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Monitoring Report for San Diego Creek and Newport Bay (per Newport Bay Toxics Settlement Agreement)

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~~April 29, 2003~~
Aug. 5, 2004 Update to include dieldrin and PCB results

FORWARD

This report compiles chemical monitoring results from several different entities as identified in the Appendices. As stipulated in the settlement agreement, EPA is providing these results to be included in California's next water quality assessment--305(b) report and 303(d) list. Readers looking for information regarding water quality conditions (based on these studies only) should review both the methodologies and benchmarks (Section IV) and assessment summary (Section V). The assessment results are chemical specific and do not compile information regarding toxicity.

See Newport Bay Toxics TMDLs available data (pp. 22-23) for results compiled and presented here in Assessment summary as of 6/10/01. Newer results (from the 4 named studies) are compiled and presented here as "Assessment summary as of 4/30/03."

NOTE: There are other monitoring data sets which are not included here but should also be reviewed to obtain all readily available data; e.g., more recent (post 1999) TSM and SMW data, (post 1999= year 1) OEHHA coastal fish project, (post 2000) OCPFRD water and sediment data, (post 1997) ACOE dredging data; any Western EMAP results; SCCWRP Rhine Channel characterization study; any other monitoring results for San Diego Creek and Newport Bay, including Rhine Channel.

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I. Summary

This report describes monitoring data compiled as outlined in the settlement agreement between EPA Region 9 and Defend the Bay, Inc. ("Plaintiff"). The overall goal of this monitoring is to obtain additional analytical results for seven target analytes, for which TMDLs were not developed as outlined in modification to Consent Decree No. C-97-3997 MMC. This report outlines sampling results from different events as well as the different environmental samples (water, sediment and tissue) collected by EPA or designees. Waterbodies of concern include San Diego Creek (freshwater), Upper and Lower Newport Bay, including Rhine Channel (all saltwater) within Orange County, California.

The information in this report is intended to assist in water quality assessment and planning within this watershed. Among other things, it is anticipated that this information will be considered (with other relevant data) by the Santa Ana RWQCB in its water quality assessment work pursuant to section 305(b) of the Clean Water Act, and its next listing of impaired waterbodies pursuant to section 303(d) of the Clean Water Act (currently expected to occur in 2004). As noted in the settlement agreement, EPA has not undertaken any obligation to prepare TMDLs for any of these analytes in the San Diego Creek/Newport Bay watershed.

For the seven target analytes (listed below), the analytical results were nearly all below the appropriate water standards, sediment guidelines or tissue screening values. In fact, for the organic compounds, nearly all results were not only below the media specific benchmark, but they were also below the detection limit, suggesting that ambient levels of these three compounds are not worthy of concern. For the metals, mercury is the only compound with some elevated sediment levels, whereas no detections in water were observed and all mercury tissue levels were below the tissue benchmarks.

We have included analytical results for many other trace metals and organic compounds, since the analytical methods produced the complete suite of chemical results. These additional results show elevated levels of DDT, chlordane and PAHs relative to the low sediment guidelines. Water quality exceedances of selenium in San Diego Creek continue to occur. We utilized the appropriate QC for sampling and analytical methods for dissolved metals, thus we have more evidence that copper is the only metal of concern in seawater.

II. Background

Pursuant to the above Consent Decree, EPA Region 9 has established TMDLs for certain toxicants in San Diego Creek and Newport Bay. In the subsequent modification to this consent decree, EPA Region 9 agreed to take actions in addition to those set forth in the Consent Decree, namely to assure monitoring data is collected from these water bodies for seven specific toxicants. These seven toxicants, hereby referred to as "target analytes" are:

Metals	Organics
Cadmium	Chlorpyrifos
Chromium	Endosulfan 1& 2
Mercury	Toxaphene
Silver	

The settlement agreement outlines some aspects of the monitoring to be completed by EPA Region 9. For example, the sample media type was prioritized with water samples (highest), fish samples (medium) and sediment samples (lowest). The sampling and analysis plan (SAP), previously shared with the Plaintiff and Santa Ana RWQCB, describes the sampling and analytical methods, minimum sample numbers, method detection limits etc. for each target analyte per sample type. The agreement also outlines the elements or studies EPA intended to pursue to accomplish the monitoring goals. Here is a brief overview of these sampling elements per settlement agreement, section 5, part c (i)--(iv).

i. Sediment TIE studies (including water samples) for Upper and Lower Newport Bay (SCCWRP contract with RB8)
ii. Fish bioaccumulation studies in Newport Bay for sport fish (human consumption) and forage fish (wildlife consumption) (SCCWRP contract with RB8)
iii. Freshwater samples in San Diego Creek for dry and wet weather samples (addendum to SCCWRP contract with RB8; requested and funded by EPA and RB8 to yield supplemental chemical analyses in freshwater samples)
iv. Water and sediment samples collected at Orange County NPDES permit monitoring stations (joint project by OCPFRD and EPA Region 9 to explore sampling and analytical QA/QC issues)

In a separate QA/QC section, this report explains results for several split-samples collected by EPA Region 9 and Orange County Public Facilities and Resource Division staff. We also provided QC reference samples to OCPFRD for "blind" analysis by their contract laboratory. The goal was to evaluate quality assurance and quality control aspects of the OCPFRD monitoring program and to provide recommendations as they start to develop the toxics sub-program of the existing stormwater program.

III. Studies and methods

Here we briefly describe our success at achieving the targeted goals outlined in the final Sampling and Analysis Plan (SAP). In general, we succeeded in collecting samples via the methods described in the final SAP. Analytical methods defined in 40 CFR Part 136 (or equivalent) were followed to assure data reliability, including low method detection limits for valid interpretation. (See Table 1 for chemical specific MDLs and methods.) Appropriate EPA-approved QA/QC measure s were utilized during both sample collection and sample analysis. Below we have summarized the sample methods per the four sample studies outlined above. More details are presented in the appendices, which describe the specific sampling and analytical methods, and present the analytical results. Please note the appendices also provide analytical results for chemicals other than the target ones mentioned above. The interpretation of these other chemical is also mentioned in the assessment section of this monitoring report.

Sediment TIE studies (including water samples) for Newport Bay

Sample collection occurred during three separate events in November 2001, March 2002 and May 2002. Sites included Upper Newport Bay, Lower Newport Bay and Rhine Channel. At each site, sediment and water samples were collected for chemical analysis. Sediment samples were composites of multiple grabs of top 2 cm. Water samples were grabs, collected from 2 to 3 meter depths; unfiltered samples for organics analysis and filtered samples for dissolved metals analysis. Unfiltered samples were also collected for total mercury analysis. Consistent with the SAP, all water samples were collected following EPA protocols for trace metal clean techniques.

Sediment-water interface samples were collected only during the November 2001 event. At each site, the overlying water (representing the sediment-water interface) was separated from sediment cores and filtered for dissolved metals analysis. For the November 2001 and March 2002 events, sediment samples were collected and analyzed for simultaneously extracted metals (SEM) and acid-volatile sulfides (AVS) to determine potential porewater toxicity for five metals (Cd, Cu, Ni, Pb, Zn). Sediment samples only were collected during the May 2002 event. See Appendix A.

Freshwater samples in San Diego Creek

Both dry and wet weather samples were collected from San Diego Creek at Campus Dr. For two separate dry weather events, samples were collected at the base of the bridge using ISCO samples; for each event a sample was taken in the morning and another taken 4 to 5 hours later. Filtration of metals samples occurred via in-line filters on site. Multiple (unfiltered) grab samples for hardness and organic analysis were composited in a five-gallon polycarbonate bottle and then aliquots were distributed into individual sample containers.

For wet weather, samples were collected from the Campus Drive bridge using a torpedo sampler lowered via a davit. Composites samples were obtained via multiple grabs transferred into a five-gallon polycarbonate bottle until full. Individual sample bottles were then filled from this composite bottle. Dissolved metals were collected from the composite by ISCO sampler with a 0.45 um in-line filter. Unfiltered samples were also collected for total metals, hardness, and total suspended solids. We collected both total and particulate samples for organic analyses. Two complete sample sets were collected during each storm event. All water samples for trace metal analysis were collected following clean techniques outlined in EPA Sampling Method 1669. All samples were stored on ice until transferred back to the lab and analyses began within 24 hours. Appropriate EPA-approved QA/QC measures were utilized and incorporated for saline water samples; e.g., removal of saltwater matrix interferents.

We targeted our sampling to concur with peak flow conditions by using some information provided by Orange County Stormwater monitoring group. During the first storm event (0.36" rain), March 7, 2002, we succeeded in capturing two freshwater samples (3 hours apart) near peak flow (approx. 200 cfs) conditions. However, during the second storm event (0.54" rain), November 8, 2002, we obtained two samples 5 hours apart during elevated flow rates (approx. 20 cfs), although these did not concur with peak flow conditions due to delayed rainfall during this storm. See Appendix B, figures 1 and 2.

Fish bioaccumulation studies in Newport Bay

Different sampling and handling methods were used to collect target species—sport fish versus forage species. Recreational or sport fish were collected summer 2001. Sport fish were collected from Upper and Lower Bay by boat using hook-and-line, long line, otter trawl and gill net. Fish were bagged in plastic bags, transported on ice to the lab, sorted and then frozen until processing. Composite samples were generated using 3 to 10 fish of same species; whereby in a given composite, the smallest fish was within 75% size of the largest consistent with EPA fish handling protocols (1995). All sport fish were skin-off muscle tissue samples.

Wildlife predator or forage fish were collected from Upper and Lower Bay in winter and summer 2002. Because forage fish are smaller and typically found in shallow water, they were collected by common seine, beach seine and lift net. These fish were bagged live, transported on ice to the lab, washed with deionized water, sorted into clean jars, and then frozen until processing. Composite samples were generated either by size (for larger species) or by weight (for smaller species). Forage fish from both seasons were combined and processed whole (skin-on).

We report chemical results for chlorpyrifos, endosulfan, toxaphene, cadmium and mercury for at least ten fish tissue samples. As a follow up to our previous decision to not develop arsenic TMDLs based on elevated total arsenic in fish tissue, we also report arsenic speciation results for ten sport fish samples. But here we have results of total arsenic and inorganic arsenic—both detected via direct analytical determination. This data set provides analytically measured (as opposed to calculated) inorganic arsenic values in fish tissue samples for a more appropriate comparison to human health screening values. See Appendix C, Table 8.

Water and sediment samples collected at Orange County NPDES stations

EPA collected split-samples with OCPFRD staff at freshwater and saltwater sites during several sampling events. Water column and sediment samples were collected at Orange County NPDES monitoring stations in both San Diego Creek and Newport Bay. A "split-sample" consists of two samples, collected concurrently and co-located using one sampling method into separate containers and then distributed to separate laboratories for analyses. Split samples are presumably of reasonable homogeneity since water samples are collected using steady water flow to fill alternating bottles; i.e., one for EPA then one for OCPFRD. Trace metal clean sampling techniques (EPA Method 1669) were used to collect grab water samples via either peristaltic pump and in-line filters (deep water) or via an intermediate container (manually submerged in shallow water). Grab surface sediment samples were obtained via methods similar to those described above in sediment TIE studies. To address sediment sample consistency, we obtained several samples from one site, mixed them together in one bucket and then took alternate aliquots to fill each Agency's container. Again, the goal was to provide technical assistance to OCPFRD staff regarding sampling methods, analytical results and method detection limits. These split-sample water and sediment results are included in our tally of ambient monitoring data. That is, EPA's analytical results for a split-sample collected in Lower Newport Bay were included in the final tally and assessment of that waterbody. See Appendix D.

In cooperation with OCPFRD, we also supplied seawater and estuarine reference water samples to their contract lab for dissolved metals analyses. These samples were submitted "blind" to evaluate the contract laboratory's analytical capability to accurately determine dissolved metals in matrices with a range of salinity, from seawater at 35 ppt to estuarine water at 15 ppt. These blind samples were actually standard reference materials generated by National Research Council Canada, thus we know the actual values (from NRCC) and compare the actual values to the contract lab results. To clarify discussion, we have termed these as "QC reference samples," and these two were not included in our assessment of ambient water quality conditions.

