anna signs and then Michelle enters it here in Sacramento.
Here it is, annual leave July 31, Aug 1, 2 and 6.

Bob

CC: St Croix, Michelle

Bob B.

SWRCB - RWQCB SITE HOURS - INTERIM TRACKLOG
as of August 2, 2002

This interim tracklog is being provided to assist those working on RWQCB sites to comply within the SWRCB authorized hours, costs and completion dates for each SWRCB Work Transmittal Form (WTF). If staff anticipates exceeding the authorized hours and/or will be unable to meet the scheduled completion dates, please contact Arlene immediately to request prior SWRCB approval for additional hours, funding and/or extension of completion date. "OEHHA Hours Used" are those reported from weekly e-mails or Monthly Time Sheets in arrears.

Site	RWQCB	Lead Staff	OEHHA Project #	SWRCB Authorized Hours	OEHHA Hours Used to Date	Available Hours Remaining	Estimated Completion Date	Completed
PureGro/Brea Facility (Stockton)	5	Julio	880011					
WTF #R5-02-08				15	12	3	08/30/02	Yes
Playa Vista (Los Angeles)	4	Julio	880019					
WTF #R4-02-19				46	36	10	08/30/02	
WTF #R4-02-20				28	26	2	08/30/02	
WTF #R4-02-22				40	21	19	09/30/02	
Guadalupe Oil Field (San Luis Obispo Co.)	3	Jim	880023					
WTF #R3-02-17				24	2	22	10/31/02	
San Antonio/Foster Rd (Los Angeles Co.)	4	Karen	880025					
WTF #R4-02-13				10	10	0	08/12/02	
G&R Metals (Eureka)	1	Karen	880026					
WTF #R1-02-10				0	0.5	-0.5	Cancelled 7/25	Yes
Golden West Refinery (Santa Fe Springs)	4	Russhawn	880028					
WTF #R4-02-02				5	5	0	07/31/02	Yes
Fmr WITCO Facility (Rancho Dominguez)	4	Russhawn	880040					
WTF #R4-02-11				10	8	2	Cancelled 7/30	Yes
Boeing C-1 (Long Beach)	4	Julio	880045					
WTF #R4-02-04				TBA	1			
WTF #R4-02-05				TBA				
Fmr Deep Water Iodides/Brea Canyon (Carson)	4	Karen	880050					
WTF #R4-02-01				6	4	2	07/19/02	Yes
Boeing C-6 (Torrance)	4	Julio	880053					
WTF #R4-02-21				TBA				
Natomas Airport (Sacramento)	5	Hristo	880061					
WTF #R5-02-06				TBA				
Ultramar Marine Term (Wilmington)	4	Hristo	880064					
WTF #R4-02-18				TBA				
Willow Apartments (Willow Brooks)	4	Ned	880074					
WTF #R4-02-16				TBA				
Los Angeles Bulk Fuel Distribution (LA)	4	Hristo	880075					
WTF #R4-02-03				45	6	39	09/16/02	
NASSO Marine Shipyard (San Diego)	9	Bob	880076					
WTF #R9-02-15				20		20	06/30/03	
Southwest Marine Shipyard (San Diego)	9	Bob	880077					
WTF #R9-02-15				20		20	06/30/03	
Executive Cleaners (Sacramento)	5	Karen	880079					
WTF #R5-02-07				15	2	13	08/30/02	
243 Chestnut Avenue (Long Beach)	4	Russhawn	880080					
WTF #R4-02-23				TBA	4			
Schmidbauer Arcata Mill (Arcata)	1	TBA	880081					
WTF #R1-02-24				TBA				
Blue Line Construction Authority (Los Angeles)	4	Julio	880073					
WTF #R4-02-25				1	1	0	07/31/02	Yes
Frmr Pneumo Abex Facility (Oxnard)	4	TBA	880041					
WTF #R4-02-26				TBA				

Rev. 8/2/2002 aan

SWRCB - RWQCB SITE HOURS - TRACKLOG
as of July 26, 2002

This bi-weekly tracklog is being provided to assist those working on RWQCB sites to comply within the SWRCB authorized hours, costs and completion dates for each SWRCB Work Transmittal Form (WTF). If staff anticipates exceeding the authorized hours and/or will be unable to meet the scheduled completion dates, please contact Arlene immediately to request prior SWRCB approval for additional hours, funding and/or extension of completion date. "OEHHA Hours Used" are those reported from weekly e-mails or Monthly Time Sheets in arrears.

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WTF #R5-02-08				TBA			
Playa Vista (Los Angeles)	4	Julio	880019				
WTF #R4-02-19				TBA			
WTF #R4-02-20				TBA			
WTF #R4-02-22				TBA			
Guadalupe Oil Field (San Luis Obispo Co.)	3	Jim	880023				
WTF #R3-02-17				24		24	10/31/02
San Antonio/Foster Rd (Los Angeles Co.)	4	Karen	880025				
WTF #R4-02-13				10		10	08/12/02
G&R Metals (Eureka)	1	Karen	880026				
WTF #R1-02-10				Cancelled 07/25/02			N/A
Golden West Refinery (Santa Fe Springs)	4	Russhawn	880028				
WTF #R4-02-02				5		5	07/31/02
Fmr WITCO Facility (Rancho Dominguez)	4	Russhawn	880040				
WTF #R4-02-11				TBA			
Boeing C-1 (Long Beach)	4	Julio	880045				
WTF #R4-02-04				TBA			
WTF #R4-02-05				TBA			
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WTF #R-02-01				6		6	07/19/02
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WTF #R4-02-21				TBA			
Natomas Airport (Sacramento)	5	Hristo	880061				
WTF #R5-02-06				TBA			
Ultramar Marine Term (Wilmington)	4	Hristo	880064				
WTF #R4-02-18				TBA			
Willow Apartments (Willow Brooks)	4	Ned	880074				
WTF #R4-02-16				TBA			
Los Angeles Bulk Fuel Distribution (LA)	4	Hristo	880075				
WTF #R4-02-03				TBA			
NASSO Marine Shipyard (San Diego)	9	Bob	880076				
WTF #R9-02-15				TBA			
Southwest Marine Shipyard (San Diego)	9	Bob	880077				
WTF #R9-02-15				TBA			
Executive Cleaners (Sacramento)	5	Karen	880079				
WTF #R5-02-07				15		15	08/30/02

Rev. 7/26/2002 aan

Date WTF is Completed: _____

WTF #: R9-02-14
Bob. B. 15

SWRCB WORK TRANSMITTAL FORM (WTF)

Requesting Regional Board: San Diego - Reg. 9 Date Received in CWP: MAY 22, 2002

Site Project Manager TOM ALO Phone: (858) 636-3154 Email: _____

Site ID No. * PCA #: 180-91 Circle One: (SLIC) AGST UST REDEV DOD Other: _____

Site Description/Address: NASSCO & SOUTHWEST MARINE SHIPYARD, SAN DIEGO CA

* NASSCO SITE ID# 2090004 & SOUTHWEST MARINE SITE ID# 2090005

Requested Completion Date: ASAP - CARRYOVER FY01/02 Date Sent to OEHHA: JULY 22, 2002

Estimate By OEHHA

Employee Classification:	Estimated Hours:	Estimated Cost:	Travel Per Diem:
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TOXICOLOGIST, SENIOR (JC)	4	$ 564	
OFFICE TECHNICIAN	2	$110	
AGPA	1	$ 92	
		Total: $7,306	

Work is limited to the following document(s) received: See attached Region 9 memorandum dated 4/25/02 and e-mail of 7/23/02 from Tom Alo.

(1) Task 1 - Site Visits = 2 Site Visits NASSCO and Southwest Marine Shipyards, San Diego
(2) Task 2 - Technical Review and Guidance
(3) Technical Meetings and Expert Testimony

Description of work to be performed:

Same as above.

Start Date: 7/1/02 Estimated Completion Date: 6/30/03

NOTE: Within 2-4 weeks of each WTF receipt, OEHHA shall perform up to 10 hours initial review pending SWRCB authorization. SWRCB shall reimburse OEHHA for said services with and/or without the SWRCB final authorization. ('Blanket Approval', for up to 10 hours, was granted at the Regional Water Quality Control Board Roundtable meeting on July 9, 2002).

OEHHA agrees to perform only the work as stated above. A new SWRCB WTF authorizing additional hours and funding will be required for the performance of additional task(s) not expressly stated above, i.e., review and comment of supplemental documents/information, research services, follow-up consultation, response to OEHHA comments, etc.

OEHHA Project Analyst: _____ Date: 7/24/02
Arlene Nishimura

OEHHA Project Director: _____ Date: JUL 23 2002
James Carlisle or David Siegel

To Be Signed By SWRCB - CWP

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SWRCB Contract Manager: _____ Date: 7/26/02
Kathie Mowlem or Rafaela B. Padilla
per John Anderson

AMENDMENT - SWRCB WORK TRANSMITTAL FORM (WTF)

Original Request Date:_____ Amendment No.:_____ Amendment Date:_____

Amended: Start Date: _____ Estimated Completion Date:_____

Additional Hours: _____ Additional Cost: _____

OEHHA agrees to perform only the work as stated above. A new SWRCB WTF authorizing additional hours and funding will be required for the performance of additional task(s) not expressly stated above, i.e., review and comment of supplemental documents/information, research services, follow-up consultation, response to OEHHA comments, etc.

OEHHA Project Analyst: _____ Date: _____
Arlene Nishimura

OEHHA Project Director: _____ Date: _____
James Carlisle or David Siegel

---------- **To Be Signed By SWRCB** ----------

If additional information is required from the Regional Board and/or the review will take more than originally estimated it will be the responsibility of OEHHA to contact the State Board Contract Manager and provide a new estimate of hours/costs. If the new estimate is not provided and approved, the State Water Resources Control Board will not be under any obligation to pay the additional costs.

SWRCB Contract Manager:_____ Date: _____
Kathie Mowlem or Rafaela B. Padilla

---------- **SWRCB will fax approved copy of WTF to RWQCB** ----------

Faxed by Intl: _____ Date Faxed: _____

Faxed by Intl: _____ Date Faxed: _____

---------- **Monthly Costs per OEHHA Invoices** ----------

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

Invoice Month: _____ **Hours Charged:** _____ **Cost:** _____

California Regional Water Quality Control Board
San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego, California 92123
Phone (858) 467-2952 • FAX (858) 571-6972

Gray Davis
Governor

TO: Rafaela B. Padilla
Division of Clean Water Programs
State Water Resources Control Board

FROM: Tom Alo, Engineer
San Diego Regional Water Quality Control Board

DATE: APR 25 2002

2002 APR 25 A 11: 12

STATE WATER QUALITY CONTROL BOARD

SUBJECT: NASSCO & SOUTHWEST MARINE SHIPYARDS

Elevated levels of pollutants exist in the bay bottom sediments adjacent to NASSCO and Southwest Marine shipyards. The concentrations of these pollutants cause or threaten to cause a condition of pollution that harms aquatic life beneficial uses designated in San Diego Bay. The concentrations of these pollutants may also present wildlife and human health risks from exposure to pollutants through the food chain.

Mr. Bob Broadburg of OEHHA has agreed to provide his services on the NASSCO and Southwest Marine shipyard sites located in San Diego, CA.

