Part H. Decision Document of Water Quality Assessment for San Diego Creek and Newport Bay

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I. TMDL Overview

EPA Region 9 is required by a consent decree to ensure completion of Total Maximum Daily Loads (TMDLs) for certain toxic pollutants in Newport Bay by June 2002. The chemicals of concern are specific to three water bodies and are identified in the consent decree. Although the consent decree included a list of chemicals for which TMDLs would be prepared, it specifically provided that EPA was under no obligation to establish TMDLs for any pollutants that EPA determined did not need TMDLs consistent with Clean Water Act Sec. 303(d). This document summarizes EPA's analysis supporting our determinations of which pollutants need TMDLs. This document was originally drafted in May 2001 but has been revised based on some additional data and analysis.

Santa Ana Regional Water Quality Control Board staff prepared a problem statement (Dec. 2000) that includes their determination of which chemicals warrant preparation of TMDLs based on their assessment of which chemicals appear to be creating toxicity in the water bodies at issue. This report recommends a significant number of chemicals identified in the consent decree not receive TMDLs. The report also recommends preparing TMDLs for some water body segments in the Newport Bay watershed and specific chemicals not identified in the consent decree.

EPA Region 9 independently evaluated all readily available data for San Diego Creek and Upper and Lower Newport Bay to determine which chemicals warrant TMDLs. We did not evaluate chemicals beyond those identified in the consent decree or by Santa Ana Regional Board. Column 1 of Table 1 lists specific chemicals for each affected water body identified in the consent decree. Column 2 of Table 1 identifies the specific chemicals for each affected water body for which EPA has determined that TMDLs need to be prepared. As part of our analysis, we determined the Rhine Channel should be treated as a separate water body. Therefore, Table 1 identifies chemicals for the three water bodies set forth in the consent decree, plus Rhine Channel.

EPA Region 9 has agreed to gather monitoring data for those constituents not determined to be appropriate for TMDL development, e.g., Endosulfan, Silver and other chemicals in Column 3 of Table 1. EPA Region 9 will compile analytical results of water column, sediment and fish tissue samples collected in 2001, 2002 and 2003. This monitoring report (and accompanying data) will be submitted to Santa Ana Regional Board in April 2003. This report will supply additional information to the Regional Board as part of future water quality assessment and planning activities.

Watershed description

Newport Bay is about 4 miles long by three to one-half mile wide with one ocean inlet. The watershed (150 sq. miles) consists of two regions of freshwater tributaries flowing into San Diego Creek, which flows into Upper Newport Bay. Santa Ana Regional Board has divided San Diego Creek (**SDC**) into two Reaches, upstream (Reach 1) and downstream (Reach 2) of Jeffrey Road. San Diego Creek has a mean base flow of about 8 cfs with significant increases (1000 to 4000 cfs) during storm events. SDC is influenced by slightly saline water table (less than 1 or 2% salinity) and approximate mean hardness of about 400 ppm. SDC is the primary tributary and flows into Upper Newport Bay.

Upper Newport Bay (**UNB**) is defined by Jamboree Road to the North and Pacific Coast Highway (PCH) Bridge to the south. There are two main freshwater inputs—San Diego Creek and Santa Ana / Delhi Channel—as well as tidal influxes, so salinity is about 15 ppt. It has estuarine wetlands and is designated a State Ecological reserve in the upper areas with more small boat marinas (including a boat painter's yard) near PCH Bridge. Periodically it has been dredged to remove trapped sediment. There is a storm drain just above PCH Bridge coming from the PCH Bridge overpass and immediate vicinity.

Lower Newport Bay (**LNB**) is defined as below PCH bridge to the outer harbor, so salinity is about 30--35 ppt. Surrounding shores and two islands are highly urbanized with nine boatyards and about 10,000 small boats. In the western area of Lower Newport Bay, two isolated areas have less tidal flushing: Turning Basin and Rhine Channel.