Table 1. Requested analytical MDLs and analytical methods. Also provided are the chemical-specific water quality standards, sediment quality guidelines, and tissue screening values.

Water Samples: metals will be dissolved (<0.45 um filter); organic will be total (unfiltered)

Element	Chronic Freshwater WQS (ug/L)	MDL (ug/L)	Chronic Saltwater WQS (ug/L)	MDL (ug/L)	Suggested EPA method(s)
Cadmium*	3.45	0.3	9.3	4	200.8; 602; 1638; 1640
Chromium#	11	5	50	50	
Silver*	9.0	1	1.9	0.2	
Mercury	0.77	0.1	0.94	0.1	1631
Hardness					130.2
TSS					160.2
Chlorpyrifos	14 (ng/L)	0.1	9 (ng/L)	0.1	614; 8141
Endosulfan I II	0.22	0.05	0.034	0.006	608 or 1625
Toxaphene	0.0002	0.0001	0.0002	0.0001	

*hardness dependent, assumed value = 175 ppm (in unfiltered sample)
#value is for Cr (VI), Cr-tot value = 565 ug/L for chronic freshwater

Sediment Samples:

Element	Freshwater Sediment Quality Guideline (mg/ dry kg)	MDL (mg/ dry kg)	Saltwater Sediment Quality Guideline (mg/ dry kg)	MDL (mg/ dry kg)	Suggested EPA method(s)
Cadmium	0.596	0.1	0.67	0.1	3050; 3051 = prep; 6020 = analysis
Chromium	37.3	10	52.3	10	
Silver	N/a		N/a		
Mercury	0.174	0.05	0.13	0.05	7473* or equiv.
Chlorpyrifos	N/a		N/a		3510; 3540 = prep 8141 = analysis
Endosulfan (I & II)	N/a		N/a		3510; 3540 = prep 8081; 8270 = analysis
Toxaphene	N/a		N/a		

Sediment quality guidelines from NOAA (Buchmann 1999)
*7473 method for mercury in solids includes preparatory protocol

Tissue Samples:

Element	Screening Value (mg/kg ww)	MDL (mg/kg ww)	Suggested EPA method(s)
Cadmium	3.0	1.0	3050; 3051 = prep; 6020 = analysis
Selenium	2.0	0.2	
Mercury*	0.3	0.05	7473 or equiv
Chlorpyrifos	10,000 ppb	2 (ng/g ww)	3545 = prep; 8081; 8270 = analysis
Endosulfan-tot	20	2 (ng/g ww)	
Toxaphene	0.030	10 (ng/g ww)	

*EPA screening value; otherwise all values from OEHHA

Note: EPA has promulgated analytical methods for NPDES monitoring for water samples; however, similar methods have not been promulgated for other sample types such as sediments and fish tissue. Analytical methods for solid waste, provided in SW-846, serve as guidance and are commonly used for determining chemical concentrations in sediment and tissue samples.

IV. Assessment methodology

EPA has compiled all analytical results from the above sampling events and provides at the minimum an assessment of the seven target analytes. We have followed the same assessment methodology as previously described in the Decision Document for Newport Bay Toxics (June 2001). This two tiered assessment methodology relies on comparing analytical results for each media relative to existing water quality standards, sediment guidelines or tissue screening values. Water column results were compared to water quality defined in California Toxics Rule (USEPA 2000a). Fish tissue results were compared to the lower screening values as determined by EPA (2000b) and OEHHA (1999). Sediment results were compared to sediment quality guidelines (ERLs and ERMs) presented by NOAA (Buchman 1999).

Freshwater sample results for dissolved metals were evaluated using the corresponding sample hardness values to determine the appropriate water quality standards (determined via equations presented) in CTR (US EPA 2000a). The maximum hardness value used was 400 mg/L; consistent with the maximum value allowed in CTR. Freshwater results from dry weather samples were compared with chronic standards. Results from wet weather samples were compared with acute standards as well as chronic standards. Saltwater results were be compared with both acute and chronic water quality standards defined in CTR (hardness is irrelevant for saline samples).

As previously mentioned, we have included results for many other analytes in the appendices, since the laboratory methods often yield the complete suite of results. For these other analytes, we have provided a discussion of those with elevated concentrations only; i.e., levels above the benchmarks mentioned above.

Table 2.

Two-tiered approach to assessment of monitoring data for Newport Bay and its watershed			
	Water Quality	Sediment Quality	Tissue Results
Tier 1 Impairment to Aquatic Life or Probable Adverse Human Health effects	>10% samples* exceed CTR values OR water TIEs clearly demonstrate toxicant	sediment triad or TIE studies clearly demonstrate toxicant OR >25% samples# exceed high SQGs (or ESG values)	posted consumption advisory$^{\delta}$ OR >25% samples# above tissue screening values
Tier 2 Possible Effects to Aquatic Life or Human Health	two or more samples* exceed applicable CTR values within six years	>10% samples above *both* low SQGs OR toxicity evident and sediment chemistry results provided, but no TIEs	>10% samples above fish tissue OR Shellfish values
Comment TMDL can triggered by one category in Tier 1 but needs two categories in Tier 2	see CTR for full discussion of acute and chronic values; Freshwater metals values are hardness dependent	ESGs from EPA (draft 2001a) High SQGs = PELs/ERMs/AETs; low SQGs = ERLs/TELS	Use lowest value of EPA, OEHHA, US F&W, MTRL or MIS.

NOTE: For TIER 1 requires minimum number of 10 samples within each category. If insufficient data exist then assessment defaults into TIER 2 or inconclusive.

V. Assessment Summary

See Newport Bay Toxics TMDLs available data (pp. 22-23) for results compiled and presented here in Assessment summary as of 6/10/01. Newer results (from the 4 named studies) are compiled and presented here as "Assessment summary as of 4/30/03."

Arsenic (As) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/12) water quality criteria exceedances

Upper Newport Bay
No (0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low SQGs
No (0/10) inorganic As tissue exceedances in sport fish vs. inorganic As value (1.2 ppm)

Lower Newport Bay
No (0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/3) sediment results above low SQGs.
No (0/10) inorganic As tissue exceedances in sport fish vs. inorganic As value (1.2 ppm)

Rhine Channel
No (0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low SQGs = TIER 2

Arsenic (As) **Assessment Summary as of 6/10/01**

San Diego Creek Recommendation: stay off list
No (0/62) water quality criteria exceedances
Sediment results (2/2) inconclusive vs. freshwater SQGs
No (0/15) tissue exceedances vs. total As screening value in past five years
7% (1/15) tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Upper Newport Bay Recommendation: no TMDL
No (0/6) water quality criteria exceedances
12% (1/8) sediment results above low SQGs = TIER 2
55% (5/9) tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Lower Newport Bay Recommendation: no TMDL
no (0/3) water quality criteria exceedances
68% (17/25) sediment results above low SQGs. = TIER 2
36% (8/22) tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Rhine Channel Recommendation: no TMDL
no water column data
(2/2) sediment results above low SQGs = TIER 2
9% (1/11) shellfish tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Cadmium (Cd) Assessment Summary as of 4/30/03

San Diego Creek
no water quality criteria exceedances -- (0/4 acute; 0/12 chronic) based on hardness adjusted CTR freshwater standard.
No (0/2) sediment results above low freshwater SQGs

Upper Newport Bay
no (0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low SQGs
Acid volatile sulfide (4/4) results indicate no porewater problem due to Cd
No (0/23) tissue exceedances in sport fish and forage fish

Lower Newport Bay
no (0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
no (0/3) sediment results above low SQGs
No (0/51) tissue exceedances in sport fish and forage fish

Rhine Channel
no (0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
no (0/2) sediment results above low SQGs
Acid volatile sulfide (1/1) results indicate no porewater problem due to Cd

Cadmium (Cd) Assessment Summary as of 6/10/01

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances -- (1/347 acute; 0/90 chronic) based on CTR std.
Many water quality criteria exceedances (6/347 acute; 23/23 chronic) based on more recent EPA criteria value; therefore threatened waterbody = Tier 2
46% (12/26) sediment results above low freshwater SQGs = TIER 2
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: yes TMDL
no (0/10) water quality criteria exceedances
21% (8/42) sediment results above low SQGs = TIER 2
No (0/15) tissue exceedances in past five years
Sediment data indicate potential threat to UNB, and substantial evidence of impairment in San Diego Creek, therefore TMDL warranted based on adjacent waters analysis.

Lower Newport Bay Determination: no TMDL
no (0/6) water quality criteria exceedances; no porewater results above saltwater chronic CTR values
30% (8/27) sediment samples above low SQGs = TIER 2
acid volatile sulfide and porewater results indicate no problem
No (0/20) tissue exceedances in past five years

Rhine Channel Determination: no TMDL
no reliable water column data
15% (2/15) sediment results above low SQGs = TIER 2
acid volatile sulfide and porewater results indicate no problem
No (0/13) shellfish tissue exceedances in past five years

Chromium (Cr) **Assessment Summary as of 4/30/03**

San Diego Creek
no water quality criteria exceedances -- (0/4 acute; 0/12 chronic) based on hardness adjusted CTR freshwater standard.
no (0/2) sediment results above low freshwater SQGs

Upper Newport Bay
no (0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
no (0/2) sediment results above low SQGs
No tissue analyses for Cr in sport fish and forage fish, since Cr does not bioaccumulate

Lower Newport Bay
no (0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/3) sediment results above low SQGs
No tissue analyses for Cr in sport fish and forage fish, since Cr does not bioaccumulate

Rhine Channel
No (0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low SQGs

Chromium (Cr) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: no TMDL
no water quality criteria exceedances – (0/269 for Cr-tot and 0/30 for Cr(VI) and Cr(III))
[OCPFRD field screening data of Cr(VI) in SDC tributaries showed false positives results (26%) due to interferences with analytical technique.]
1% (3/94) sediment results above freshwater SQGs
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: no TMDL
no (0/10) water quality criteria exceedances
no (0/42) sediment results above low SQGs
10% (1/10) tissue exceedance in past five years = TIER 2

Lower Newport Bay Determination: no TMDL
no (0/6) water quality criteria exceedances
4% (1/27) sediment results above low SQGs
20% (2/10) tissue exceedances in past five years = TIER 2

Rhine Channel Determination: yes TMDL
no reliable water column data
8% (1/13) sediment results above low SQGs
31% (4/13) shellfish tissue exceedances in past five years = **TIER 1**

Mercury (Hg) **Assessment Summary as of 4/30/03**

San Diego Creek
No water quality criteria exceedances -- (0/4 acute, 0/12 chronic) based on CTR std.