Scope of Work

The scope of work includes, but is not limited to, the following:

- *Task 1 – Site Visits*. Conduct site visits, as needed, to become familiar with the physical and environmental settings at NASSCO and Southwest Marine shipyards. Site-specific information will be observed and documented by OEHHA during these site visits, which will be used to assist OEHHA in reviewing technical documents/data and providing technical expertise and recommendations to the Regional Board. A report will be prepared by OEHHA that summarizes the observations made during each site visit.

- *Task 2 – Technical Review and Guidance*. Review and provide written comments on technical documents and data pertaining to human health risks for NASSCO and Southwest Marine shipyards. The technical documents include, but are not limited to, workplans, site investigation reports, technical memorandums, correspondence letters, and reference materials. Data analysis includes, but is not limited to, quality assurance/quality control (QA/QC) checks, comparisons of control/reference data to site data, and use of sediment quality guidelines.

- *Task 3 – Technical Meetings and Expert Testimony*. Attend (or teleconference) and participate in technical meetings pertaining to the NASSCO and Southwest Marine shipyard sites. The technical meetings will include Regional Board staff meetings, Natural Resource Trustee Agency meetings, public meetings, and responsible party(s) meetings. Additionally, at the direction of Regional Board staff, provide testimony or information regarding scientific/technical issues relating to NASSCO and Southwest Marine shipyards at Regional Board meetings or at public workshops.

Thank your for your assistance in this matter. If you have questions, please contact me at (858) 636-3154.

cc: Mike Chee, National Steel and Shipbuilding Company
Sandor Halvax, Southwest Marine, Inc.

RECEIVED
APR 2 9 2002
DIVISION OF CLEAN WATER PROGRAMS

From: "Tom Alo" <alot@rb9.swrcb.ca.gov>
To: <ANISHIMU@oehha.ca.gov>, <RBRODBER@oehha.ca.gov>
Date: 7/23/02 7:51AM
Subject: Re: RWQCB Work into FY 02-03?

Bob,

Yes, please include travel $$ for FY 02-03. I would suggest that you plan for 2 potential trips.

--Tom

>>> "Robert Brodberg" <RBRODBER@oehha.ca.gov> 07/22/02 07:33PM >>>
Tom,
Did you want to include the option of my traveling to San Diego for a meeting or site visit some time during the current fiscal year? Arlene estimated that an airline ticket, overnight stay, car rental, per diem would be $400-500. If I understand this correctly if you want this option it is easier to include it now, even if it isn't used. Up to you.
Bob

>>> Arlene Nishimura 07/22/02 09:12AM >>>
Tom,
Thank you for your e-mail. On June 28, 2002, I submitted a request to the SWRCB for a FY 02-03 Work Transmittal Form to carryover Bob Brodberg's work on NASSCO & Southwest Marine sites. The SWRCB has begun processing more than a dozen FY 02-03 Work Transmittal Forms and we will check on the status of your specific request.

>>> "Tom Alo" <alot@rb9.swrcb.ca.gov> 07/22/02 09:04AM >>>
Arlene,

I would like to continue working with Bob Broadburg on the NASSCO & Southwest Marine Shipyard sites located in San Diego, CA for FY 02-03. Please contact the State Board to initiate a new Transmittal Form. If you have any questions please email or call me. Thanks.

--Tom

Tom C. Alo
Water Resources Control Engineer
CA Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123
Main: (858) 467-2952
Direct: (858) 636-3154
Fax: (858) 571-6972
<alot@rb9.swrcb.ca.gov>

>>> "Arlene Nishimura" <ANISHIMU@oehha.ca.gov> 06/25/02 02:49PM >>>
For those of you working on RWQCB sites/projects that will be carried over into FY 02-03, please let me know the name of the site/projects and the numbers of hours needed to complete the work in progress.

The current contract expires on June 30th. So, in order for IRAS to be reimbursed for work beyond July 1, we will need to request new work orders for existing work in progress. In addition, any work pending will require new work orders. All FY 01-02 work authorizations from the SWRCB are rescinded effective June 30th. Thank you and please provide this information to me by Friday (6/28).

CC: "Rafaela Padilla" <padillar@cwp.swrcb.ca.gov>

OEHHA Guidelines for SWRCB-CWP Work Transmittal Forms

1. **Work Transmittal Forms:** A SWRCB-CWP Transmittal Form is required for all work to be performed by OEHHA/IRAS under the SWRCB/RWQCB interagency agreement. IRAS' Administrative Assistant (AA) is responsible for processing and verifying the approval of the work order. If work is received without a Transmittal Form, IRAS staff shall immediately forward the item(s) to the IRAS' AA for processing.

2. **Initial Review:** OEHHA will perform up to ten (10) hours initial review within two (2) to four (4) weeks upon receipt of the Transmittal Form and attached document(s). IRAS will confer with the RWQCB Site/Project Manager to determine the level of review and/or assistance being requested and identify components of the work to be performed on the Transmittal Form. Reviews of human health risk assessments, work plans, or any similar technical support report will be estimated per document and/or binder. Any required travel time and expenses to attend meetings/conduct site visits will be additional and stated so. The Transmittal Form will be limited to the specific document(s) received and excludes any additional effort such as supplemental documents, follow-up assistance and/or response to comments.

3. **Completion of Work Transmittal Forms:** IRAS staff shall complete Transmittal Forms identifying estimated staff time, required travel and per diem expenses, specific tasks to be performed and estimated start and completion dates. Upon completion, all Transmittal Forms are to be submitted to IRAS' AA for further processing no later than four (4) weeks upon initial receipt of the Work Transmittal Form.

4. **Work Start Date:** With the exception of the initial review, no work shall commence prior to the receipt of the approved Transmittal Form, signed by the SWRCB Contract Manager, authorizing the hours, costs and activities.

5. **Additional Hours:** IRAS staff shall confer with the RWQCB as to whether the task will require additional hours beyond the original estimate of hours. Staff will then inform IRAS' AA to submit an amended Transmittal Form to the SWRCB for additional hours, funding and the justification for an increased level of effort. IRAS staff will **suspend** all work pending receipt of the amended Transmittal Form, signed by the SWRCB Contract Manager, authorizing the additional hours, costs and activities.

6. **Reduction of Hours:** IRAS staff shall confer with the RWQCB should the task require less than the originally estimated hours. Staff will then inform IRAS' AA to submit an amended Transmittal Form to notify the SWRCB of a reduction of hours and costs. Timely notification will assist the RWQCB and SWRCB in reallocating funding to other sites.

7. **Progress Reports:** For each site and/or task, IRAS staff shall provide a brief monthly progress report to the respective RWQCB Project Manager, via electronic mail, with a copy to padillar@cwp.swrcb.ca.gov and anishimu@oehha.ca.gov

8. **Schedule Completion Date:** Upon receipt of the final Transmittal Form, signed by the SWRCB Contract Manager, OEHHA will review existing workload and provide a revised estimated completion date to the RWQCB/SWRCB if necessary. If it is anticipated that IRAS will be unable to meet the estimated completion date, staff will notify the RWQCB Project Manager within 15 working days of the due date and provide a revised completion date and brief explanation, i.e., workload priorities, absences, etc. IRAS staff shall send notification to the RWQCB via electronic mail with a copy to padillar@cwp.swrcb.ca.gov and anishimu@oehha.ca.gov

9. **Follow-up Assistance:** Upon receipt of final OEHHA comments, any RWQCB or project/site consultant additional requests such as follow-up assistance, requests for review/comment on supplemental information, or response to comments, will require a separate and new Transmittal Form.

NOTE: Failure to follow these guidelines may result in non-payment of services by the SWRCB/RWQCB.

Work Transmittal Form Contacts:
SWRCB: Rafaela Padilla (916) 341-5972 or padillar@cwp.swrcb.ca.gov
OEHHA: Arlene Nishimura (916) 324-3732 or anishimu@oehha.ca.gov

July 2002 aan

Robert Brodberg - Re: RWQCB Work into FY 02-03?

From: Arlene Nishimura
To: Tom Alo
Date: 7/22/2002 9:12 AM
Subject: Re: RWQCB Work into FY 02-03?
CC: Rafaela Padilla; Robert Brodberg

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--Tom

Tom C. Alo
Water Resources Control Engineer
CA Regional Water Quality Control Board
9174 Sky Park Court, Suite 100
San Diego, CA 92123
Main: (858) 467-2952
Direct: (858) 636-3154
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TRANSMITTAL FORM

Regional Board: 9 – San Diego Date Rec'd By CWP: May 22, 2002

Site ID No.: *See Note Below PCA #: 18091

Site Description: NASSCO & Southwest Marine Shipyards in San Diego CA

Shipyard Sediment Cleanup (Human Health Issues)

* Note: NASSCO Site ID#: 2090004 & Southwest Marine Site ID #: 2090005

Date: 05/22/02

Kathie Mowlem or Rafaela B. Padilla

---------- **DO NOT WRITE BELOW THIS LINE - OEHHA TO COMPLETE** ----------

Return to SWRCB - CWP Contract Manager once information is completed.

Received By: Robert Broadberg, Senior Toxicologist (PETS)

Date Received: TBA (Upon SWRCB Approval)

SWRCB-CWP to fax copy to the RWQCB once signed & approved.
Faxed By Intl: AHL for the Region
Date Faxed: 5/31/02

Hour/Cost Est.: 20 Hours / $6,000

Completion Schedule: June 30, 2002*

Description of Task(s): A maximum of 20 hours will be spent, excluding Task 1-Site Visits, on the tasks outlined in the Regional Board letter dated April 25, 2002 (attached): Task 2-Technical Review and Guidance and Task 3-Technical Meetings and Expert Testimony. Travel will not allowed due to budgetary constraints in FY 01/02.

*NOTE: Whichever event occurs first, all work will stop on June 30, 2002 or once the 20 hours has been expended. A new Transmittal Form will be required for work after 6/30/02.

If additional information is required from the Regional Board and/or the review will take more time than originally estimated it will be the responsibility of OEHHA to contact the State Board Contract Manager and provide a new estimate of hours/cost. **If the new estimate is not provided and approved, the State Water Resources Control Board will not be under any obligation to pay the additional costs.**

Project Analyst: Arlene Nishimura Date: 5/24/02

Project Director: David Siegel or Jim Carlisle Date: 5/24/02

Contract Manager: Kathie Mowlem or Rafaela B. Padilla Date: 5/31/02

California Regional Water Quality Control Board
San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego, California 92123
Phone (858) 467-2952 • FAX (858) 571-6972

Gray Davis
Governor

TO: Rafaela B. Padilla
Division of Clean Water Programs
State Water Resources Control Board

FROM: Tom Alo, Engineer
San Diego Regional Water Quality Control Board

DATE: APR 25 2002

SUBJECT: NASSCO & SOUTHWEST MARINE SHIPYARDS

Elevated levels of pollutants exist in the bay bottom sediments adjacent to NASSCO and Southwest Marine shipyards. The concentrations of these pollutants cause or threaten to cause a condition of pollution that harms aquatic life beneficial uses designated in San Diego Bay. The concentrations of these pollutants may also present wildlife and human health risks from exposure to pollutants through the food chain.

Mr. Bob Broadburg of OEHHA has agreed to provide his services on the NASSCO and Southwest Marine shipyard sites located in San Diego, CA.

Scope of Work

The scope of work includes, but is not limited to, the following:

- *Task 1 – Site Visits*. Conduct site visits, as needed, to become familiar with the physical and environmental settings at NASSCO and Southwest Marine shipyards. Site-specific information will be observed and documented by OEHHA during these site visits, which will be used to assist OEHHA in reviewing technical documents/data and providing technical expertise and recommendations to the Regional Board. A report will be prepared by OEHHA that summarizes the observations made during each site visit.