Santa Ana Regional Board has designated **Rhine** Channel as toxic hotspot. The land use history in the area immediately adjacent to Rhine Channel suggests that local pollutant source may be significantly different from the pollutant sources that have discharged to the rest of the watershed. Given the different levels of sediment contamination observed in Rhine Channel as compared to other areas of Newport Bay and the likely association of toxic hotspots in Rhine Channel with local pollutant sources, EPA has determined that is appropriate to develop separate TMDLs for that reach of Lower Newport Bay rather than simply addressing it as part of the TMDLs for Lower Newport Bay. We believe this approach will facilitate more effective planning and implementation of pollutant control strategies by the State.

Table 1.

Consent Decree	TMDL Development	More monitoring
San Diego Creek: Cd, Cr, Cu, Pb, Zn	**Cd, Cu**, **Pb**, **Zn, Se**	Cr
Endosulfan, DDT, PCBs, Toxaphene, Chlorpyrifos	**Chlordane, Dieldrin, DDT, PCBs, Toxaphene** **Chlorpyrifos, Diazinon**	Endosulfan
Upper Newport Bay: Cd, Cr, Cu, Pb, Hg, Ag, Zn	**Cd, Cu, Pb, Zn, Se, As**	Cr, Hg, Ag
Endosulfan, DDT	**Chlordane, DDT, PCBs, Chlorpyrifos**	Endosulfan
Lower Newport Bay: As, Cd, Cu, Pb, Se, Ag, Hg, Zn	**Cu, Pb, Zn, Se, As**	Ag, Cd, Hg
Chlorbenside, Chlordane, Chlorpyrifos, Dieldrin, Endosulfan, DDT, PCBs, Toxaphene,	**Chlordane, Dieldrin, DDT**, **PCBs**	Chlorbenside, Chlorpyrifos, Endosulfan, Toxaphene
Rhine Channel:	**Cu**, **Pb**, **Zn, Se, As, Cr, Hg**	Ag, Cd
	Chlordane, Dieldrin, DDT, PCBs	Chlorbenside Chlorpyrifos, Endosulfan, Toxaphene

III. Weight of Evidence Approach

EPA Region 9 assessed several types of available toxicity and chemical data to assess the need for TMDLs: water column data, sediment quality data, and fish / shellfish tissue data. We applied a two-tiered approach whereby data were analyzed to determine whether there is clear evidence of impairment with probable adverse effects (TIER 1) or incomplete evidence and / or evidence of possible adverse effects or potential for future impairment (TIER 2). Table 2 provides a diagram of EPA's assessment criteria for determining whether a constituent would be placed in TIER 1 or TIER 2 with respect to each data category.

If a chemical exceeded the screening criteria in TIER 1 with respect to any of the three categories, we determined that a TMDL would be completed for that chemical in the affected water body.

TIER 2 addresses the "gray area" where exceedences of standards or screening guidelines are less frequent or less extreme, where data sets are incomplete for particular categories, or where there is concern about potential water quality standards violations in a segment based on conditions in the adjacent segments. EPA developed two methods for determining whether TMDLs were needed based on TIER 2 considerations.

First, if a chemical exceeded the screening criteria in TIER 2 with respect to two or more data categories, we determined that a TMDL is needed. This determination was based on a conclusion that the weight of available evidence indicates applicable numeric and / or narrative water quality standards are being exceeded and that designated beneficial uses may not be fully supported.

Second, we also considered as part of the TIER 2 analysis whether a TMDL is warranted for an individual water segment based on the considerations that TMDLs were determined to be needed for adjoining water segments and that some evidence of impairment was present for the individual segment. All the water segments in the watershed are hydrologically connected, and in many cases pollutants may move freely between different segments. Therefore, EPA carefully evaluated situations where a specific water segment did not meet the criteria for a TMDL determination based on the data analysis criteria described above, but one or more adjoining segments did meet the data analysis criteria and were found to need TMDLs. If there was some evidence for the specific segment indicating potential impairment and the impairment evidence for the adjacent segment was very strong, we determined TMDLs may be needed for the specific water segments in order to ensure that TMDLs would be developed where needed despite uncertainties about the degree of local impairment. For the toxic pollutants of potential concern in the watershed, this approach was warranted because many of these pollutants remain in and move through the aquatic environment for long periods of time. Because Newport Bay is tidally influenced, water, sediments, and pollutants may move back and forth in the Bay over time. EPA concluded that it is appropriate to take a "watershed approach" to TMDL development for many pollutants rather than simply excluding individual segments from consideration because TIER 1 and TIER 2 data analysis thresholds were not fully met when adjacent segments did meet those thresholds. This watershed approach enabled EPA to look holistically at pollutant discharges and transport through the watershed in developing TMDL approaches. The sections below that present analysis for specific pollutants describe the basis for EPA's judgments in conducting the adjacent waters analysis.