Upper Newport Bay
No (0/7) water quality criteria exceedances vs. CTR saltwater standard
No (0/2) sediment results above low SQGs
No (0/23) tissue exceedances in sport fish and forage fish

Lower Newport Bay
No (0/2) water quality criteria exceedances
33% (1/3) sediment results above low SQGs
No (0/51) tissue exceedances in sport fish and forage fish

Rhine Channel
no (0/3) water quality criteria exceedances
100% (2/2) sediment results above high SQGs

Mercury (Hg) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: no TMDL
no (0/62) water quality criteria exceedances
no (0/2) sediment results above freshwater SQGs
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: no TMDL
no water column data available
no (0/2) sediment results above low SQGs
10% (1/10) tissue exceedances in past five years = TIER 2

Lower Newport Bay Determination: no TMDL
no water column data available
36% (5/14) sediment exceedances above low SQGs = TIER 2
No (0/23) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no water column data available
(5/5) sediment results *above high* SQGs = TIER 2 or TIER 1 based on magnitude of exceedences all values show very high exceedances (>3.4 ppm) vs. ERM value (0.71 ppm), indicating substantial threat. TMDL warranted based on observed magnitude of sediment levels, which are at least 5 times higher than screening values
No (0/12) shellfish tissue exceedances in past five years

Silver (Ag) **Assessment Summary as of 4/30/03**

San Diego Creek
no water quality criteria exceedances -- (0/12 acute) based on hardness adjusted CTR freshwater standard (no chronic std)

Upper Newport Bay
no (0/7 acute) water quality criteria exceedances-- (no CTR saltwater chronic standard)
no (0/2) sediment results above low saltwater SQGs
No tissue analyses for Ag in sport fish and forage fish, since Ag does not bioaccumulate

Lower Newport Bay
No (0/2 acute) water quality criteria exceedances-- (no CTR saltwater chronic standard)
No (0/3) sediment results above low SQGs
No tissue analyses for Ag in sport fish and forage fish, since Ag does not bioaccumulate

Rhine Channel
No (0/3 acute) water quality criteria exceedances-- (no CTR saltwater chronic standard)
No (0/2) sediment results above low SQGs

Silver (Ag) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: no TMDL
(1/338) acute water exceedance but no chronic exceedences
Virtually all sediment results below detection limits and inconclusive since no freshwater SQG
No tissue screening value for comparison

Upper Newport Bay Determination: no TMDL
no (0/7) water quality criteria exceedances
9% (4/42) sediment result above low saltwater SQGs
No tissue screening value for comparison

Lower Newport Bay Determination: no TMDL
no (0/3) water quality criteria exceedances
no (0/27) sediment results above low saltwater SQGs
no acid volatile sulfide results for silver; porewater results show no problem
No tissue screening value for comparison

Rhine Channel Determination: no TMDL
no reliable water column data
31% (4/13) sediment results above low saltwater SQGs = TIER 2
no acid volatile sulfide results for silver; porewater results show no problem
No tissue screening value for comparison

Chlorpyrifos Assessment Summary as of 4/30/03

San Diego Creek
No water quality exceedances-- (0/8 acute; 0/8 chronic) freshwater chronic target of 14 ng/L
No (0/0) detections but results inconclusive, no sediment criteria guidelines available

Upper Newport Bay
No (0/23) tissue exceedances of OEHHA screening value (10,000 ppb)

Lower Newport Bay
No (0/51) tissue exceedances of OEHHA screening value (10,000 ppb)

Chlorpyrifos Assessment Summary as of 6/10/01

San Diego Creek Determination: yes TMDL
Water Quality: 44% (34/78) exceed acute freshwater numeric target of 20 ng/L = **TIER 1**
(this includes some non-detects with MDL = 40 ng/L) (2/2) detections but results inconclusive, no sediment criteria guidelines available
no (0/34) tissue exceedances of OEHHA screening value (10,000 ppb)

Upper Newport Bay Determination: yes TMDL
Water Quality: 92% (22/24) exceed acute saltwater numeric target of 11 ng/L = **TIER 1**
No sediment data
Tissue: (0/14) tissue exceedance of OEHHA screening value (10,000 ppb)

Lower Newport Bay Determination: no TMDL
no data

Rhine Channel Determination: no TMDL
no data

Endosulfan (total) Assessment Summary as of 4/30/03

San Diego Creek
No (0/8) water quality criteria exceedances of total endosulfan (sum of endosulfate, endosulfan-I and endosulfan-II)
No (0/2) sediment results above detection limit and inconclusive since no freshwater SQG

Upper Newport Bay
No water quality data
No (0/6) sediment results above detection limit and inconclusive since no freshwater SQG
No (0/23) tissue exceedances in sport and forage fish

Lower Newport Bay
No water quality data
No (0/5) sediment results above detection limit and inconclusive since no saltwater SQG
No (0/51) tissue exceedances in sport and forage fish

Rhine Channel
No water quality data
No (0/4) sediment results above detection limit and inconclusive since no saltwater SQG

Endosulfan (total) Assessment Summary as of 6/10/01

San Diego Creek Determination: no TMDL
no water quality criteria exceedances of endosulfan α and β, nor endosulfate
6% (5/84) sediment results maybe detection, yet inconclusive since no freshwater SQG
no (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: no TMDL
no water quality data
(3/36) sediment results maybe detection, yet inconclusive since no saltwater SQG
No (0/6) tissue exceedances in past five years

Lower Newport Bay Determination: no TMDL
no water quality data
no (0/12) sediment results above detection limit and inconclusive since no saltwater SQG
no (0/19) tissue exceedances in past five years

Rhine Channel Determination: no TMDL
no water data
no (0/10) sediment results above detection limit and inconclusive since no saltwater SQG
no (0/10) tissue exceedances in past five years

Toxaphene Assessment Summary as of 4/30/03

San Diego Creek
No water quality criteria exceedances
(2/2) sediment results inconclusive vs. freshwater SQG

Upper Newport Bay
No water quality data
No (0/6) sediment results above detection limit and inconclusive since no saltwater SQG
No (0/23) tissue exceedances in sport and forage fish

Lower Newport Bay
No water quality data
No (0/5) sediment results above detection limit and inconclusive since no saltwater SQG
No (0/51) tissue exceedances in sport and forage fish

Rhine Channel
No water quality data
No (0/4) sediment results above detection limit and inconclusive since no saltwater SQG

Toxaphene Assessment Summary as of 6/10/01

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances
(2/2) sediment results inconclusive vs. freshwater SQG
87% (13/15) tissue exceedances in past five years = **TIER 1**

Upper Newport Bay Determination: no TMDL
no water quality data
all (0/6) sediment results were non-detect, but no saltwater SQG
17% (1/6) tissue exceedances in past five years = TIER 2

Lower Newport Bay Determination: no TMDL
no water quality data
all (0/10) sediment results were non-detect, but no saltwater SQG
no (0/23) tissue exceedances in past five years

Rhine Channel Determination: no TMDL
no water quality data
(0/2) sediment results were non-detect, but no saltwater SQG
20% (2/10) tissue exceedances in past five years = TIER 2

Ancillary data **Summary as of 4/30/03**

San Diego Creek
Total organic carbon (TOC) in water = 11-16 mg/L; DOC in water = 12 mg/L
Total suspended solids (TSS) in wet weather range = 38 - 62 mg/L, dry weather = 41—82.
Hardness in wet weather typically near 180 mg/L; dry weather = greater than 400 mg/L

Upper Newport Bay
Total organic carbon (TOC) in sediment = 1.1 - 2.3% (n=3)

Lower Newport Bay
Total organic carbon (TOC) in sediment = 0.65 - 1.5% (n=3)

Rhine Channel
Total organic carbon (TOC) in sediment = 1.6% (n=3)

PAHs **Assessment Summary as of 4/30/03**

San Diego Creek
No water data
No sediment data

Upper Newport Bay
No water data
No (0/4) sediment results above low SQGs

Lower Newport Bay
No water data
No (0/3) sediment results above low SQGs

Rhine Channel
No water data
(1/4) sediment results above low SQGs; 4 individual HiPAHs and 4 individual LoPAHs above ERL values

Chlordane **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/8) Chlordane compounds detected in dry and wet weather samples at Campus Dr.
(1/2) results above *high* SQGs (in Central Irvine Channel); (1/2) above low SQGs

Upper Newport Bay
No (0/1) Chlordane compounds detected in water samples
(1/6) results above *high* SQGs; (5/6) above low SQGs
~~Fish tissue results still pending~~
No (24/74) tissue exceedances in sport and forage fish collected in Upper and Lower Bay

Lower Newport Bay
No water data
(1/5) results above *high* SQGs; (4/5) above low SQGs
~~Fish tissue results still pending~~

Rhine Channel
No (0/1) Chlordane compounds detected in water samples
(0/4) results above *high* SQGs; (4/4) above low SQGs

Chlordane **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no (0/6) water quality criteria exceedances
sediment results (2) inconclusive vs. freshwater SQG
40% (6/15) tissue exceedances in past five years = **TIER 1**

Upper Newport Bay Determination: yes TMDL
no water column data
56% (13/23) above high SQGs = **TIER 1** (see Masters and Inman data)
No (0/6) tissue exceedances in past five years

Lower Newport Bay Determination: yes TMDL
no water column data
36% (8/22) sediment results *above high* SQGs = **TIER 1**
no (0/19) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no water quality data
2/2 sediment results above low SQGs = TIER 2
no (0/10) shellfish tissue exceedances in past five years
Sediment data indicate potential threat to Rhine Channel, and substantial evidence of impairment in LNB, therefore TMDL warranted based on adjacent waters analysis.

Potentially declining tissue trends in San Diego Creek but still above screening values.

DDT (total) **Assessment Summary as of 4/30/03**

San Diego Creek
one DDT compound (DDE) detected in dry and wet weather samples (1/8) at Campus Dr.
(this detection of DDE is not comparable to CTR stds because no DDE std defined)
(1/2) results above *high* SQGs (in Central Irvine Channel); (1/2) above low SQGs

Upper Newport Bay
No water data
(4/6) results above *high* SQGs; (2/6) above low SQGs
~~Fish tissue results still pending~~ No (24/74) tissue exceedances in sport and forage fish collected in Upper and Lower Bay

Lower Newport Bay
No water data
(2/5) results above *high* SQGs; (3/5) above low SQGs
~~Fish tissue results still pending~~

Rhine Channel
No water data
(2/4) results above *high* SQGs; (2/4) above low SQGs

DDT (total) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances
(0/2) sediment results above freshwater SQG
93% (14/15) tissue exceedances in past five years = **TIER 1**

Upper Newport Bay Determination: yes TMDL
no water quality data
37% (20/21) sediment results *above low* saltwater SQGs = TIER 2
50% (3/6) tissue exceedances in past five years = TIER 2

Lower Newport Bay Determination: yes TMDL
no water quality data
91% (10/11) sediment results *above high* saltwater SQGs = **TIER 1**
14% (3/21) tissue exceedances in past five years = TIER 2

Rhine Channel Determination: yes TMDL
no water data
(2/2) sediment results *above high* saltwater SQGs = TIER 2
10% (1/10) tissue exceedances in past five years = TIER 2
trend analysis shows decline in mussels but not below screening value as of 1999

Copper (Cu) **Assessment Summary as of 4/30/03**

San Diego Creek
No water quality criteria exceedances -- (0/4 acute, 0/12 chronic) based on hardness adjusted CTR freshwater standard.
(2/2) sediment results above low freshwater SQGs

Upper Newport Bay
(2/7) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above low SQGs
Acid volatile sulfide (4/4) results indicate no porewater problems due to Cu

Lower Newport Bay
(2/2) water quality criteria exceedances vs. CTR saltwater chronic standard
(3/3) sediment results above *high* SQGs

Rhine Channel
(3/3) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above *high* SQGs
Acid volatile sulfide (1/1) results indicate no porewater problem due to Cu

Copper (Cu) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
5.6% (21/347) acute water exceedances; 25% (7/28) chronic water exceedances based upon OCPFRD data = TIER 1
3% (1/30) acute water exceedances based on Lee (00-01) report, no exceedances in IRWD data
4% (4/92) sediment results above freshwater SQGs
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: yes TMDL
Numerous water quality exceedances based on OCPFRD monitoring data
no (0/10) water quality criteria exceedances based on IRWD data
17% (7/42) sediment results above low SQGs = TIER2
No (0/10) tissue exceedances in past five years

Lower Newport Bay Determination: yes TMDL
no (0/6) water colunm criteria exceedances, based on IRWD data but some values close to saltwater CTR std; many OCPFRD exceedances
33 (9/27) sediment results above low SQGs = TIER 2; AVS >SEM indicate no Cu problem
(5/10) sites have elevated Cu conc. in porewaters based on Bight '98 data = TIER 2
No (0/10) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no reliable water column data
82% (9/11) sediment samples above *higher* SQGs = **TIER 1**
acid volatile sulfide and porewater results indicate problem =TIER 2
15% (2/13) shellfish tissue exceedances in past five years = TIER 2

Selenium (Se) **Assessment Summary as of 4/30/03**

San Diego Creek
8/8 water quality criteria exceedances vs. freshwater chronic numeric target.
No new sediment data

Selenium (Se) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
97% (30/31) water quality criteria exceedances = **TIER 1**
(3) sediment results inconclusive since no freshwater SQG
no (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: yes TMDL
no water quality data
all sediment results were non-detect, but no saltwater SQG
no (0/9) tissue exceedances in past five years
Due to substantial evidence of exceedences in SDC, appearance of increasing Se trend in Newport Bay mussel tissue, and concerns about protection of aquatic and aquatic dependent species in Ecological Reserve in UNB, TMDL warranted based on adjacent waters analysis. Implementation of TMDLs for SDC should be sufficient to attain TMDLs for Newport Bay segments; establishment of the Bay TMDLs will assist in will assist in ensuring that aquatic life uses of concern in the Bay are fully maintained in the future.