- *Task 2 – Technical Review and Guidance*. Review and provide written comments on technical documents and data pertaining to human health risks for NASSCO and Southwest Marine shipyards. The technical documents include, but are not limited to, workplans, site investigation reports, technical memorandums, correspondence letters, and reference materials. Data analysis includes, but is not limited to, quality assurance/quality control (QA/QC) checks, comparisons of control/reference data to site data, and use of sediment quality guidelines.

- *Task 3 – Technical Meetings and Expert Testimony*. Attend (or teleconference) and participate in technical meetings pertaining to the NASSCO and Southwest Marine shipyard sites. The technical meetings will include Regional Board staff meetings, Natural Resource Trustee Agency meetings, public meetings, and responsible party(s) meetings. Additionally, at the direction of Regional Board staff, provide testimony or information regarding scientific/technical issues relating to NASSCO and Southwest Marine shipyards at Regional Board meetings or at public workshops.

Thank your for your assistance in this matter. If you have questions, please contact me at (858) 636-3154.

cc: Mike Chee, National Steel and Shipbuilding Company
Sandor Halvax, Southwest Marine, Inc.

California Regional Water Quality Control Board

San Diego Region

Internet Address: http://www.swrcb.ca.gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego, California 92123
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Winston H. Hickox
Secretary for Environmental Protection

Gray Davis
Governor

TO: Rafaela B. Padilla
Division of Clean Water Programs
State Water Resources Control Board

FROM: Tom Alo, Engineer
San Diego Regional Water Quality Control Board

DATE: APR 25 2002

2002 APR 25 A 11: 13
SAN DIEGO REGIONAL WATER QUALITY CONTROL BOARD

SUBJECT: OEHHA REVIEW OF TECHNICAL MEMORANDUM 2 NASSCO & SOUTHWEST MARINE SHIPYARDS

Please forward the attached Technical Memorandum titled "Proposed Receptor Species for Assessment of Risks to Aquatic-Dependent Wildlife and Tissue Residue Guidelines for Wildlife and Human Health" to Mr. Bob Broadburg of OEHHA. Mr. Broadburg should focus his review on the human health section of the memorandum. Following his review Mr. Broadburg will prepare written comments to the Regional Board.

Thank your for your assistance in this matter. If you have questions, please contact me at (858) 636-3154.

RECEIVED
APR 29 2002
DIVISION OF CLEAN WATER PROGRAMS

Robert Brodberg - request for review on OEHHA contract

From: Robert Brodberg
To: Alo, Tom
Date: 4/18/2002 2:36 PM
Subject: request for review on OEHHA contract
CC: Fan, Anna; Siegel, David

Tom,
I got an OK to continue with this review of your NASSCO & Southwest shipyard site. I talked to Dave Siegel, the Chief of the IRAS Section, about using the OEHHA-State Water Resources Control Board Contract for site cleanups. Dave agreed with the concept of using this contract and remaining funds for review and consulting by the OEHHA Fish Unit on human health risk issues for your shipyard cleanup. Dave pointed out that the San Diego Regional Water Resource Control Board would need to formally request the review through the State Board. Evidently, you already do this on other sites. I think this just gets it into the system. Dave said that we would also need to estimate OEHHA's time for the project. I can't quite tell how many more documents or meetings would be involved. My estimate is that this would require around 10 hours per month. It might be more if there were a series of meetings in San Diego that we would have to attend in person. We would keep track of time spent and bill through Dave's group. So if you send in the request I will start a time tally for the review and discussion we had. And we can put together some existing San Diego Bay data for you.

OK?
Bob

Robert K. Brodberg, Ph.D.
Chief, Fish and Water Quality Evaluation Unit
Cal/EPA
Office of Environmental Health Hazard Assessment

Street Address: 1001 I Street
Sacramento, CA 95814

Mailing Address: PO Box 4010
Sacramento, CA 95812-4010
phone: 916-323-4763
fax: 916-327-7320
email: rbrodber@oehha.ca.gov
~~ <'))).>< ~~

The energy challenge facing California is real. Every Californian needs to take immediate action to reduce energy consumption. For a list of simple ways you can reduce demand and

From: Anna Fan
To: Brodberg, Robert
Date: 4/18/02 12:35PM
Subject: Re: request from San Diego Regional Board

sure

>>> Robert Brodberg 04/17/02 05:29PM >>>
Anna,
staff from the San Diego Regional Water Quality Control Board have requested our review and consulting on human health issues for a shipyard cleanup in the Bay. They have suggested that we can be reimbursed for time spent via the IRAS contract with the State Water Board for other cleanups. I spent some time reviewing and discussing their project with them and think that this should not take more than about 10 hours of time per month through June. They would have to decide in July whether to continue this arrangement next fiscal year, providing there is a contract. This is convenient now since there is a contract in place. I talked with Dave Siegel about this and he is OK with the concept as long as the Regional Board makes the request and we keep track of the hours to submit for reimbursement. Plus he would need to verify that Region 9 actually has enough money remaining in their contract.

So is it OK to proceed with this?
Thanks
Bob

CC: Siegel, David

Mtg Nov. 14 - Com. Dre Dec 5

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD, SAN DIEGO REGION
- NOTICE OF PUBLIC WORKSHOP -

- **PRESENTATION OF SEDIMENT QUALITY ASSESSSMENT AND REMEDIATION TECHNICAL REPORT SUBMITTED BY NATIONAL STEEL AND SHIPBUILDING COMPANY (NASSCO) AND SOUTHWEST MARINE, INC. (SOUTHWEST MARINE)**

- **CLEANUP AND ABATEMENT ORDER SCOPING MEETING**

November 14, 2003 at 9:00 a.m.
Regional Board Office, Board Room
9174 Sky Park Court, Suite 100
San Diego California 92123-4340

PUBLIC WORKSHOP
The California Regional Water Quality Control Board, San Diego Region (Regional Board) will hold a public workshop to present and receive comments on the marine sediment quality assessment and remediation technical report submitted by National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. (Southwest Marine). This technical report will be used as a basis for the Regional Board's development of cleanup and abatement orders for NASSCO and Southwest Marine.

The Regional Board will also be conducting a scoping meeting at the workshop for interested and affected persons to communicate their views on the site assessment, data interpretation, sediment cleanup levels, sediment cleanup alternatives, extent of cleanup, cleanup costs, and other considerations that should be addressed by the Regional Board in preparing cleanup and abatement orders (CAOs) for NASSCO and Southwest Marine.

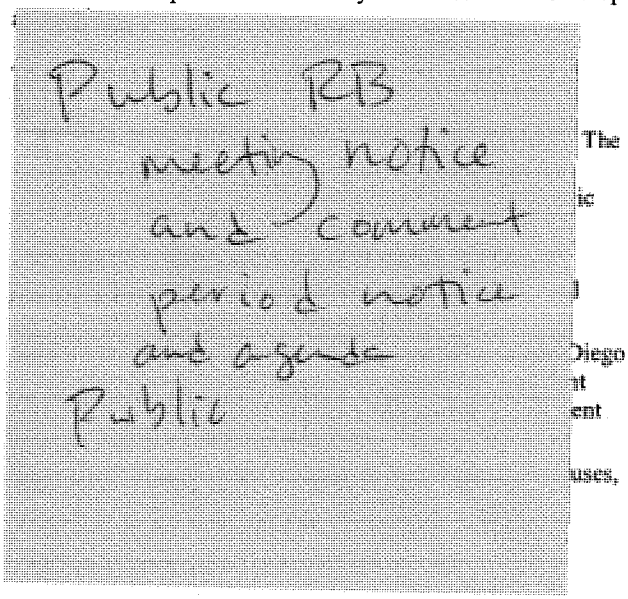
Date: Friday, November 14, 2003
Time: 9:00 a.m.
Location: Regional Board Office – Board Room
9174 Sky Park Court, Suite 100
San Diego, CA 92123-4340

Three or more Regional Board members may attend this workshop. Regional Board members will not be making any decisions.

Objectives for the Public Workshop: To present an overview of the technical report for the NASSCO and Southwest Marine shipyard sediment investigation, to provide an opportunity for the public to provide comments on the technical report, and to solicit input on the development of the CAOs.

Public participation is encouraged. The Regional Board will receive and consider comments from the public. Written comments may be submitted as described below.

BACKGROUND
Elevated levels of pollutants present in the marine sediments within and adjacent to the shipyard leaseholds. The concentrations of these pollutants cause or threaten to cause a condition of pollution that harms the beneficial uses designated for San Diego Bay. NASSCO and Southwest Marine have conducted a site-specific study to develop sediment cleanup levels and identify marine sediment cleanup



The technical report summarizing the results of the sediment investigation will be used as a basis for the Regional Board's development of CAOs for NASSCO and Southwest Marine.

AVAILABILITY OF TECHNICAL REPORT
To obtain a copy of the NASSCO and Southwest Marine technical report, contact Sylvia Wellnitz by:

U.S. mail: Regional Water Quality Control Board, 9174 Sky Park Court Suite 100, San Diego, California 92123-4340. Attention: Sylvia Wellnitz.

Email: wells@rb9.swrcb.ca.gov

Telephone: (858) 637-5593

The technical report can also be reviewed by appointment at the Regional Board office at the above address and can also be downloaded from the Regional Board's website at www.swrcb.ca.gov/rwqcb9/.

Mts NOV 14 - Com Dive Dec 5

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BACKGROUND
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The site-specific investigation included:

- Collecting sediment quality data at each shipyard. The data consists of bulk sediment and pore water chemistry, sediment and pore water toxicity, benthic community structure, and bioaccumulation.
- Assessing the nature and areal extent of sediment contamination resulting from current and historical waste discharges from the shipyards.
- Evaluating the biological effects and risks to San Diego Bay beneficial uses (aquatic life, aquatic-dependent wildlife, and human health) associated with sediment contamination at the shipyards.
- Evaluating cleanup levels protective of beneficial uses, including cleanup levels representing background conditions for NASSCO and Southwest Marine.
- Analyzing sediment remedial alternatives.

The technical report summarizing the results of the sediment investigation will be used as a basis for the Regional Board's development of CAOs for NASSCO and Southwest Marine.

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Telephone: (858) 637-5593

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DEADLINE DATE FOR SUBMISSION OF WRITTEN COMMENTS

The Regional Board is accepting written comments on both the NASSCO and Southwest Marine technical report and scoping issues that should be considered by the Regional Board in preparing the CAOs for NASSCO and Southwest Marine. Written comments are due in the Regional Board office on December 5, 2003 by 5:00 p.m.

INFORMATION

Parking is available at the workshop location. A map with directions to the workshop may be obtained from the Regional Board's website or by contacting Ms. Lori Costa at the phone number below.

The workshop room facilities are accessible to persons with disabilities. Individuals who require special accommodations are requested to contact Ms. Lori Costa at (858) 467-2357 at least 5 working days prior to November 14, 2003. TTY users may contact the California Relay Service at 1-800-735-2929 or voice line at 1-800-735-2922.