In a few situations, however, EPA determined it was not appropriate to develop TMDLs for specific segments despite the fact that an adjacent segment was determined to need a TMDL. TMDL development is not appropriate in these situations because the evidence of impairment in the adjacent segment, or evidence of potential impairment in the specific segment, was not strong enough to support such a determination. The basis for these determinations is described below where the individual pollutant assessments are discussed.

We have applied this tiered system to assess water, sediment and tissue monitoring data in four water body segments: San Diego Creek, Upper Newport Bay, Lower Newport Bay and Rhine Channel (see Table 5 for data sources). To maximize the relevance of this analysis to present conditions of water quality and to ensure the analysis is based on reliable data, we concentrate on most recent results (since 1995) and apply quality control (QC) measures outlined in Section V.

Tier 1 Sufficient evidence in *one category* establishes impairment and triggers a TMDL

Water Column

Dissolved water column concentrations were compared to acute and chronic California Toxic Rule (CTR) water quality criteria (WQC). EPA 305(b) guidance (EPA, 1997) suggests that if greater than 10% of sample results exceed either acute or chronic values then the aquatic life beneficial uses of the water body are not fully supported. If water toxicity tests showed a chemical caused toxicity, then we concluded a TMDL was needed for this chemical. In our best professional judgment, we assumed that toxicant identification evaluations (TIE) should be completed for at least two organisms or three or more separate sampling events to clearly demonstrate impairment associated with water column toxicity tests. This frequency is based on the often-transient nature of water column contamination and associated toxicity.

Sediment

Sediment TIE studies and triad studies determine if one or more chemicals are present at levels which do not support beneficial uses. Triad studies require three measurements: sediment toxicity, infaunal analysis and sediment chemistry to evaluate sediment effects on aquatic life. If two of the three portions of triad study indicate benthic community degradation (e.g., defined as a negative value by Bay Protection Toxic Clean-up Program) then impairment was established but additional analysis was needed to clarify which pollutants were causing the degradation. To identify chemicals associated with impairment, we compared sediment concentrations to higher sediment quality guidelines (SQGs) or equilibrium partitioning guidelines (ESG) and if greater than 25% of sample results exceed higher SQGs then we concluded a TMDL was necessary.

Tissue

Two types of tests were applied. First, if a fish consumption advisory was posted *and* based on analysis of local data, then TMDL development was determined to be necessary. Second, sportfish and shellfish tissue concentrations were compared to screening values, primarily those established by EPA or California Office of Environmental Health Hazard Assessment (OEHHA). For chemicals for which neither EPA or OEHHA have established screening values, we also considered tissue screening values from other sources: maximum tissue residue levels (MTRLs), United Nations Median International Standards (MIS), and wildlife risk values (US Fish and Wildlife, 1998). We compared the lowest or most protective screening value to results of total tissue concentrations, except for arsenic as discussed in section IV below. If greater than 25% of sample results exceeded this screening value then we concluded a TMDL is necessary for this pollutant.