Lower Newport Bay Determination: yes TMDL

all (0/11) sediment results were detects, but no saltwater SQG
no (0/9) tissue exceedances in past five years, but trend analysis shows increase in mussels
Due to substantial evidence of exceedences in SDC, and increasing Se trend in Newport Bay mussel tissue, TMDL warranted based on adjacent waters analysis. Implementation of TMDLs for SDC should be sufficient to attain TMDLs for Newport Bay segments; establishment of the Bay TMDLs will assist in ensuring that aquatic life uses of concern in the Bay are fully maintained in the future.

Rhine Channel Determination: yes TMDL

(2) sediment results were detects, but no saltwater SQG
no (0/10) tissue exceedances in past five years
Due to substantial evidence of exceedences in SDC, and increasing Se trend in Newport Bay mussel tissue, TMDL warranted based on adjacent waters analysis. Implementation of TMDLs for SDC should be sufficient to attain TMDLs for Newport Bay segments; establishment of the Bay TMDLs will assist in ensuring that aquatic life uses of concern in the Bay are fully maintained in the future.

Dieldrin Assessment Summary as of 4/30/03

San Diego Creek
No (0/8) Dieldrin detected in dry and wet weather samples at Campus Dr.
(0/2) sediment results above low SQGs

Upper Newport Bay
No (0/1) Dieldrin compounds detected in water samples
(4/6) sediment results above *high* SQGs; (4/6) above low SQGs
~~Fish tissue results still pending~~
No (24/74) tissue exceedances in sport and forage fish collected in Upper and Lower Bay

Lower Newport Bay
No water data
(0/5) sediment results above low SQGs
~~Fish tissue results still pending~~

Rhine Channel
No (0/1) dieldrin compounds detected in water samples
(0/4) sediment results low SQGs

Dieldrin Assessment Summary as of 6/10/01

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances
no (0/2) sediment results above freshwater SQG
93% (13/14) tissue exceedances in past five years = TIER 1

Upper Newport Bay Determination: no TMDL
no water quality data
37% (3/8) sediment results above low SQGs = TIER 2
(see Masters and Inman study for additional data of non-detects for Dieldrin)
No (0/6) tissue exceedances in past five years
EPA concluded that the evidence of impacts in the adjacent segments was not strong enough to warrant a conclusion that a TMDL is needed for Upper Newport Bay.

Lower Newport Bay Determination: yes TMDL
no water quality data
27% (3/11) sediment results above low SQGs = TIER 2
5% (1/21) tissue exceedances in past five years
Sediment data indicate potential threat to LNB, and substantial evidence of impairment in Rhine Channel, therefore TMDL warranted based on adjacent waters analysis.

Rhine Channel Determination: yes TMDL
no water quality data
(1/2) sediment result *above high* SQG = TIER 2
60% (6/10) shellfish tissue exceedances in past five years= TIER 1
trend analysis shows decline in mussels but not below screening value as of 1999 ensuring that aquatic life uses of concern in the Bay are fully maintained in the future.

PCBs (total) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/8) PCB compounds detected in dry and wet weather samples at Campus Dr.
(0/2) results above low SQGs

Upper Newport Bay
No (0/1) PCB compounds detected in water samples
(0/6) results above low SQGs
~~Fish tissue results still pending~~
No (11/74) tissue exceedances in sport and forage fish collected in Upper and Lower Bay

Lower Newport Bay
No water data
(0/5) results above low SQGs
~~Fish tissue results still pending~~

Rhine Channel
No (0/1) PCB compounds detected in water samples
(0/4) results above *high* SQGs; (4/4) above low SQGs

PCBs (total) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no water quality data
(1/2) sediment results non-detect vs. freshwater SQG, inconclusive
67% (10/15) tissue exceedances in past five years = TIER 1

Upper Newport Bay Determination: yes TMDL
no water quality data
no (0/8) sediment results above low SQGs, (max = 530 ppb in 1995)
17% (1/6) tissue exceedances in past five years = TIER 2
Tissue data indicate potential threat to UNB, and substantial evidence of impairment in SCD and LNB, therefore TMDL warranted based on adjacent waters analysis.

Lower Newport Bay Determination: yes TMDL
no water quality data
14% (2/14) sediment results above low SQGs = TIER 2
33% (7/21) tissue exceedances in past five years = TIER 1

Rhine Channel Determination: yes TMDL
no water quality data
(2/2) sediment results were above low SQGs; one sample above high SQG = TIER 2
100% (13/13) shellfish tissue exceedances in past five years = TIER 1
trend analysis shows decline in mussels but not below screening value in 1999

VI. Discussion of QA/QC issues

The split-samples collected and analyzed by both EPA and OCPFRD offer the opportunity to evaluate the analytical QA/QC for ambient samples. We collected water split-samples for dissolved metals and sediment split-samples for organics.

Metals

Freshwater

All analytical results (see Appendix D) for dissolved metals in ambient freshwater samples are directly comparable with hardness dependent CTR standards. This is due to adequately low method detection limits and high (greater than 5 ppb) standards. Even if hardness values drop, the MDLs are adequate since the matrix is further diluted and interference less likely. However, the actual ambient concentrations of dissolved metals (see EPA results) may be lower than the OCPFRD detection limits, thereby making it difficult for accurate determination and interpretation. This proves to be challenging for evaluating actual background concentrations and source analysis for TMDL development.

Saltwater

The high salt content (matrix) of seawater makes accurate determination of certain metals much more difficult than freshwater samples. An additional method preparation is usually required to remove the salt matrix prior to analysis by instruments with lower detection limits. For copper, the CTR chronic seawater standard is lower (3.1 ppb) and this compounds the analytical problem. The OCPFRD contract laboratory results typically show a high bias in comparison to the actual values for Cd, Cr, Cu, Pb, Ag, Zn in both ambient and reference seawater samples. Until this problem is resolved, it will be challenging to make a confident assessment for these metals, especially for copper. It will be equally as problematic for data analysis for TDML development. Based on the analytical results provided by EPA, using the appropriate sampling techniques and analytical methods, no exceedances of dissolved Cd, Cr, Pb, Ni, Ag and Zn are observed in saline waters of Newport Bay. Whereas, dissolved copper has 8/12 exceedances of the CTR chronic seawater standard for all seawater samples in Newport Bay.

Organics

Water

Detection of most organic compounds in water requires either extremely sensitive analytical methods (rare and/or research type analyses) or larger sample volumes to be concentrated and thereby achieve lower detection limits. If one chooses to pursue improving sampling and analytical techniques for aqueous organic samples, then one could decide to collect stormwater samples with higher suspended solids.

See total DDT results for wet weather sample collected Nov. 8, 2002.

Sediments

There is plenty of improvement for detecting organic compounds in sediment samples. By examining the sediment split-sample results, we offer these observations and recommendations to the OCPFRD toxics monitoring program:

1. Begin requesting chlordane analyses, (there are five sub-compounds: alpha- chlordane, gamma-chlordane, *cis*-nonachlor, *trans*-nonachlor and oxychlordane).
2. For sediment samples, remove diazinon analyses and replace with chlorpyrifos, since chlorpyrifos is much more likely to be bound to particulate matter and diazinon is predominately found in the dissolved phase. (Domalgowski, et al. 1993).
3. Both 4,4 DDE and total DDT results reported by OCPFRD appear lower than those by EPA. Given the high profile nature of these compounds and probable TMDL development, it is prudent to improve accuracy and to achieve a lower detection limit; e.g., 1 ng/ dry g.
4. PAH analyses should be considered in future monitoring plans.
5. TOC in sediments should be added.

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Monitoring Report for San Diego Creek and Newport Bay (per Newport Bay Toxics Settlement Agreement)

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Monitoring and Assessment Office
EPA Region 9, Water Division

~~April 29, 2003~~

Jan. 26, 2005 Update to include fish tissue bioaccumulation study results and clarify sediment quality guideline values used

FORWARD

This report compiles chemical monitoring results from several different entities as identified in the Appendices. As stipulated in the settlement agreement, EPA is providing these results to be included in California's next water quality assessment--305(b) report and 303(d) list. Readers looking for information regarding water quality conditions (based on these studies only) should review both the methodologies and benchmarks (Section IV) and assessment summary (Section V). The assessment results are chemical specific and do not compile information regarding toxicity.

See Newport Bay Toxics TMDLs available data (pp. 22-23) for results compiled and presented here in Assessment summary as of 6/10/01. Newer results (from the 4 named studies) are compiled and presented here as "Assessment summary as of 4/30/03."

NOTE: There are other monitoring data sets which are not included here but should also be reviewed to obtain all readily available data; e.g., more recent (post 1999) TSM and SMW data, (post 1999= year 1) OEHHA coastal fish project, (post 2000) OCPFRD water and sediment data, (post 1997) ACOE dredging data; any Western EMAP results; SCCWRP Rhine Channel characterization study; any other monitoring results for San Diego Creek and Newport Bay, including Rhine Channel.

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Appendices: (with analytical results)

I. Summary

This report describes monitoring data compiled as outlined in the settlement agreement between EPA Region 9 and Defend the Bay, Inc. ("Plaintiff"). The overall goal of this monitoring is to obtain additional analytical results for seven target analytes, for which TMDLs were not developed as outlined in modification to Consent Decree No. C-97-3997 MMC. This report outlines sampling results from different events as well as the different environmental samples (water, sediment and tissue) collected by EPA or designees. Waterbodies of concern include San Diego Creek (freshwater), Upper and Lower Newport Bay, including Rhine Channel (all saltwater) within Orange County, California.

The information in this report is intended to assist in water quality assessment and planning within this watershed. Among other things, it is anticipated that this information will be considered (with other relevant data) by the Santa Ana RWQCB in its water quality assessment work pursuant to section 305(b) of the Clean Water Act, and its next listing of impaired waterbodies pursuant to section 303(d) of the Clean Water Act (currently expected to occur in 2004). As noted in the settlement agreement, EPA has not undertaken any obligation to prepare TMDLs for any of these analytes in the San Diego Creek/Newport Bay watershed.

For the seven target analytes (listed below), the analytical results were nearly all below the appropriate water standards, sediment guidelines or tissue screening values. In fact, for the organic compounds, nearly all results were not only below the media specific benchmark, but they were also below the detection limit, suggesting that ambient levels of these three compounds are not worthy of concern. For the metals, mercury is the only compound with some elevated sediment levels, whereas no detections in water were observed and all mercury tissue levels were below the tissue benchmarks.

We have included analytical results for many other trace metals and organic compounds, since the analytical methods produced the complete suite of chemical results. These additional results show elevated levels of DDT, chlordane and PAHs relative to the low sediment guidelines. Water quality exceedances of selenium in San Diego Creek continue to occur. We utilized the appropriate QC for sampling and analytical methods for dissolved metals, thus we have more evidence that copper is the only metal of concern in seawater.