[Original Signed]

John H. Robertus
EXECUTIVE OFFICER

NOV. 14

California Regional Water Quality Control Board

San Diego Region

Winston H. Hickox
Secretary for Environmental Protection

Internet Address: http://www.swrcb.ca.gov/rwqcb9/
9174 Sky Park Court, Suite 100, San Diego, California 92123
Phone (858) 467-2952 FAX (858) 571-6972

Gray Davis
Governor

STAFF WORKSHOP AGENDA

- Presentation of NASSCO and Southwest Marine Technical Report
- Cleanup and Abatement Order Scoping Meeting

November 14, 2003 - 9:00 am to 4:30 pm
Regional Board Office – Board Room

---

1. Introduction
   (Craig Carlisle, RWQCB) [9:00-9:15]

2. Background and Project Schedule
   (Tom Alo, RWQCB) – [9:15-9:40]

3. Overview of Cleanup and Abatement Orders
   (Tom Alo, RWQCB) – [9:40-10:00]

4. Presentation of Technical Report
   (Tom Ginn & Dreas Nielsen, Exponent)

   - Historical Site Conditions [10:00-10:15]
   - Sediment Chemistry [10:15-10:45]

   <**10-MIN BREAK**> [10:45-10:55]

   - Aquatic Life Risk Assessment [10:55-11:35]
   - Aquatic-Dependent Wildlife Risk Assessment [11:35-12:05]
   - Human Health Risk Assessment [12:05-12:35]

   <**BREAK FOR LUNCH**> [12:35-1:35]

   - Integrated Assessment of Beneficial Uses [1:35-2:05]
   - Feasibility Study [2:05-3:05]

5. San Diego Bay Council Comments [3:05-3:35]

   <**10-MIN BREAK**> [3:35-3:45]

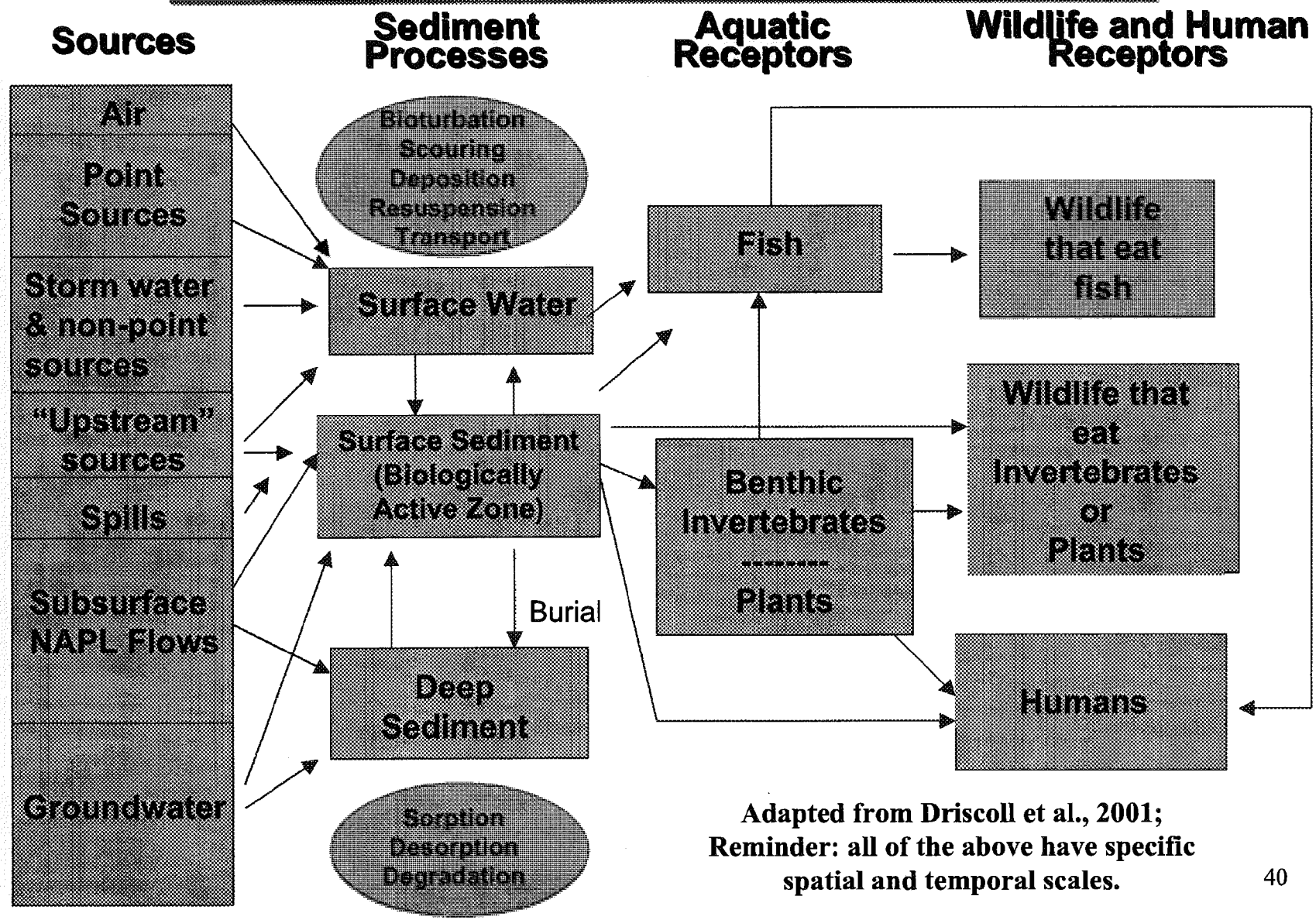
6. Comments from Other Interested Parties [3:45-4:30]

7. Closing
   (Craig Carlisle, RWQCB)

Figures

Tables (By Reference)

Basic Conceptual Model for Sediment Risk Assessment



Adapted from Driscoll et al., 2001;
Reminder: all of the above have specific spatial and temporal scales.

FIGURE 1.