II. Background

Pursuant to the above Consent Decree, EPA Region 9 has established TMDLs for certain toxicants in San Diego Creek and Newport Bay. In the subsequent modification to this consent decree, EPA Region 9 agreed to take actions in addition to those set forth in the Consent Decree, namely to assure monitoring data is collected from these water bodies for seven specific toxicants. These seven toxicants, hereby referred to as "target analytes" are:

Metals	Organics
Cadmium	Chlorpyrifos
Chromium	Endosulfan 1& 2
Mercury	Toxaphene
Silver	

The settlement agreement outlines some aspects of the monitoring to be completed by EPA Region 9. For example, the sample media type was prioritized with water samples (highest), fish samples (medium) and sediment samples (lowest). The sampling and analysis plan (SAP), previously shared with the Plaintiff and Santa Ana RWQCB, describes the sampling and analytical methods, minimum sample numbers, method detection limits etc. for each target analyte per sample type. The agreement also outlines the elements or studies EPA intended to pursue to accomplish the monitoring goals. Here is a brief overview of these sampling elements per settlement agreement, section 5, part c (i)–(iv).

i. Sediment TIE studies (including water samples) for Upper and Lower Newport Bay (SCCWRP contract with RB8)
ii. Fish bioaccumulation studies in Newport Bay for sport fish (human consumption) and forage fish (wildlife consumption)
(SCCWRP contract with RB8)
iii. Freshwater samples in San Diego Creek for dry and wet weather samples
(addendum to SCCWRP contract with RB8; requested and funded by EPA and RB8 to yield supplemental chemical analyses in freshwater samples)
iv. Water and sediment samples collected at Orange County NPDES permit monitoring stations
(joint project by OCPFRD and EPA Region 9 to explore sampling and analytical QA/QC issues)

In a separate QA/QC section, this report explains results for several split-samples collected by EPA Region 9 and Orange County Public Facilities and Resource Division staff. We also provided QC reference samples to OCPFRD for "blind" analysis by their contract laboratory. The goal was to evaluate quality assurance and quality control aspects of the OCPFRD monitoring program and to provide recommendations as they start to develop the toxics sub-program of the existing stormwater program.

III. Studies and methods

Here we briefly describe our success at achieving the targeted goals outlined in the final Sampling and Analysis Plan (SAP). In general, we succeeded in collecting samples via the methods described in the final SAP. Analytical methods defined in 40 CFR Part 136 (or equivalent) were followed to assure data reliability, including low method detection limits for valid interpretation. (See Table 1 for chemical specific MDLs and methods.) Appropriate EPA-approved QA/QC measure s were utilized during both sample collection and sample analysis. Below we have summarized the sample methods per the four sample studies outlined above. More details are presented in the appendices, which describe the specific sampling and analytical methods, and present the analytical results. Please note the appendices also provide analytical results for chemicals other than the target ones mentioned above. The interpretation of these other chemical is also mentioned in the assessment section of this monitoring report.

Sediment TIE studies (including water samples) for Newport Bay

Sample collection occurred during three separate events in November 2001, March 2002 and May 2002. Sites included Upper Newport Bay, Lower Newport Bay and Rhine Channel. At each site, sediment and water samples were collected for chemical analysis. Sediment samples were composites of multiple grabs of top 2 cm. Water samples were grabs, collected from 2 to 3 meter depths; unfiltered samples for organics analysis and filtered samples for dissolved metals analysis. Unfiltered samples were also collected for total mercury analysis. Consistent with the SAP, all water samples were collected following EPA protocols for trace metal clean techniques.

Sediment-water interface samples were collected only during the November 2001 event. At each site, the overlying water (representing the sediment-water interface) was separated from sediment cores and filtered for dissolved metals analysis. For the November 2001 and March 2002 events, sediment samples were collected and analyzed for simultaneously extracted metals (SEM) and acid-volatile sulfides (AVS) to determine potential porewater toxicity for five metals (Cd, Cu, Ni, Pb, Zn). Sediment samples only were collected during the May 2002 event. See Appendix A.

Freshwater samples in San Diego Creek

Both dry and wet weather samples were collected from San Diego Creek at Campus Dr. For two separate dry weather events, samples were collected at the base of the bridge using ISCO samples; for each event a sample was taken in the morning and another taken 4 to 5 hours later. Filtration of metals samples occurred via in-line filters on site. Multiple (unfiltered) grab samples for hardness and organic analysis were composited in a five-gallon polycarbonate bottle and then aliquots were distributed into individual sample containers.

For wet weather, samples were collected from the Campus Drive bridge using a torpedo sampler lowered via a davit. Composites samples were obtained via multiple grabs transferred into a five-gallon polycarbonate bottle until full. Individual sample bottles were then filled from this composite bottle. Dissolved metals were collected from the composite by ISCO sampler with a 0.45 um in-line filter. Unfiltered samples were also collected for total metals, hardness, and total suspended solids. We collected both total and particulate samples for organic analyses. Two complete sample sets were collected during each storm event. All water samples for trace metal analysis were collected following clean techniques outlined in EPA Sampling Method 1669. All samples were stored on ice until transferred back to the lab and analyses began within 24 hours. Appropriate EPA-approved QA/QC measures were utilized and incorporated for saline water samples; e.g., removal of saltwater matrix interferents.

We targeted our sampling to concur with peak flow conditions by using some information provided by Orange County Stormwater monitoring group. During the first storm event (0.36" rain), March 7, 2002, we succeeded in capturing two freshwater samples (3 hours apart) near peak flow (approx. 200 cfs) conditions. However, during the second storm event (0.54" rain), November 8, 2002, we obtained two samples 5 hours apart during elevated flow rates (approx. 20 cfs), although these did not concur with peak flow conditions due to delayed rainfall during this storm. See Appendix B, figures 1 and 2.

Fish bioaccumulation studies in Newport Bay

Different sampling and handling methods were used to collect target species—sport fish versus forage species. Recreational or sport fish were collected summer 2001. Sport fish were collected from Upper and Lower Bay by boat using hook-and-line, long line, otter trawl and gill net. Fish were bagged in plastic bags, transported on ice to the lab, sorted and then frozen until processing. Composite samples were generated using 3 to 10 fish of same species; whereby in a given composite, the smallest fish was within 75% size of the largest consistent with EPA fish handling protocols (1995). All sport fish were skin-off muscle tissue samples.

Wildlife predator or forage fish were collected from Upper and Lower Bay in winter and summer 2002. Because forage fish are smaller and typically found in shallow water, they were collected by common seine, beach seine and lift net. These fish were bagged live, transported on ice to the lab, washed with deionized water, sorted into clean jars, and then frozen until processing. Composite samples were generated either by size (for larger species) or by weight (for smaller species). Forage fish from both seasons were combined and processed whole (skin-on).

We report chemical results for chlorpyrifos, endosulfan, toxaphene, cadmium and mercury for at least ten fish tissue samples. As a follow up to our previous decision to not develop arsenic TMDLs based on elevated total arsenic in fish tissue, we also report arsenic speciation results for ten sport fish samples. But here we have results of total arsenic and inorganic arsenic—both detected via direct analytical determination. This data set provides analytically measured (as opposed to calculated) inorganic arsenic values in fish tissue samples for a more appropriate comparison to human health screening values. See Appendix C, Table 8.

Water and sediment samples collected at Orange County NPDES stations

EPA collected split-samples with OCPFRD staff at freshwater and saltwater sites during several sampling events. Water column and sediment samples were collected at Orange County NPDES monitoring stations in both San Diego Creek and Newport Bay. A "split-sample" consists of two samples, collected concurrently and co-located using one sampling method into separate containers and then distributed to separate laboratories for analyses. Split samples are presumably of reasonable homogeneity since water samples are collected using steady water flow to fill alternating bottles; i.e., one for EPA then one for OCPFRD. Trace metal clean sampling techniques (EPA Method 1669) were used to collect grab water samples via either peristaltic pump and in-line filters (deep water) or via an intermediate container (manually submerged in shallow water). Grab surface sediment samples were obtained via methods similar to those described above in sediment TIE studies. To address sediment sample consistency, we obtained several samples from one site, mixed them together in one bucket and then took alternate aliquots to fill each Agency's container. Again, the goal was to provide technical assistance to OCPFRD staff regarding sampling methods, analytical results and method detection limits. These split-sample water and sediment results are included in our tally of ambient monitoring data. That is, EPA's analytical results for a split-sample collected in Lower Newport Bay were included in the final tally and assessment of that waterbody. See Appendix D.

In cooperation with OCPFRD, we also supplied seawater and estuarine reference water samples to their contract lab for dissolved metals analyses. These samples were submitted "blind" to evaluate the contract laboratory's analytical capability to accurately determine dissolved metals in matrices with a range of salinity, from seawater at 35 ppt to estuarine water at 15 ppt. These blind samples were actually standard reference materials generated by National Research Council Canada, thus we know the actual values (from NRCC) and compare the actual values to the contract lab results. To clarify discussion, we have termed these as "QC reference samples," and these two were not included in our assessment of ambient water quality conditions.

Table 1. Requested analytical MDLs and analytical methods. Also provided are the chemical-specific water quality standards, sediment quality guidelines, and tissue screening values.

Water Samples: metals will be dissolved (<0.45 um filter); organic will be total (unfiltered)

Element	Chronic Freshwater WQS (ug/L)	MDL (ug/L)	Chronic Saltwater WQS (ug/L)	MDL (ug/L)	Suggested EPA method(s)
Cadmium*	3.45	0.3	9.3	4	200.8; 602; 1638; 1640
Chromium#	11	5	50	50	
Silver*	9.0	1	1.9	0.2	
Mercury	0.77	0.1	0.94	0.1	1631
Hardness					130.2
TSS					160.2
Chlorpyrifos	14 (ng/L)	0.1	9 (ng/L)	0.1	614; 8141
Endosulfan I II	0.22	0.05	0.034	0.006	608 or 1625
Toxaphene	0.0002	0.0001	0.0002	0.0001	

*hardness dependent, assumed value = 175 ppm (in unfiltered sample)
#value is for Cr (VI), Cr-tot value = 565 ug/L for chronic freshwater

Sediment Samples:

Element	Freshwater Sediment Quality Guideline (mg/ dry kg)	MDL (mg/ dry kg)	Saltwater Sediment Quality Guideline (mg/ dry kg)	MDL (mg/ dry kg)	Suggested EPA method(s)
Cadmium	0.596	0.1	0.67	0.1	3050; 3051 = prep; 6020 = analysis
Chromium	37.3	10	52.3	10	
Silver	N/a		N/a		
Mercury	0.174	0.05	0.13	0.05	7473* or equiv.
Chlorpyrifos	N/a		N/a		3510; 3540 = prep 8141 = analysis
Endosulfan (I & II)	N/a		N/a		3510; 3540 = prep 8081; 8270 = analysis
Toxaphene	N/a		N/a		

Sediment quality guidelines from NOAA (Buchmann 1999)
*7473 method for mercury in solids includes preparatory protocol

Tissue Samples:

Element	Screening Value (mg/kg ww)	MDL (mg/kg ww)	Suggested EPA method(s)
Cadmium	3.0	1.0	3050; 3051 = prep; 6020 = analysis
Selenium	2.0	0.2	
Mercury*	0.3	0.05	7473 or equiv
Chlorpyrifos	10,000 ppb	2 (ng/g ww)	3545 = prep; 8081; 8270 = analysis
Endosulfan-tot	20	2 (ng/g ww)	
Toxaphene	0.030	10 (ng/g ww)	

*EPA screening value; otherwise all values from OEHHA

Note: EPA has promulgated analytical methods for NPDES monitoring for water samples; however, similar methods have not been promulgated for other sample types such as sediments and fish tissue. Analytical methods for solid waste, provided in SW-846, serve as guidance and are commonly used for determining chemical concentrations in sediment and tissue samples.

IV. Assessment methodology

EPA has compiled all analytical results from the above sampling events and provides at the minimum an assessment of the seven target analytes. We have followed the same assessment methodology as previously described in the Decision Document for Newport Bay Toxics (June 2001). This two tiered assessment methodology relies on comparing analytical results for each media relative to existing water quality standards, sediment guidelines or tissue screening values. Water column results were compared to water quality defined in California Toxics Rule (USEPA 2000a). Fish tissue results were compared to the lower screening values as determined by EPA (2000b) and OEHHA (1999). Sediment results were compared to sediment quality guidelines (ERLs and ERMs) presented by NOAA (Buchman 1999).

Freshwater sample results for dissolved metals were evaluated using the corresponding sample hardness values to determine the appropriate water quality standards (determined via equations presented) in CTR (US EPA 2000a). The maximum hardness value used was 400 mg/L; consistent with the maximum value allowed in CTR. Freshwater results from dry weather samples were compared with chronic standards. Results from wet weather samples were compared with acute standards as well as chronic standards. Saltwater results were be compared with both acute and chronic water quality standards defined in CTR (hardness is irrelevant for saline samples).

As previously mentioned, we have included results for many other analytes in the appendices, since the laboratory methods often yield the complete suite of results. For these other analytes, we have provided a discussion of those with elevated concentrations only; i.e., levels above the benchmarks mentioned above.

Table 2.

Two-tiered approach to assessment of monitoring data for Newport Bay and its watershed			
	Water Quality	Sediment Quality	Tissue Results
Tier 1 Impairment to Aquatic Life or Probable Adverse Human Health effects	>10% samples* exceed CTR values OR water TIEs clearly demonstrate toxicant	sediment triad or TIE studies clearly demonstrate toxicant OR >25% samples# exceed high SQGs (or ESG values)	posted consumption advisory$^{\delta}$ OR >25% samples# above tissue screening values
Tier 2 Possible Effects to Aquatic Life or Human Health	two or more samples* exceed applicable CTR values within six years	>10% samples above *both* low SQGs OR toxicity evident and sediment chemistry results provided, but no TIEs	>10% samples above fish tissue OR Shellfish values
Comment TMDL can triggered by one category in Tier 1 but needs two categories in Tier 2	see CTR for full discussion of acute and chronic values; Freshwater metals values are hardness dependent	ESGs from EPA (draft 2001a) High SQGs = PELs/ERMs/AETs; low SQGs = ERLs/TELS	Use lowest value of EPA, OEHHA, US F&W, MTRL or MIS.

NOTE: For TIER 1 requires minimum number of 10 samples within each category. If insufficient data exist then assessment defaults into TIER 2 or inconclusive.

Table 3. Water, sediment and fish tissue screening values (attached at very end of this document)

V. Assessment Summary

Newer results (from the 4 named studies) are compiled and presented here as "Assessment summary as of 4/30/03." See Newport Bay Toxics TMDLs Decision (assessment) document for results and data therein (pp. 22-23) compiled and presented here as "Assessment summary as of 6/10/01."

Arsenic (As) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/12) water quality criteria exceedances

Upper Newport Bay
No (0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low SQGs (ERL = 8.2 ppm)
No (0/10) inorganic As tissue exceedances in sport fish vs. inorganic As value (1.2 ppm)

Lower Newport Bay
No (0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/3) sediment results above low SQGs. (ERL = 8.2 ppm)
No (0/10) inorganic As tissue exceedances in sport fish vs. inorganic As value (1.2 ppm)

Rhine Channel
No (0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low SQGs = TIER 2 (ERL = 8.2 ppm)

Arsenic (As) **Assessment Summary as of 6/10/01**

San Diego Creek Recommendation: stay off list
No (0/62) water quality criteria exceedances
Sediment results (2/2) inconclusive vs. freshwater SQGs
No (0/15) tissue exceedances vs. total As screening value in past five years
7% (1/15) tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Upper Newport Bay Recommendation: no TMDL
No (0/6) water quality criteria exceedances
12% (1/8) sediment results above low SQGs = TIER 2
(0/9) tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Lower Newport Bay Recommendation: no TMDL
no (0/3) water quality criteria exceedances
68% (17/25) sediment results above low SQGs. = TIER 2
(0/22) tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Rhine Channel Recommendation: no TMDL
no water column data
(2/2) sediment results above low SQGs = TIER 2
(0/11) shellfish tissue exceedances vs. inorganic As screening value in past five years = TIER 2

Cadmium (Cd) Assessment Summary as of 4/30/03

San Diego Creek
No (0/4 acute, 0/12 chronic) water exceedences based on hardness adjusted CTR freshwater standard.
No (0/2) sediment results above low freshwater SQGs (fw TEL = 0.596 ppm)

Upper Newport Bay
no (0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above low saltwater SQGs (ERL = 1.2 ppm)
Acid volatile sulfide (4/4) results indicate no porewater problem due to Cd
No (0/23) tissue exceedances in sport fish and forage fish collected in Upper Bay; OEHHA screening value = 3.0 ppm ww. (each fish result was a composite sample of 3 or more)

Lower Newport Bay
no (0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
no (0/3) sediment results above low SQGs (ERL = 1.2 ppm)
(0/51) tissue exceedances in sport and forage fish collected in Lower Bay; OEHHA screening value = 3.0 ppm ww. (each fish result was a composite sample of 3 or more)

Rhine Channel
no (0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
no (0/2) sediment results above low SQGs (ERL = 1.2 ppm)
Acid volatile sulfide (1/1) results indicate no porewater problem due to Cd

Cadmium (Cd) Assessment Summary as of 6/10/01

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances -- (1/347 acute; 0/90 chronic) based on CTR std.
Many water quality criteria exceedances (6/347 acute; 23/23 chronic) based on more recent EPA criteria value; therefore threatened waterbody = Tier 2
46% (12/26) sediment results above low freshwater SQGs = TIER 2 (fw TEL = 0.596 ppm)
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: yes TMDL
no (0/10) water quality criteria exceedances
21% (8/42) sediment results above saltwater ERL (1.2 ppm) = TIER 2 (4/42 above PEL = 4.2 ppm)
No (0/15) tissue exceedances in past five years
Sediment data indicate potential threat to UNB, and substantial evidence of impairment in San Diego Creek, therefore TMDL warranted based on adjacent waters analysis.

Lower Newport Bay Determination: no TMDL
no (0/6) water quality criteria exceedances; no porewater results above saltwater chronic CTR values
30% (8/27) sediment samples above saltwater ERL (1.2 ppm) = TIER 2 (1/27 above PEL = 4.2 ppm)
acid volatile sulfide and porewater results indicate no problem
No (0/20) tissue exceedances in past five years

Rhine Channel Determination: no TMDL
no reliable water column data
15% (2/15) sediment results above saltwater ERL (1.2 ppm) = TIER 2 (1/15 above PEL = 4.2 ppm)
acid volatile sulfide and porewater results indicate no problem
No (0/13) shellfish tissue exceedances in past five years

Chromium (Cr) Assessment Summary as of 4/30/03

San Diego Creek
No (0/4 acute, 0/12 chronic) water exceedences based on hardness adjusted CTR freshwater standard.
no (0/2) sediment results above low freshwater SQGs (fw TEL = 37.3 ppm)

Upper Newport Bay
no (0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
no (0/2) sediment results above saltwater ERL (81 ppm)
No tissue analyses for Cr in sport fish and forage fish, since Cr does not bioaccumulate

Lower Newport Bay
no (0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/3) sediment results above saltwater ERL (81 ppm)
No tissue analyses for Cr in sport fish and forage fish, since Cr does not bioaccumulate

Rhine Channel
No (0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
No (0/2) sediment results above saltwater ERL (81 ppm)

Chromium (Cr) Assessment Summary as of 6/10/01

San Diego Creek Determination: no TMDL
no water quality criteria exceedances – (0/269 for Cr-tot and 0/30 for Cr(VI) and Cr(III))
[OCPFRD field screening data of Cr(VI) in SDC tributaries showed false positives results (26%) due to interferences with analytical technique.]
1% (3/94) sediment results above freshwater TEL (37.3 ppm)
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: no TMDL
no (0/10) water quality criteria exceedances
no (0/42) sediment results above saltwater ERL (81 ppm)
10% (1/10) tissue exceedance in past five years = TIER 2

Lower Newport Bay Determination: no TMDL
no (0/6) water quality criteria exceedances
4% (1/27) sediment results above saltwater ERL (81 ppm)
20% (2/10) tissue exceedances in past five years = TIER 2

Rhine Channel Determination: yes TMDL
no reliable water column data
8% (1/13) sediment results above saltwater ERL (81 ppm); 0 above PEL (160 ppm)
31% (4/13) shellfish tissue exceedances in past five years = **TIER 1**

Copper (Cu) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/4 acute, 0/12 chronic) water exceedences based on hardness adjusted CTR freshwater standard.
(2/2) sediment results above low freshwater SQGs (fw TEL = 35.7 ppm)

Upper Newport Bay
(2/7) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above saltwater ERL (34 ppm)
Acid volatile sulfide (4/4) results indicate no porewater problems due to Cu

Lower Newport Bay
(2/2) water quality criteria exceedances vs. CTR saltwater chronic standard
(3/3) sediment results above saltwater PEL (108 ppm)

Rhine Channel
(3/3) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above saltwater PEL (108 ppm)
Acid volatile sulfide (1/1) results indicate no porewater problem due to Cu

Copper (Cu) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
5.6% (21/347) acute water; 25% (7/28) chronic water exceedances based upon OCPFRD data = TIER 1
3% (1/30) acute water exceedances based on Lee (00-01) report, no exceedances in IRWD data
4% (4/92) sediment results above freshwater SQGs (fw TEL = 35.7)
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: yes TMDL
Numerous water quality exceedances based on OCPFRD monitoring data
no (0/10) water quality criteria exceedances based on IRWD data
17% (7/42) sediment results above saltwater ERL (34 ppm) = TIER2
No (0/10) tissue exceedances in past five years

Lower Newport Bay Determination: yes TMDL
no (0/6) water colunm criteria exceedances, based on IRWD data but some values close to saltwater CTR std; many OCPFRD exceedances
33 (9/27) sediment results saltwater PEL (108 ppm) = TIER 2; AVS >SEM indicate no Cu problem
(5/10) sites have elevated Cu conc. in porewaters based on Bight '98 data = TIER 2
No (0/10) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no reliable water column data
82% (9/11) sediment above saltwater PEL (108 ppm) = TIER 1; 3/11 above ERM (270 ppm); max value =530 ppm
acid volatile sulfide and porewater results indicate problem =TIER 2
15% (2/13) shellfish tissue exceedances in past five years = TIER 2

Lead (Pb) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/4 acute, 0/12 chronic) water exceedences based on hardness adjusted CTR freshwater standard.
(0/2) sediment results above low freshwater SQGs (fw TEL = 35 ppm)

Upper Newport Bay
(0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above saltwater ERL (46.7 ppm) ; 0/2 above PEL (112 ppm)
Acid volatile sulfide (4/4) results indicate no porewater problems due to Pb

Lower Newport Bay
(0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
(3/3) sediment results above saltwater ERL (46.7 ppm) ; 0/3 above PEL (112 ppm)

Rhine Channel
(0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above saltwater ERL (46.7 ppm) ; 0/2 above PEL (112 ppm)
Acid volatile sulfide (1/1) results indicate no porewater problem due to Pb

Lead (Pb) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
7% (2/28) chronic water exceedances based on OCPFRD data = TIER 2
no (0/371) acute water exceedances
6% (4/72) sediment results above freshwater TEL (35 ppm)
No (0/15) tissue exceedances in past five years
Water column and sediment data indicate potential threat to SDC, and substantial evidence of impairment in Rhine Channel, therefore TMDL warranted based on adjacent waters analysis.

Upper Newport Bay Determination: yes TMDL
no (0/10) water quality criteria exceedances
5% (2/42) sediment results above saltwater ERL (46.7 ppm); 0/42 above saltwater PEL (112 ppm)
No (0/10) tissue exceedances in past five years
Sediment data indicate potential threat to UNB, and substantial evidence of impairment in Rhine Channel, therefore TMDL warranted based on adjacent waters analysis.

Lower Newport Bay Determination: yes TMDL
no (0/6) water quality criteria exceedances
12% (5/30) sediment results above saltwater ERL (46.7 ppm); 0/30 above saltwater PEL (112 ppm)
acid volatile sulfide and porewater results indicate no problem
No (0/10) tissue exceedances in past five years
Sediment data indicate potential threat to LNB, and substantial evidence of impairment in Rhine Channel, therefore TMDL warranted based on adjacent waters analysis.

Rhine Channel Determination: yes TMDL
no reliable water column data
54% (7/13) sediment results above saltwater ERL (46.7 ppm); 2/13 above PEL (112 ppm) ((0 above ERM)); acid volatile sulfide and porewater results indicate no problem
No (0/13) shellfish tissue exceedances in past five years

Mercury (Hg) **Assessment Summary as of 4/30/03**

San Diego Creek
No water quality criteria exceedances -- (0/4 acute, 0/12 chronic) based on CTR std.