Figure 3
Relative Frequency of TOC, NASSCO and SW Marine

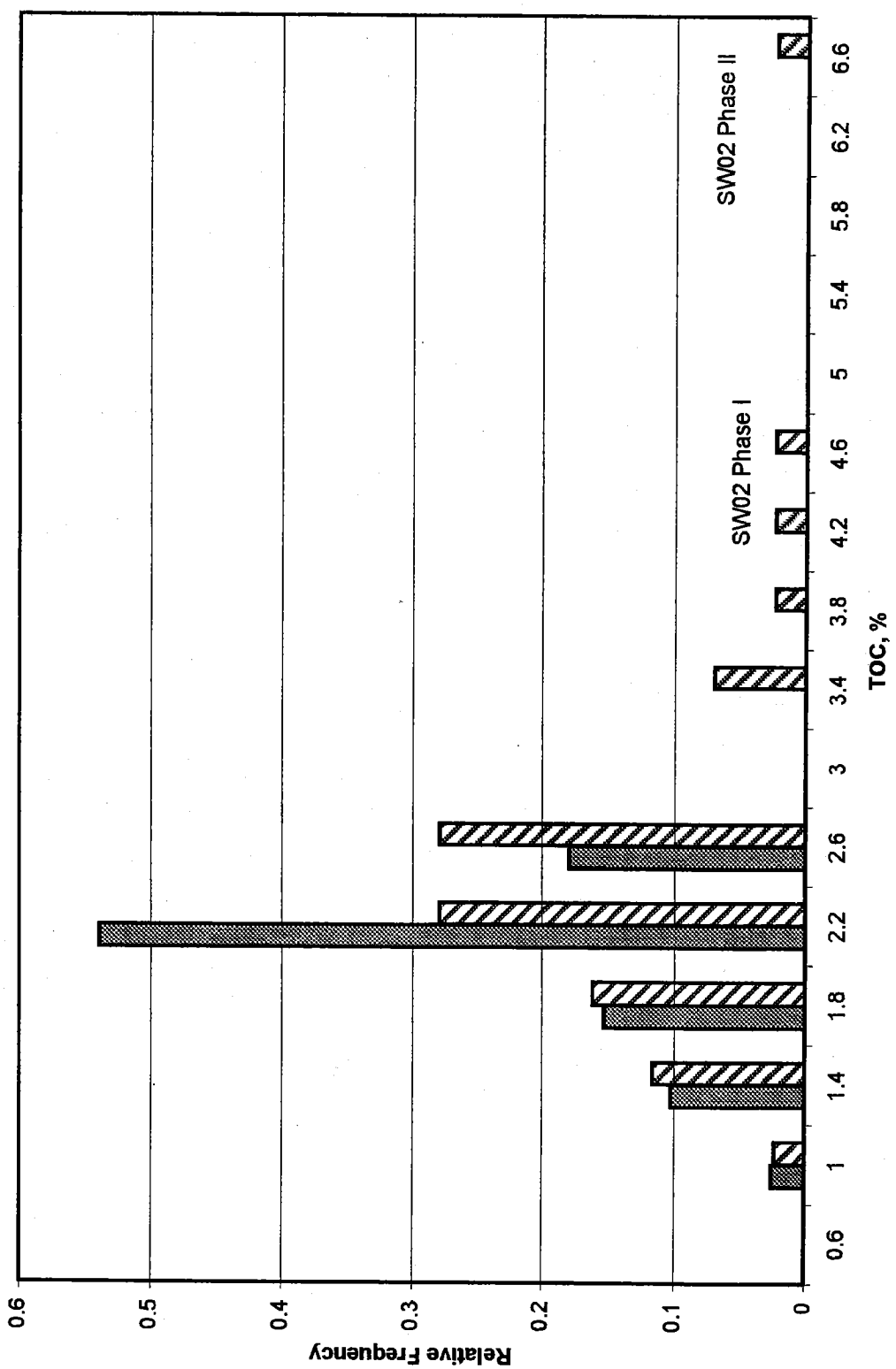


Figure 4
Relative Frequency Distribution , %TOC
Bight 98 San Diego Bay

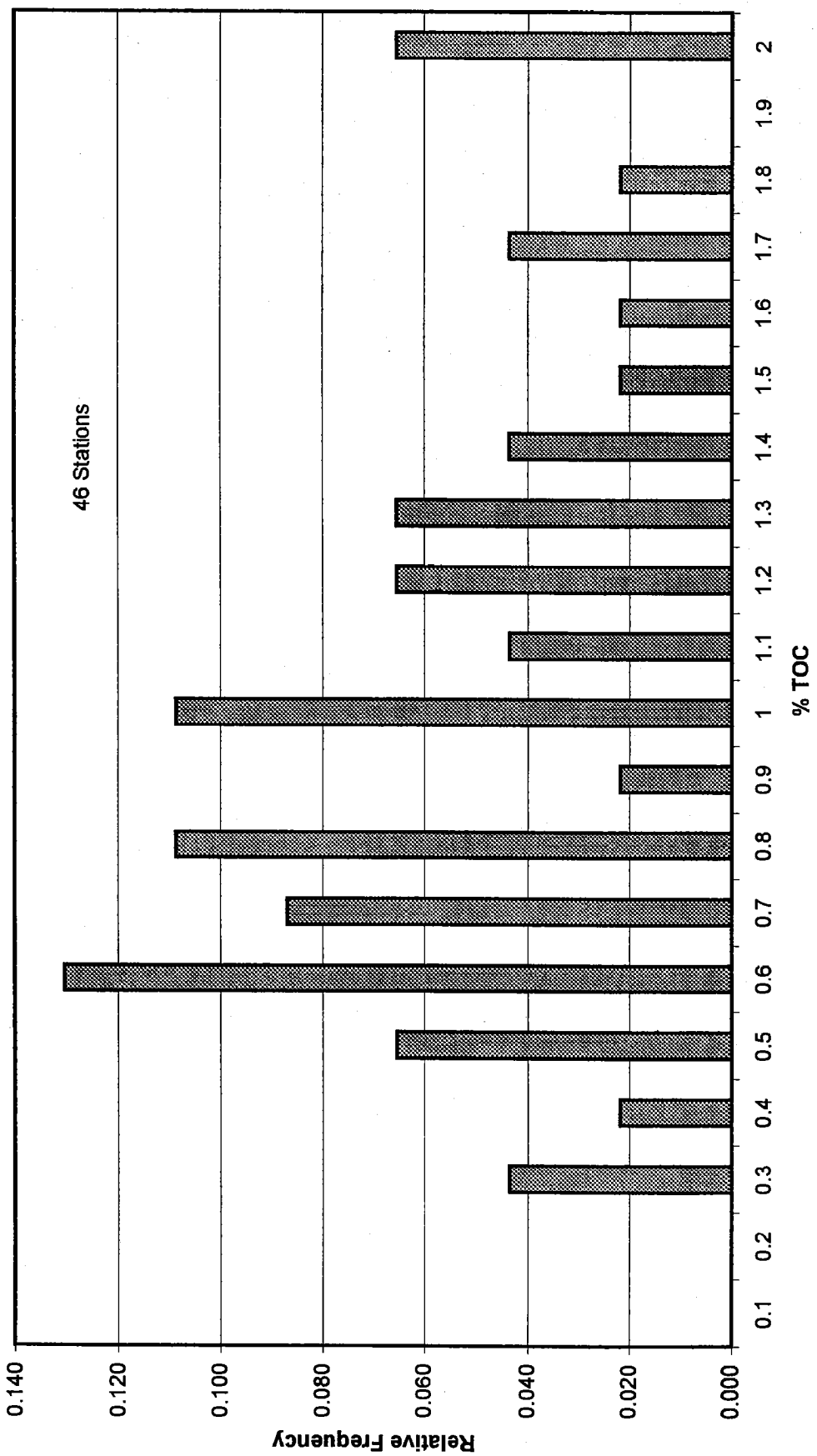


Figure 5
TOC vs. Fines San Diego Bay, Bight 98
46 Stations

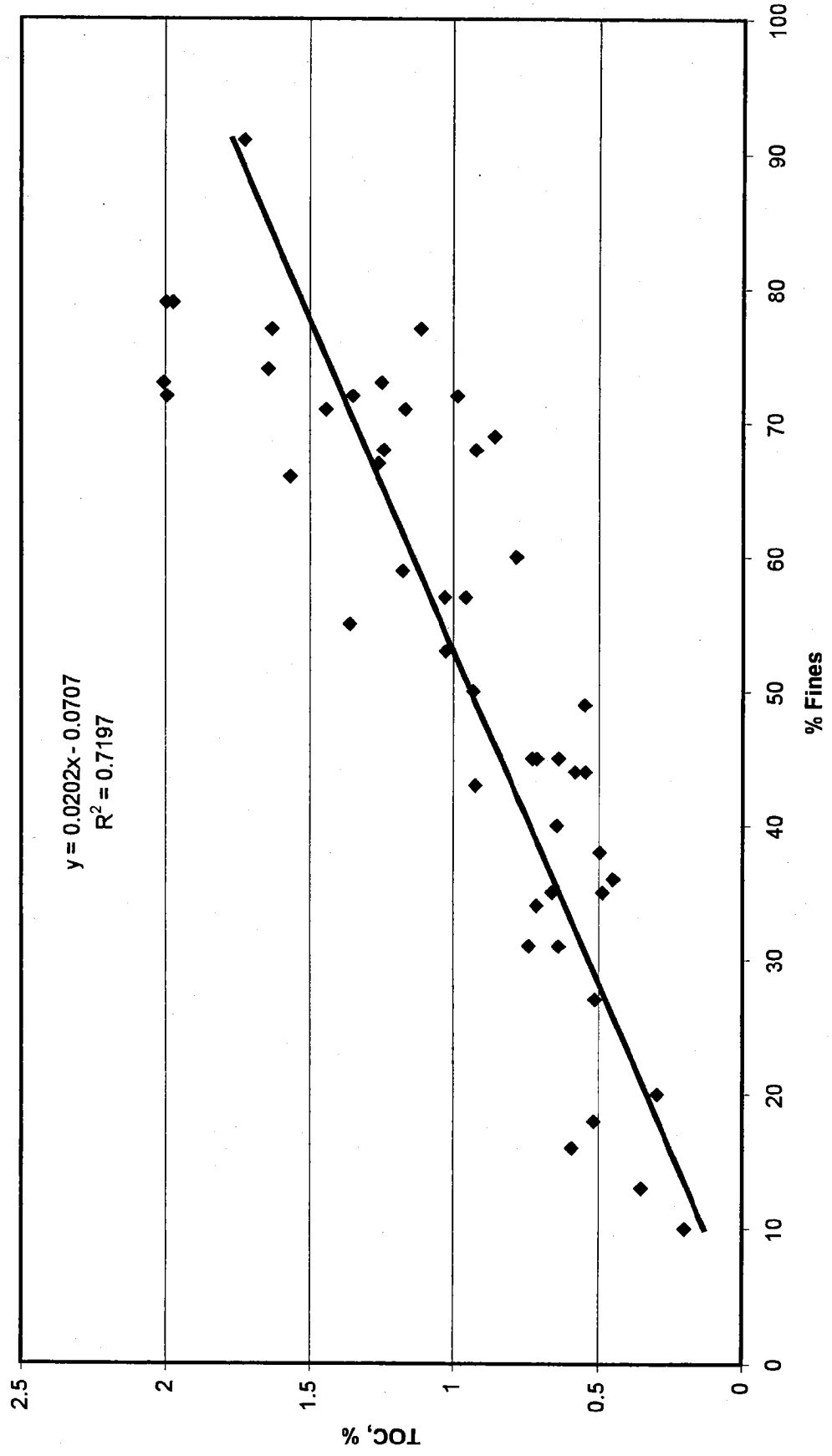


Figure 6
TOC vs Fines, NASSCO Shipyard

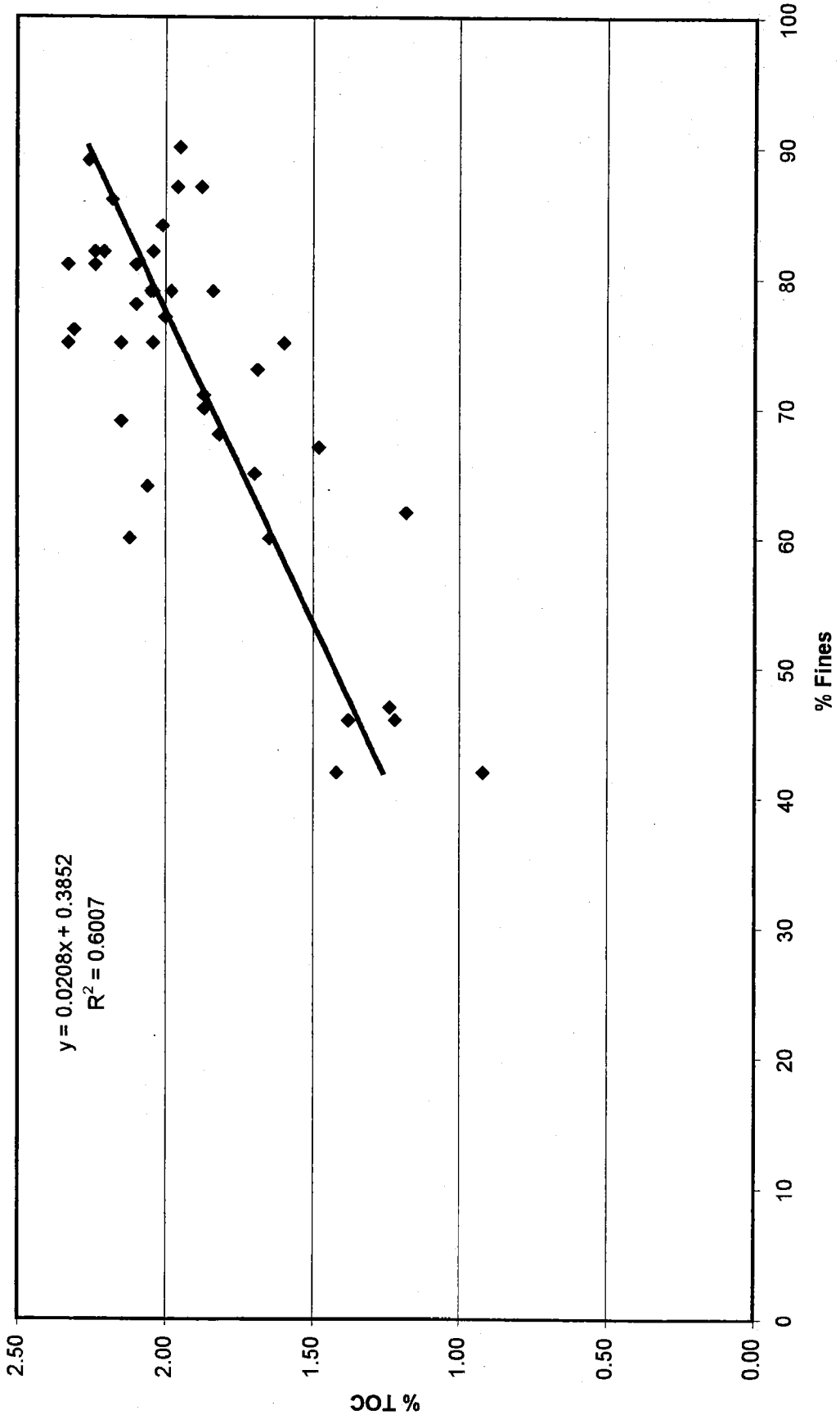


Figure 7
TOC vs Fines, SW Marine Shipyard