Upper Newport Bay
No (0/7) water quality criteria exceedances vs. CTR saltwater standard
No (2/2) sediment results above saltwater ERL (0.15 ppm)
No (0/23) tissue exceedances in sport and forage fish collected in Upper Bay; OEHHA screening value = 0.3 ppm ww. (each fish result was a composite sample of 3 or more)

Lower Newport Bay
No (0/2) water quality criteria exceedances
(3/3) sediment results above saltwater ERL (0.15 ppm); 1/3 above ERM (0.71 ppm); max is 2.06 ppm
No (0/51) tissue exceedances in sport and forage fish collected in Lower Bay; OEHHA screening value = 0.3 ppb ww. (each fish result was a composite sample of 3 or more)

Rhine Channel
no (0/3) water quality criteria exceedances
(2/2) sediment results above saltwater ERM (0.71 ppm); actual results were 4.95 and 6.69 ppm, so nearly 10 times higher than ERM

Mercury (Hg) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: no TMDL
no (0/62) water quality criteria exceedances
no (0/2) sediment results above freshwater SQGs
No (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: no TMDL
no water column data available
no (0/2) sediment results above saltwater ERL (0.13 ppm)
10% (1/10) tissue exceedances in past five years = TIER 2

Lower Newport Bay Determination: no TMDL
no water column data available
36% (5/14) sediment exceedances above saltwater ERL (0.13 ppm) = TIER 2.
No (0/23) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no water column data available
(5/5) sediment results saltwater ERM (0.71 ppm) all sediment values show very high exceedances (>3.4 ppm) vs. ERM value (0.71 ppm), indicating substantial threat = TIER 1. TMDL warranted based on observed magnitude of sediment levels, which are at least 5 times higher than screening values
No (0/12) shellfish tissue exceedances in past five years

Selenium (Se) **Assessment Summary as of 4/30/03**

San Diego Creek
8/8 water quality criteria exceedances vs. freshwater chronic numeric target.
No new sediment data

Upper Newport Bay
(4/23) tissue exceedances in sport and forage fish (4 whole body) collected in Upper Bay; fish tissue MDL = 0.01 ppm ww; USFWS (1998) screening value of 3 ppm dw = 0.6 ppm ww. (each fish result was a composite sample of 3 or more)

Lower Newport Bay
(0/51) tissue exceedances in sport and forage fish collected in Lower Bay; fish tissue MDL = 0.01 ppm ww; USFWS (1998) screening value of 3 ppm dw = 0.6 ppm ww. (each fish result was a composite sample of 3 or more)

Selenium (Se) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
97% (30/31) water quality criteria exceedances = **TIER 1**
(3) sediment results inconclusive since no freshwater SQG
no (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: yes TMDL
no water quality data
all sediment results were non-detect, but no saltwater SQG
no (0/9) tissue exceedances in past five years
Due to substantial evidence of exceedences in SDC, appearance of increasing Se trend in Newport Bay mussel tissue, and concerns about protection of aquatic and aquatic dependent species in Ecological Reserve in UNB, TMDL warranted based on adjacent waters analysis. Implementation of TMDLs for SDC should be sufficient to attain TMDLs for Newport Bay segments; establishment of the Bay TMDLs will assist in will assist in ensuring that aquatic life uses of concern in the Bay are fully maintained in the future.

Lower Newport Bay Determination: yes TMDL

all (0/11) sediment results were detects, but no saltwater SQG
no (0/9) tissue exceedances in past five years, but trend analysis shows increase in mussels
Due to substantial evidence of exceedences in SDC, and increasing Se trend in Newport Bay mussel tissue, TMDL warranted based on adjacent waters analysis. See more above.

Rhine Channel Determination: yes TMDL
(2) sediment results were detects, but no saltwater SQG
no (0/10) tissue exceedances in past five years
Due to substantial evidence of exceedences in SDC, and increasing Se trend in Newport Bay mussel tissue, TMDL warranted based on adjacent waters analysis. See more above.

Silver (Ag) **Assessment Summary as of 4/30/03**

San Diego Creek
no water quality criteria exceedances -- (0/12 acute) based on hardness adjusted CTR freshwater standard (no chronic std)

Upper Newport Bay
no (0/7 acute) water quality criteria exceedances-- (no CTR saltwater chronic standard)
no (0/2) sediment results above low saltwater TEL (0.73 ppm)
No tissue analyses for Ag in sport fish and forage fish, since Ag does not bioaccumulate

Lower Newport Bay
No (0/2 acute) water quality criteria exceedances-- (no CTR saltwater chronic standard)
No (0/3) sediment results above low SQGs
No tissue analyses for Ag in sport fish and forage fish, since Ag does not bioaccumulate

Rhine Channel
No (0/3 acute) water quality criteria exceedances-- (no CTR saltwater chronic standard)
No (0/2) sediment results above low SQGs

Silver (Ag) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: no TMDL
(1/338) acute water exceedance but no chronic exceedences
Virtually all sediment results below detection limits and inconclusive since no freshwater SQG
No tissue screening value for comparison

Upper Newport Bay Determination: no TMDL
no (0/7) water quality criteria exceedances
9% (4/42) sediment result above low saltwater TEL (0.73 ppm)
No tissue screening value for comparison

Lower Newport Bay Determination: no TMDL
no (0/3) water quality criteria exceedances
no (0/27) sediment results above low saltwater SQGs
no acid volatile sulfide results for silver; porewater results show no problem
No tissue screening value for comparison

Rhine Channel Determination: no TMDL
no reliable water column data
31% (4/13) sediment results above low saltwater SQGs = TIER 2
no acid volatile sulfide results for silver; porewater results show no problem
No tissue screening value for comparison

Zinc (Zn) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/4 acute, 0/12 chronic) water exceedences based on hardness adjusted CTR freshwater standard.
(2/2) sediment results above low freshwater SQGs (fw TEL = 123 ppm)

Upper Newport Bay
(0/7) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above saltwater ERL (150 ppm) ; 0/2 above PEL (271 ppm)
Acid volatile sulfide (4/4) results indicate no porewater problems due to Zn

Lower Newport Bay
(0/2) water quality criteria exceedances vs. CTR saltwater chronic standard
(3/3) sediment results above saltwater ERL (150 ppm) ; 0/3 above PEL (271 ppm)

Rhine Channel
(0/3) water quality criteria exceedances vs. CTR saltwater chronic standard
(2/2) sediment results above saltwater ERL (150 ppm) ; 1/2 above PEL (271 ppm)
Acid volatile sulfide (1/1) results indicate no porewater problem due to Zn

Zinc (Zn) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no (0/62) acute exceedances based on IRWD dataset and Lee report
1% (5/370) acute water quality criteria exceedances based upon OCPFRD data = TIER 2
4% (4/94) sediment results above low freshwater TEL (123 ppm)
20% (3/15) tissue exceedances in past five years = TIER 2

Upper Newport Bay Determination: yes TMDL
no (0/25) water quality criteria exceedances based solely on IRWD data, but many exceedences found if OCPFRD data are considered= probably TIER 2
17% (8/48) sediment results above saltwater ERL (150 ppm) = TIER 2; 0/48 above PEL (271 ppm)
10% (1/10) tissue exceedances in past five years =TIER 2

Lower Newport Bay Determination: yes TMDL
no (0/15) water quality criteria exceedances exceedances based solely on IRWD data, but many exceedences found if OCPFRD data are considered= probably TIER 2
37% (14/38) sediment results above saltwater ERL (150 ppm) = TIER 2; 0/48 above PEL (271 ppm)
acid volatile sulfide and porewater results indicate no problem
No (0/10) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no reliable water column data
38% (5/13) sediment results above saltwater ERL (150 ppm); 2/13 results above PEL (271 ppm) TIER 2
acid volatile sulfide and porewater results indicate no problem
69% (9/13) shellfish tissue exceedances (vs. MIS sv for shellfish= 70 ppm) in past five years = TIER 1

Chlorpyrifos **Assessment Summary as of 4/30/03**

San Diego Creek
No water quality exceedances-- (0/8 acute; 0/8 chronic) freshwater chronic target of 14 ng/L
No (0/0) detections but results inconclusive, no sediment criteria guidelines available

Upper Newport Bay
No (0/23) tissue exceedances of OEHHA screening value (10,000 ppb)
(each fish result was a composite sample of 3 or more)

Lower Newport Bay
No (0/51) tissue exceedances of OEHHA screening value (10,000 ppb)

Chlorpyrifos **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
Water Quality: 44% (34/78) exceed acute freshwater numeric target of 20 ng/L = **TIER 1**
(this includes some non-detects with MDL = 40 ng/L) (2/2) detections but results inconclusive, no sediment criteria guidelines available
no (0/34) tissue exceedances of OEHHA screening value (10,000 ppb)

Upper Newport Bay Determination: yes TMDL
Water Quality: 92% (22/24) exceed acute saltwater numeric target of 11 ng/L = **TIER 1**
No sediment data
Tissue: (0/14) tissue exceedance of OEHHA screening value (10,000 ppb)

Lower Newport Bay Determination: no TMDL
no data

Rhine Channel Determination: no TMDL
no data

Chlordane **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/8) Chlordane compounds detected in dry and wet weather samples at Campus Dr.
(1/2) results above fw PEL (8.9 ppb) (in Central Irvine Channel); (1/2) above fw TEL (4.5 ppb)

Upper Newport Bay
No (0/1) Chlordane compounds detected in water samples
(3/6) results above saltwater ERM (6 ppb); max. = 8.21 ppb
No (0/23) tissue exceedances in sport and forage fish collected in Upper Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 30 ppb ww. (each fish result was a composite sample of 3 or more)

Lower Newport Bay
No water data
(1/5) results above saltwater ERM (6 ppb); (4/5) above saltwater TEL (0.7 15 ppb)
No (0/51) tissue exceedances in sport and forage fish collected in Lower Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 30 ppb ww. (each fish result was a composite sample of 3 or more)

Rhine Channel
No (0/1) Chlordane compounds detected in water samples
(0/4) results above saltwater ERM (6 ppb); (4/4) above low saltwater TEL (0.7 15 ppb)

Chlordane **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no (0/6) water quality criteria exceedances
sediment results (2) inconclusive vs. freshwater SQG
40% (6/15) tissue exceedances in past five years = **TIER 1**

Upper Newport Bay Determination: yes TMDL
no water column data
56% (13/23) sediment results above saltwater ERM (6 ppb) = **TIER 1** (see Masters and Inman data)
No (0/6) tissue exceedances in past five years

Lower Newport Bay Determination: yes TMDL
no water column data
36% (8/22) sediment results saltwater ERM (6 ppb) = **TIER 1**
no (0/19) tissue exceedances in past five years

Rhine Channel Determination: yes TMDL
no water quality data
2/2 sediment results above saltwater TEL (0.7 15 ppb) = TIER 2
no (0/10) shellfish tissue exceedances in past five years
Sediment data indicate potential threat to Rhine Channel, and substantial evidence of impairment in LNB, therefore TMDL warranted based on adjacent waters analysis.