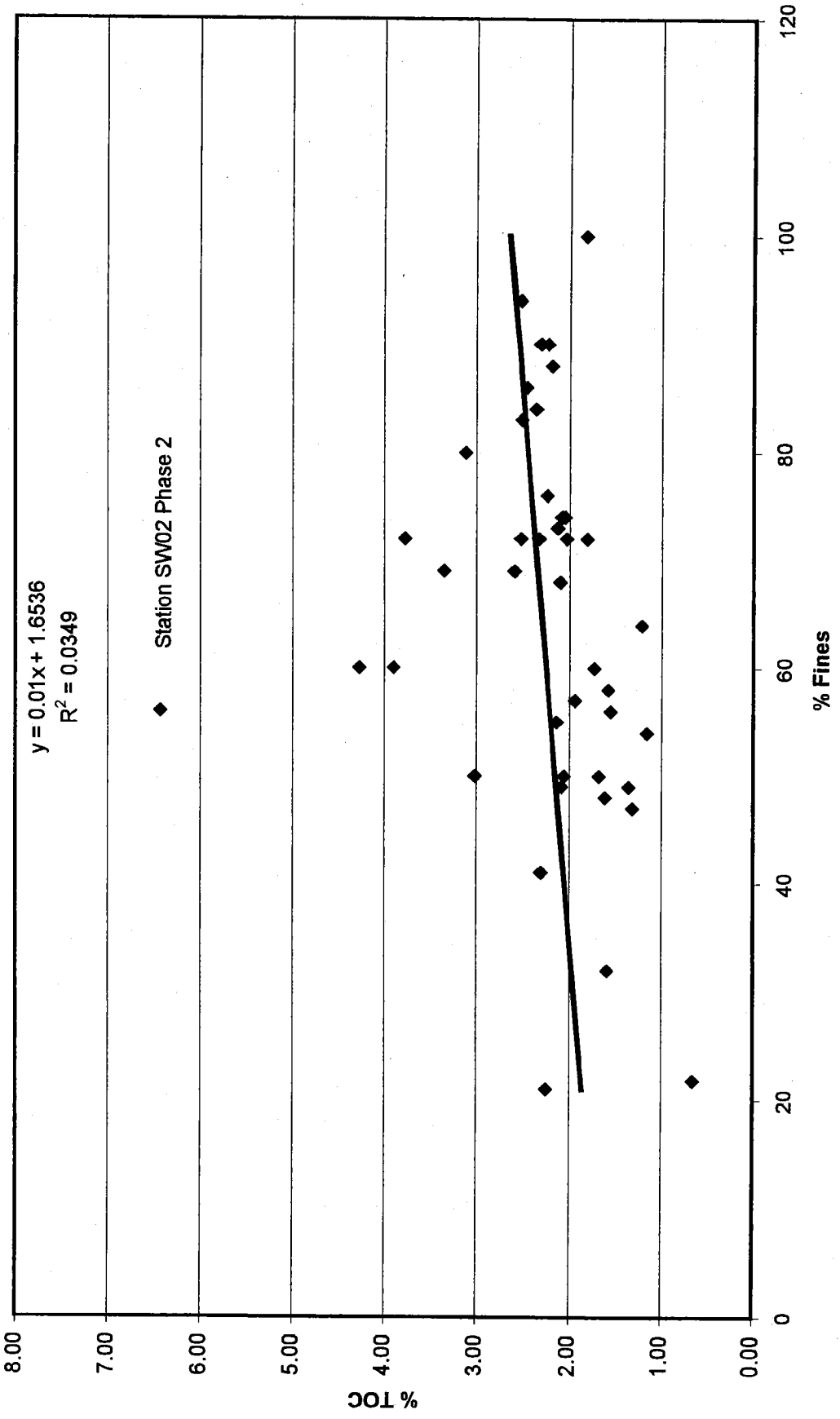


Figure 8
Relation of % Fines to Sum Metals Concentration
< 800 mg/kg & > 800 mg/kg , NASSCO

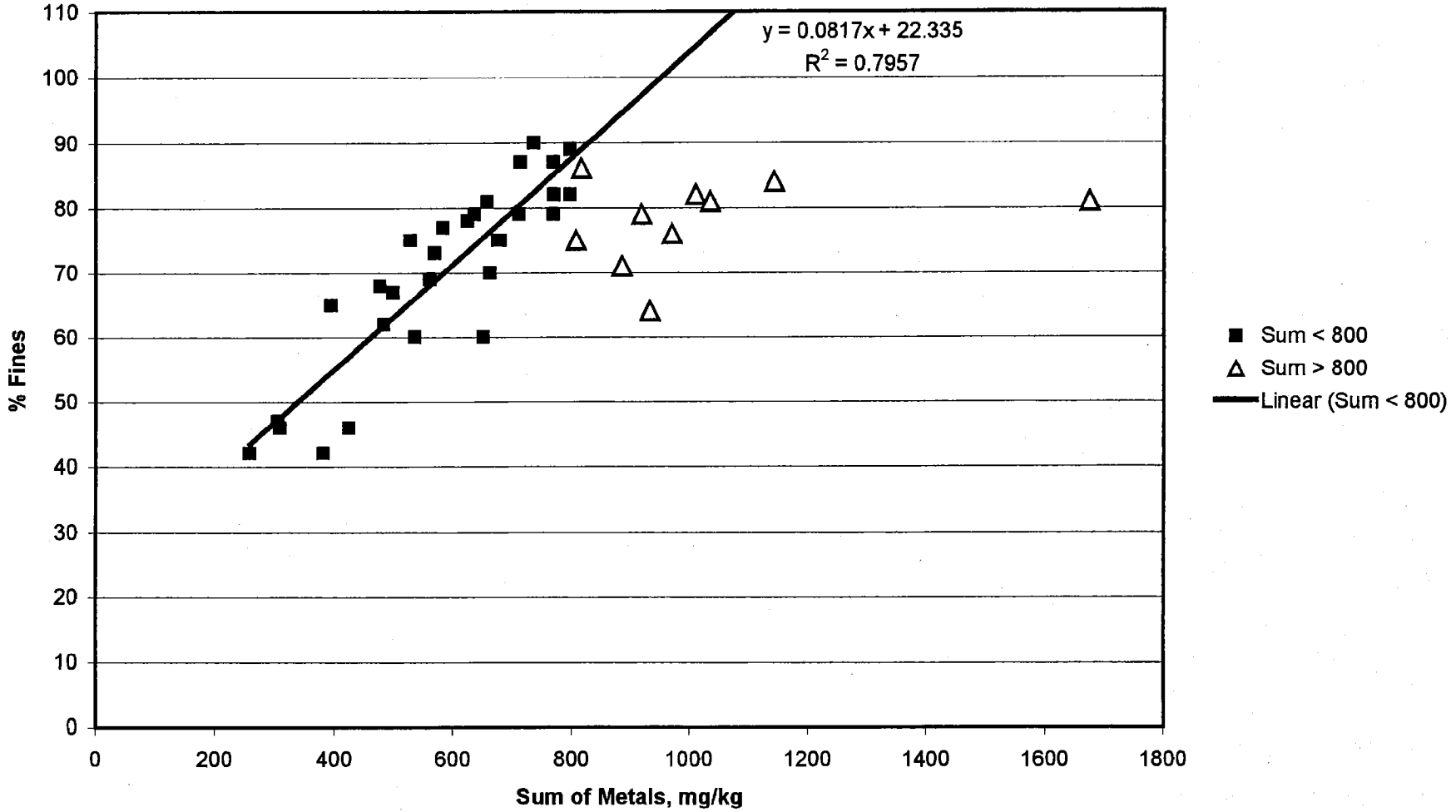


Figure 9
Relative Frequency Distribution Benthic Response Index, BRI, San Diego Bay Bight 98 and Shipyards

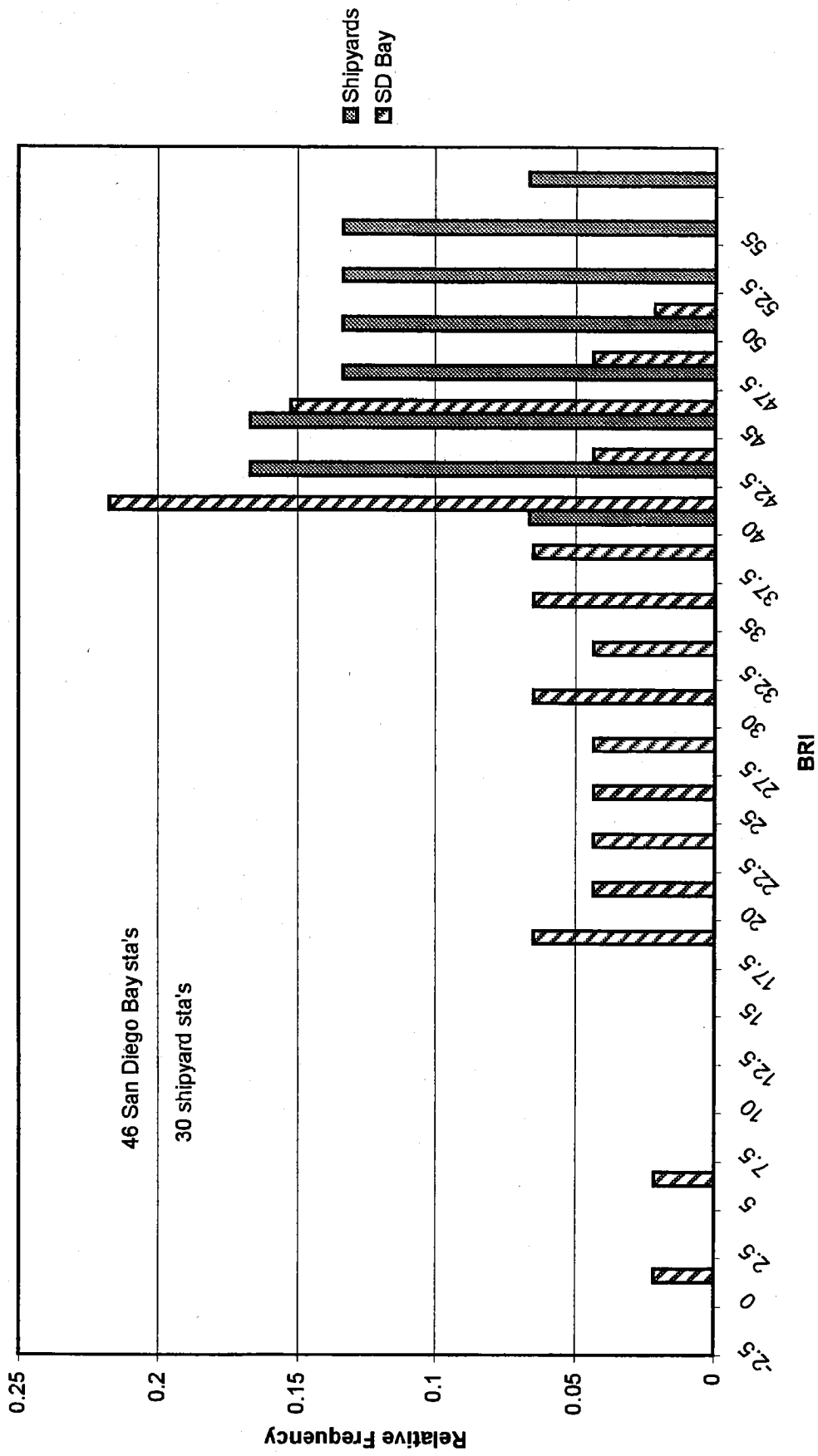


Figure 10
Frequency Distribution, Benthic Response Index, BRI,
Bay Council Reference Stations & Shipyard

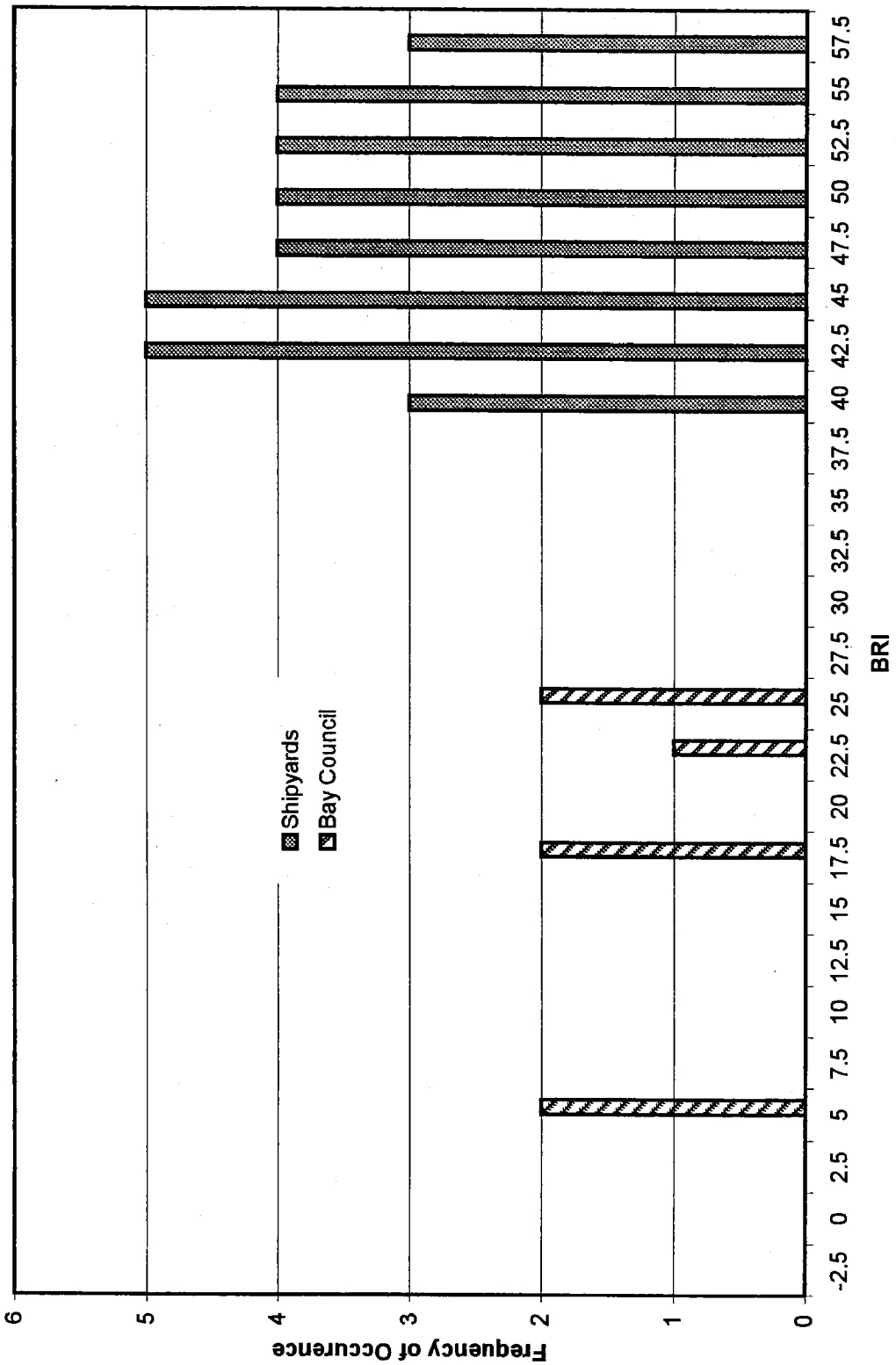
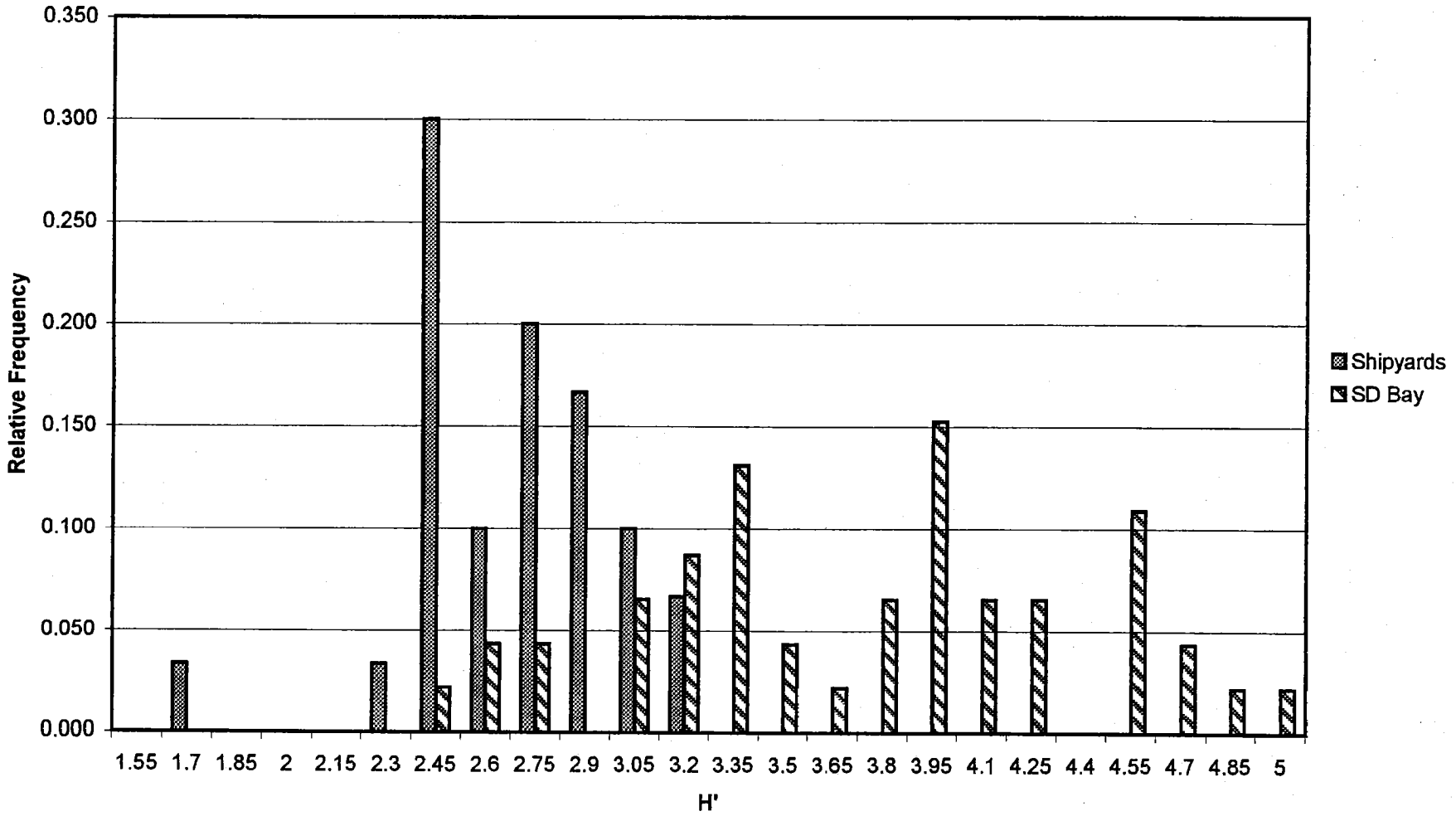


Figure 11
Relative Frequency Distribution, Shannon-Weaver Diversity Index , H',
Shipyards & San Diego Bay Bight 98



Appendix

1. Figure 1A. Relation Sum Metals to % TOC, Sum Metals <800 mg/kg, > 800 mg/kg, NASSCO
2. Figure 2A Relation Sum Metals to % TOC, Sum Metals < 855 mg/kg, >800 mg/kg, SW Marine
3. Figure 3A Relation Copper Concentration to % TOC < 240 mg/kg, > 240 mg/kg NASSCO
4. Figure 4A Relation Copper Concentration to % TOC < 280 mg/kg, > 280 mg/kg SW Marine

Figure 1A
Relation Sum Metals to %TOC, Sum Metal < 800 mg/kg & > 800 mg/kg
NASSCO

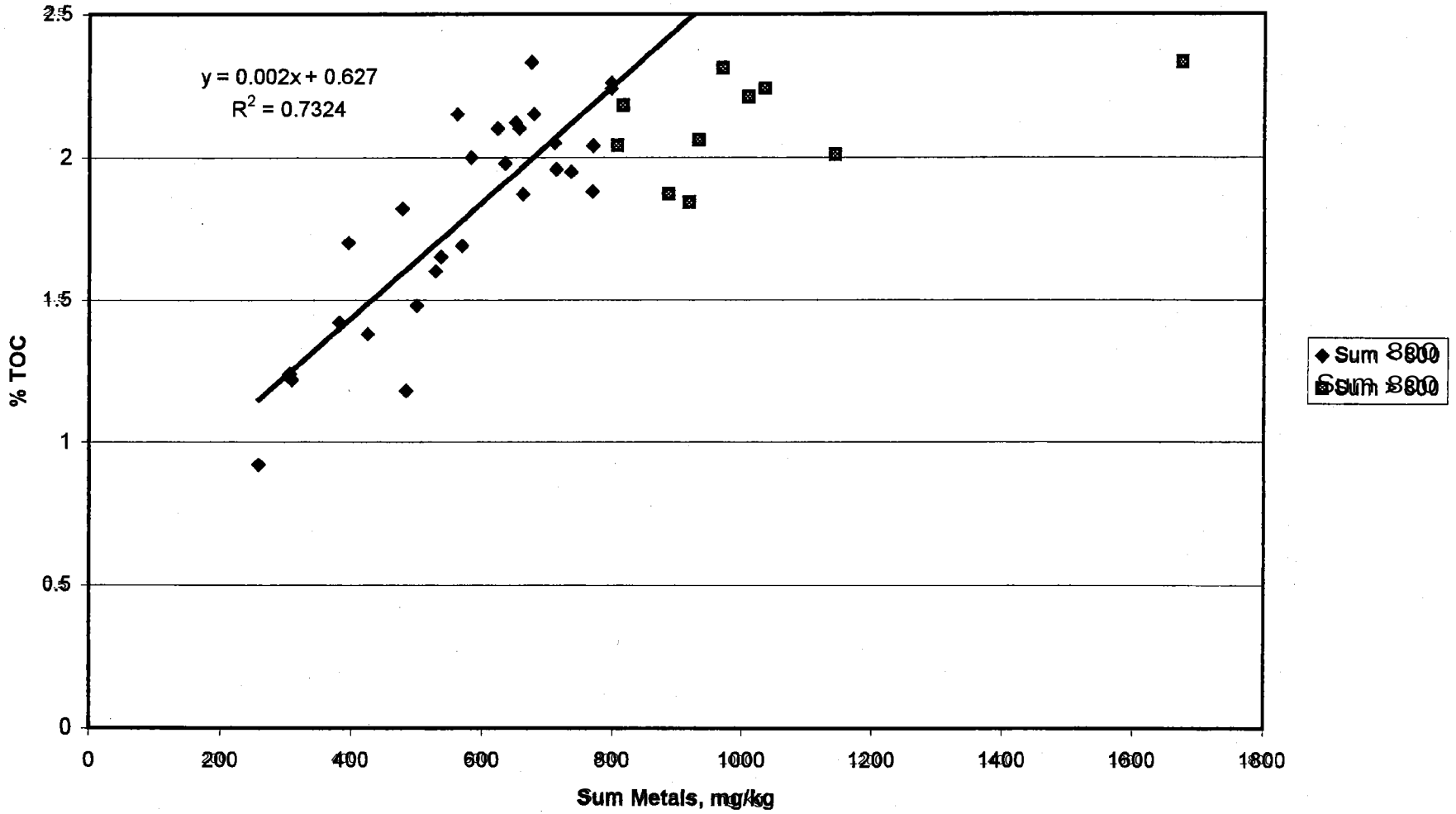


Figure 2A
Relation Sum Metals to %TOC for Sum Metals <855 & > 855 mg/kg, SW Marine