DDT (total) **Assessment Summary as of 4/30/03**

San Diego Creek
one DDT compound (DDE) detected in dry and wet weather samples (1/8) at Campus Dr.
(this detection of DDE is not comparable to CTR stds because no DDE std defined)
(1/2) results above fw PEL (572 ppb) (in Central Irvine Channel); (1/2) above fw TEL (6.98 ppb)

Upper Newport Bay
No water data
(4/6) results above saltwater ERM (46.1 ppb); max. result 112 ppb
(7/23) tissue exceedances in sport (2 fillets) and forage fish (5 whole body) collected in Upper Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 100 ppb ww. each fish result was a composite sample of 3 or more)

Lower Newport Bay
No water data
(2/5) results above saltwater ERM (46.1 ppb); max results is 113 ppb
(17/51) tissue exceedances in sport (8 fillets) and forage fish (9 whole body) collected in Lower Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 100 ppb ww. each fish result was a composite sample of 3 or more)

Rhine Channel
No water data
(2/4) results above saltwater ERM (46.1 ppb); max result is 88 ppb

DDT (total) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances
(0/2) sediment results above fw PEL (572 ppb)
93% (14/15) tissue exceedances in past five years = **TIER 1**

Upper Newport Bay Determination: yes TMDL
no water quality data
37% (20/21) sediment results above saltwater TEL (3.89 ppb) = TIER 2; (1/21) above ERM (46.1ppb)
50% (3/6) tissue exceedances in past five years = TIER 2

Lower Newport Bay Determination: yes TMDL
no water quality data
91% (10/11) sediment results saltwater ERM (46.1 ppb); = **TIER 1**
14% (3/21) tissue exceedances in past five years = TIER 2

Rhine Channel Determination: yes TMDL
no water data
(2/2) sediment results saltwater ERM (46.1 ppb); = TIER 2
10% (1/10) tissue exceedances in past five years = TIER 2
trend analysis shows decline in mussels but not below screening value as of 1999

Dieldrin **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/8) Dieldrin detected in dry and wet weather samples at Campus Dr.
(0/2) sediment results above fw TEL (2.85 ppb)

Upper Newport Bay
No (0/1) Dieldrin compounds detected in water samples
(2/6) sediment results above PEL (4.3 ppb); max result = 7.4 ppb
No (0/23) tissue exceedances in sport and forage fish collected in Upper Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 2 ppb ww. each fish result was a composite sample of 3 or more)

Lower Newport Bay
No water data
(0/5) sediment results above saltwater TEL (0.71 ppb)
No (0/51) tissue detections in sport and forage fish collected in Lower Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 2 ppb ww. each fish result was a composite sample of 3 or more)

Rhine Channel
No (0/1) dieldrin compounds detected in water samples
(0/4) sediment results above saltwater TEL (0.71 ppb)

Dieldrin **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances
no (0/2) sediment results above fw TEL (2.85 ppb)
93% (13/14) tissue exceedances in past five years = TIER 1

Upper Newport Bay Determination: no TMDL
no water quality data
37% (3/8) sediment results above saltwater ERL (0.02 ppb) = TIER 2; 0/8 above PEL (4.3 ppb)
(see Masters and Inman study for additional data of non-detects for Dieldrin)
No (0/6) tissue exceedances in past five years
EPA concluded that the evidence of impacts in the adjacent segments was not strong enough to warrant a conclusion that a TMDL is needed for Upper Newport Bay.

Lower Newport Bay Determination: yes TMDL
no water quality data
27% (3/11) sediment results above saltwater ERL (0.02 ppb) = TIER 2; 0/11 above PEL (4.3 ppb)
5% (1/21) tissue exceedances in past five years
Sediment data indicate potential threat to LNB, and substantial evidence of impairment in Rhine Channel, therefore TMDL warranted based on adjacent waters analysis.

Rhine Channel Determination: yes TMDL
no water quality data
(1/2) sediment result above PEL (4.3 ppb) = TIER 2
60% (6/10) shellfish tissue exceedances in past five years= TIER 1
trend analysis shows decline in mussels but not below screening value as of 1999 ensuring that aquatic life uses of concern in the Bay are fully maintained in the future.

Endosulfan (total) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/8) water quality criteria exceedances of total endosulfan
(sum of endosulfate, endosulfan-I and endosulfan-II)
No (0/2) sediment results above detection limit and inconclusive since no freshwater SQG

Upper Newport Bay
No water quality data
No (0/6) sediment results above detection limit and inconclusive since no freshwater SQG
No (0/23) tissue exceedances in sport and forage fish, OEHHA sv is 20,000 ppb (each fish result was a composite sample of 3 or more)

Lower Newport Bay
No water quality data
No (0/5) sediment results above detection limit and inconclusive since no saltwater SQG
No (0/51) tissue exceedances in sport and forage fish; OEHHA sv is 20,000 ppb (each fish result was a composite sample of 3 or more)

Rhine Channel
No water quality data
No (0/4) sediment results above detection limit and inconclusive since no saltwater SQG

Endosulfan (total) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: no TMDL
no water quality criteria exceedances of endosulfan α and β, nor endosulfate
6% (5/84) sediment results maybe detection, yet inconclusive since no freshwater SQG
no (0/15) tissue exceedances in past five years

Upper Newport Bay Determination: no TMDL
no water quality data
(3/36) sediment results maybe detection, yet inconclusive since no saltwater SQG
No (0/6) tissue exceedances in past five years

Lower Newport Bay Determination: no TMDL
no water quality data
no (0/12) sediment results above detection limit and inconclusive since no saltwater SQG
no (0/19) tissue exceedances in past five years

Rhine Channel Determination: no TMDL
no water data
no (0/10) sediment results above detection limit and inconclusive since no saltwater SQG
no (0/10) tissue exceedances in past five years

PCBs (total) **Assessment Summary as of 4/30/03**

San Diego Creek
No (0/8) PCB compounds detected in dry and wet weather samples at Campus Dr.
(0/2) results above fw TEL (34 ppb)

Upper Newport Bay
No (0/1) PCB compounds detected in water samples
(0/6) results above saltwater TEL (21.5 ppb)
(0/23) tissue exceedances in sport and forage fish collected in Upper Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value =2 0 ppb ww. each fish result was a composite sample of 3 or more)

Lower Newport Bay
No water data
(0/5) results above saltwater TEL (21.5 ppb)
(9/51) tissue exceedances in sport (3 fillets) and forage fish (6 whole body) collected in Lower Bay; fish tissue MDL = 5 ppb ww; OEHHA screening value = 20 ppb ww. each fish result was a composite sample of 3 or more)

Rhine Channel
No (0/1) PCB compounds detected in water samples
(4/4) results above saltwater ERL (22.7 ppb); 1/4 above ERM (180ppb); max result = 183 ppb

PCBs (total) **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no water quality data
(1/2) sediment results non-detect vs. freshwater TEL (21.5 ppb) = inconclusive
67% (10/15) tissue exceedances in past five years = TIER 1

Upper Newport Bay Determination: yes TMDL
no water quality data
no (1/9) sediment results above saltwater ERL (22.7 ppb); 1/9 above ERM (180ppb); max = 530 ppb
17% (1/6) tissue exceedances in past five years = TIER 2
Tissue data indicate potential threat to UNB, and substantial evidence of impairment in SCD and LNB, therefore TMDL warranted based on adjacent waters analysis.

Lower Newport Bay Determination: yes TMDL
no water quality data
14% (2/14) sediment results above saltwater ERL (22.7 ppb) = TIER 2; 0/2 above ERM (180ppb)
33% (7/21) tissue exceedances in past five years = TIER 1

Rhine Channel Determination: yes TMDL
no water quality data
(4/10) sediment results were above saltwater ERL (22.7 ppb) low SQGs; 2/10 above ERM (180 ppb)
100% (13/13) shellfish tissue exceedances in past five years = TIER 1
trend analysis shows decline in mussels but not below screening value in 1999

Toxaphene **Assessment Summary as of 4/30/03**

San Diego Creek
No water quality criteria exceedances
(2/2) sediment results inconclusive vs. freshwater SQG

Upper Newport Bay
No water quality data
No (0/6) sediment results above detection limit and inconclusive since no saltwater SQG
No (0/23) tissue exceedances in sport and forage fish

Lower Newport Bay
No water quality data
No (0/5) sediment results above detection limit and inconclusive since no saltwater SQG
No (0/51) tissue exceedances in sport and forage fish

Rhine Channel
No water quality data
No (0/4) sediment results above detection limit and inconclusive since no saltwater SQG

Toxaphene **Assessment Summary as of 6/10/01**

San Diego Creek Determination: yes TMDL
no water quality criteria exceedances
(2/2) sediment results inconclusive vs. freshwater SQG
87% (13/15) tissue exceedances in past five years = **TIER 1**

Upper Newport Bay Determination: no TMDL
no water quality data
all (0/6) sediment results were non-detect, but no saltwater SQG
17% (1/6) tissue exceedances in past five years = TIER 2

Lower Newport Bay Determination: no TMDL
no water quality data
all (0/10) sediment results were non-detect, but no saltwater SQG
no (0/23) tissue exceedances in past five years

Rhine Channel Determination: no TMDL
no water quality data
(0/2) sediment results were non-detect, but no saltwater SQG
20% (2/10) tissue exceedances in past five years = TIER 2

PAHs **Assessment Summary as of 4/30/03**

San Diego Creek
No water data
No sediment data

Upper Newport Bay
No water data
No (0/4) sediment results above saltwater ERL for total PAHs (4022 ppb)

Lower Newport Bay
No water data
No (0/3) sediment results above saltwater ERL for total PAHs (4022 ppb)

Rhine Channel
No water data
(1/4) sediment results above saltwater ERL for total PAHs (4022 ppb) ;
4 individual HiMW PAHs and 4 individual LoMW PAHs above ERL values

Ancillary data **Summary as of 4/30/03**

San Diego Creek
Total organic carbon (TOC) in water = 11-16 mg/L; DOC in water = 12 mg/L
Total suspended solids (TSS) in wet weather range = 38 - 62 mg/L, dry weather = 41—82.
Hardness in wet weather typically near 180 mg/L; dry weather = greater than 400 mg/L

Upper Newport Bay
Total organic carbon (TOC) in sediment = 1.1 - 2.3% (n=3)

Lower Newport Bay
Total organic carbon (TOC) in sediment = 0.65 - 1.5% (n=3)

Rhine Channel
Total organic carbon (TOC) in sediment = 1.6% (n=3)

VI. Discussion of QA/QC issues

The split-samples collected and analyzed by both EPA and OCPFRD offer the opportunity to evaluate the analytical QA/QC for ambient samples. We collected water split-samples for dissolved metals and sediment split-samples for organics.

Metals

Freshwater

All analytical results (see Appendix D) for dissolved metals in ambient freshwater samples are directly comparable with hardness dependent CTR standards. This is due to adequately low method detection limits and high (greater than 5 ppb) standards. Even if hardness values drop, the MDLs are adequate since the matrix is further diluted and interference less likely. However, the actual ambient concentrations of dissolved metals (see EPA results) may be lower than the OCPFRD detection limits, thereby making it difficult for accurate determination and interpretation. This proves to be challenging for evaluating actual background concentrations and source analysis for TMDL development.

Saltwater

The high salt content (matrix) of seawater makes accurate determination of certain metals much more difficult than freshwater samples. An additional method preparation is usually required to remove the salt matrix prior to analysis by instruments with lower detection limits. For copper, the CTR chronic seawater standard is lower (3.1 ppb) and this compounds the analytical problem. The OCPFRD contract laboratory results typically show a high bias in comparison to the actual values for Cd, Cr, Cu, Pb, Ag, Zn in both ambient and reference seawater samples. Until this problem is resolved, it will be challenging to make a confident assessment for these metals, especially for copper. It will be equally as problematic for data analysis for TDML development. Based on the analytical results provided by EPA, using the appropriate sampling techniques and analytical methods, no exceedances of dissolved Cd, Cr, Pb, Ni, Ag and Zn are observed in saline waters of Newport Bay. Whereas, dissolved copper has 8/12 exceedances of the CTR chronic seawater standard for all seawater samples in Newport Bay.

Organics

Water

Detection of most organic compounds in water requires either extremely sensitive analytical methods (rare and/or research type analyses) or larger sample volumes to be concentrated and thereby achieve lower detection limits. If one chooses to pursue improving sampling and analytical techniques for aqueous organic samples, then one could decide to collect stormwater samples with higher suspended solids.

See total DDT results for wet weather sample collected Nov. 8, 2002.

Sediments

There is plenty of improvement for detecting organic compounds in sediment samples. By examining the sediment split-sample results, we offer these observations and recommendations to the OCPFRD toxics monitoring program:

1. Begin requesting chlordane analyses, (there are five sub-compounds: alpha- chlordane, gamma-chlordane, *cis*-nonachlor, *trans*-nonachlor and oxychlordane).
2. For sediment samples, remove diazinon analyses and replace with chlorpyrifos, since chlorpyrifos is much more likely to be bound to particulate matter and diazinon is predominately found in the dissolved phase. (Domalgowski, et al. 1993).
3. Both 4,4 DDE and total DDT results reported by OCPFRD appear lower than those by EPA. Given the high profile nature of these compounds and probable TMDL development, it is prudent to improve accuracy and to achieve a lower detection limit; e.g., 1 ng/ dry g.
4. PAH analyses should be considered in future monitoring plans.
5. TOC in sediments should be added.