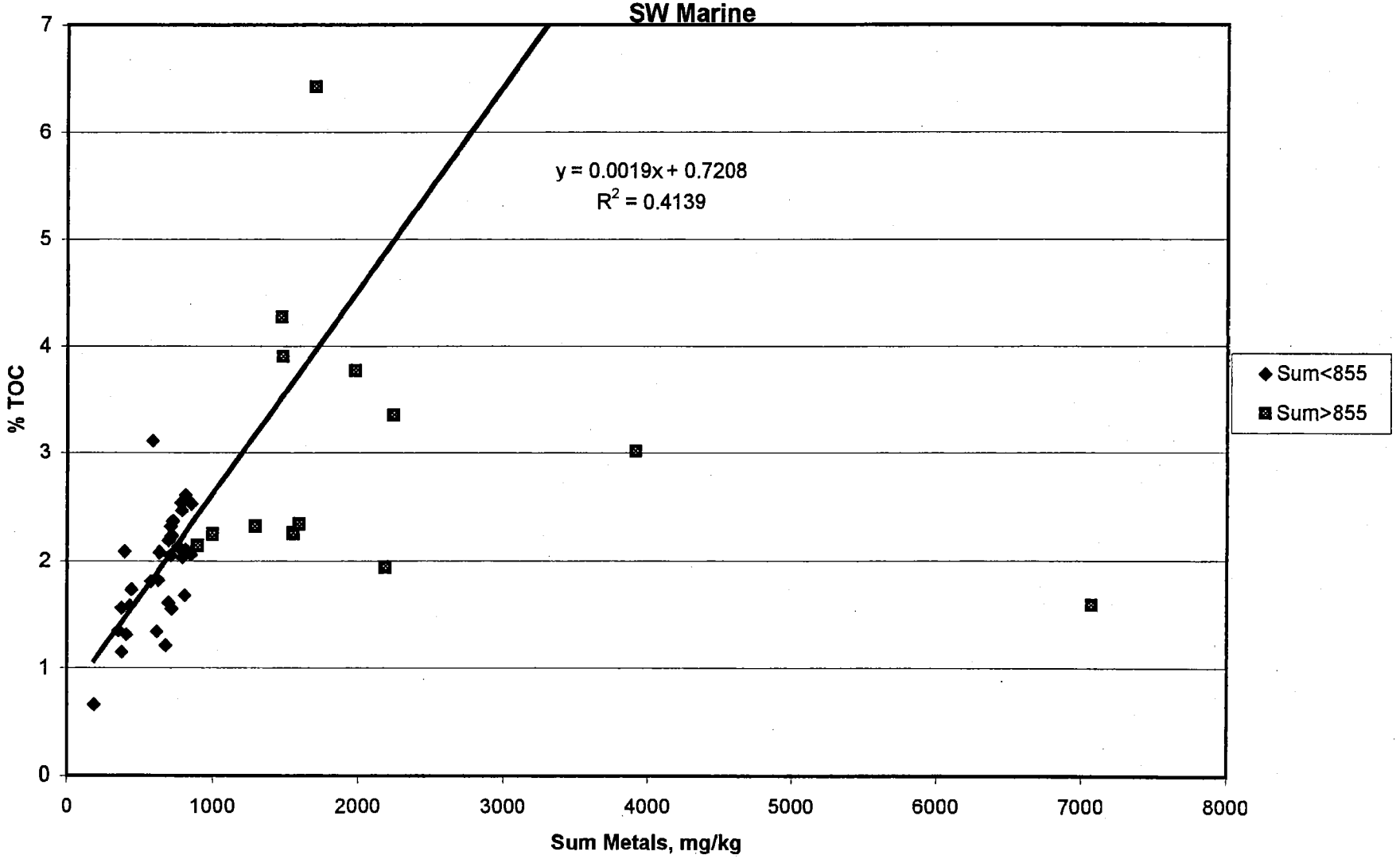


Figure 3A
Relation Copper Concentration to %TOC , < 240 mg/kg, > 240 mg/kg , NASSCO

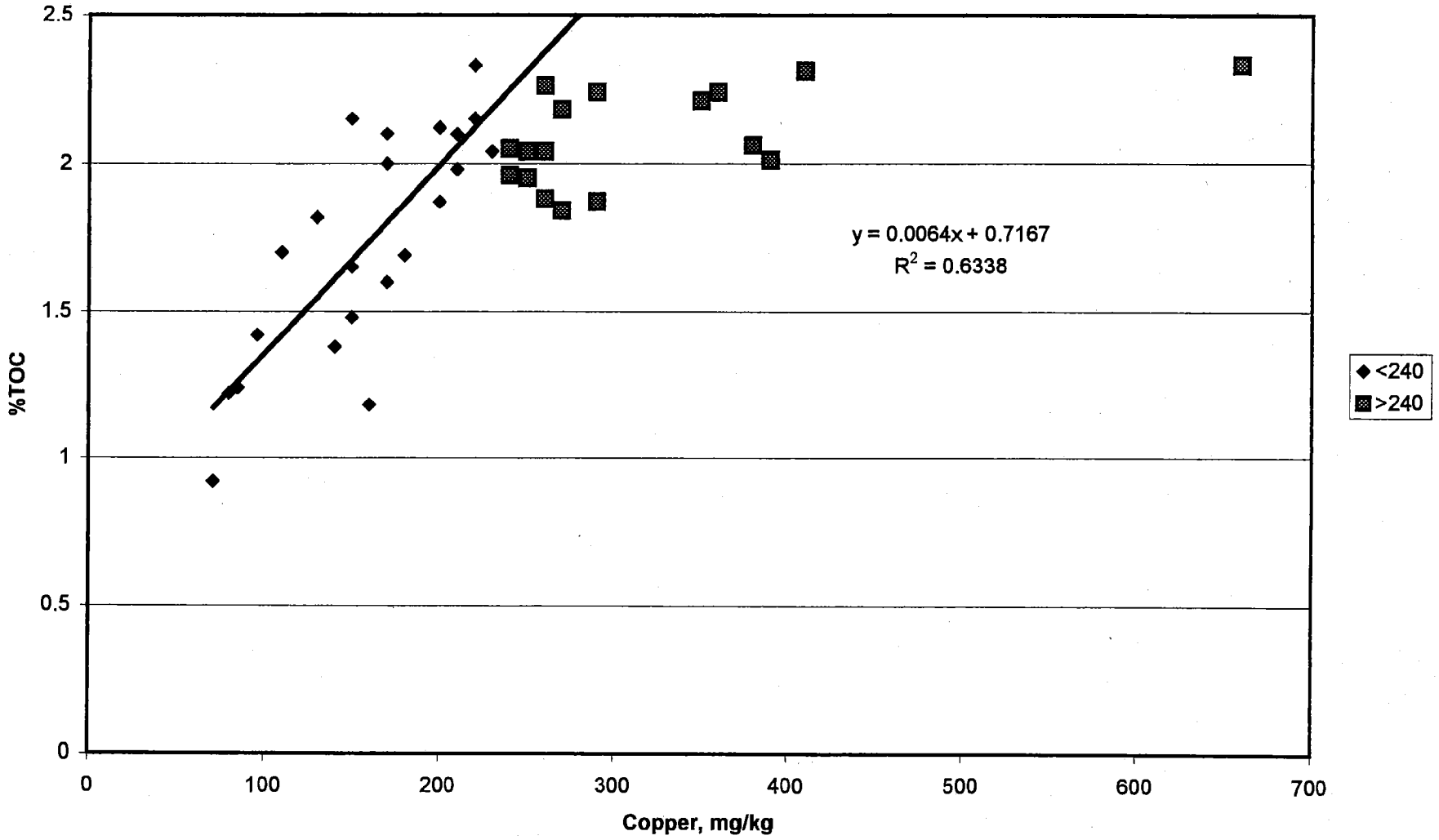
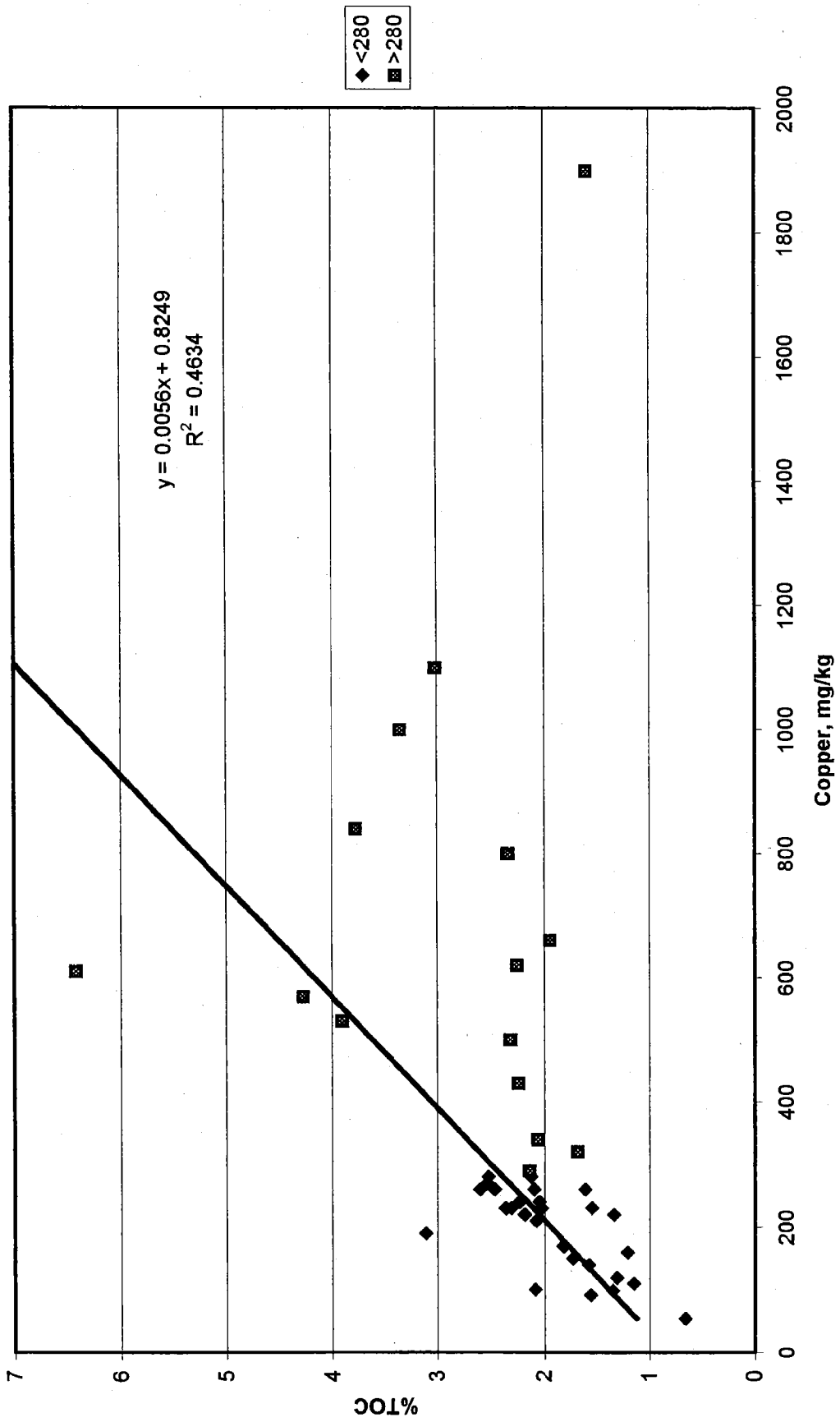


Figure 4A
Relation of Copper Concentration to to %TOC, < 280 mg/kg & > 280 mg/kg
SW Marine



Figures

Tables (By Reference)

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