We determined that a minimum of ten samples were needed in order to make a TIER 1 determination of TMDL necessity. Because TIER 1 determinations were based on a single line of evidence, we concluded that it was reasonable to expect a minimum number of samples in order to increase the level of confidence in the determination. The EPA 305(b) guidance (EPA, 1997) recommends a minimum of 10 water samples in three years in assessing potential exceedences of water quality standards for toxic pollutants. We assumed that ten sediment or fish tissue sediments were required for clear evidence of impairment. For each pollutant and data category, if 10 samples do not exist then available data were considered through the TIER 2 assessment methods described below. We consider our reliance on a minimum of ten samples for an assessment based on a single data type to be reasonable and prudent given the variability and uncertainty associated with environmental monitoring. In addition, our reliance on a minimum sample size was reasonable for the Newport Bay watershed for which relatively plentiful data are available compared to most waters in the region.

<u>Tier 2</u> Requires evidence in *two out of three categories* or information from adjacent segments to trigger a TMDL

Water Column

Dissolved water column concentrations were compared to applicable acute and chronic CTR values. EPA 305(b) guidance states if chemical results exceeded either acute or chronic values more than once in three years then the chemical partially supports beneficial uses of the water body. Limited toxicity tests were also considered reasonable indicators of possible adverse effects. Either case warranted further convincing evidence from other categories (sediment or tissue results). Prudent evaluation includes consideration of the frequency and magnitude of these exceedences as well as the analytical error for these results relative to the CTR values. (See Data QA / QC in section V.)

Sediment

Sediment concentrations were compared to low sediment quality guidelines (e.g., effects range low (ERL) and threshold effect levels (TELs)) and if greater than 10% sample results exceed *both* of those lower SQGs then the chemical was found to partially support aquatic life use. Whenever feasible specific freshwater SQGs were used for San Diego Creek sediment data. In sediment triad studies (as described above in Tier 1), when only two of three legs have been completed, at least one part must be for chemistry data in order to identify the pollutant(s) of concern. Again, evidence from water or tissue studies was also required to trigger TMDL development.

Tissue

Tissue concentrations were compared to the lowest or most protective screening values. Total concentrations were used except for arsenic as discussed in section IV below. If greater than 10% of sample results exceed the screening value, then we reviewed results of water and sediment assessments to determine additional evidence and possibly trigger TMDL. EPA or OEHHA values were preferred, yet if value for chemical was unavailable (e.g., Ag, Cd, Cr, Pb, Zn), then MTRLs, MIS, FDA, or wildlife risk values were used.

Adjacent Segments Analysis

As discussed above, we also considered as part of the TIER 2 analysis whether a TMDL is warranted for an individual water segment based on the considerations that:

- # TMDLs were determined to be needed for adjacent water segments, and
- # some evidence of impairment (e.g., one potential exceedence based on TIER 2 analysis) was present for the individual segment.

If there was some evidence for the specific segment indicating potential impairment and the impairment evidence for the adjacent segment was very strong, we determined TMDLs may be needed for the specific water segments in order to ensure that TMDLs would be developed where needed despite uncertainties about the degree of local impairment

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.
*10% and "two or more" from EPA 305(b) guidance (1997), section 3.2.4 on toxics in water samples.
#25% from Consolidated Assessment and Listing Methodology guidance (EPA draft report 2001b).
$^{\delta}$based on local data in comparison to criteria equal to or more stringent than water quality standard
Acronyms explained in text of Sections III & IV.

Trend Analysis

EPA guidance provides that threatened waters (waters currently meeting standards but expected to exceed standards within the next two years) should be considered for TMDL development (EPA, 1997). EPA regulations, as interpreted in EPA guidance (1997) also provides that TMDLs may not be needed for impaired waters if other control mechanisms will result in attainment of standards within the next two years. Therefore, EPA evaluated whether there appeared to be water quality trends in the different water segments in the watershed that would indicate either:

- # waters currently meeting standards appear to have declining trends and may not meet standards in the future or
- # waters currently exceeding standards appear to have improving trends and may meet standards in the future.

We plotted available water chemistry, sediment, and tissue data to evaluate whether chemical concentrations are decreasing or increasing relative to the numeric criteria or screening value in that category. Such graphs were generated *if* and *only if* there is sufficient data (using consistent sampling and analytical methods) covering more than five years of results; e.g., State Mussel Watch program. If trends were apparent based on visual observation of the graphs, we applied statistical methods (e.g. regression analysis and Mann-Kendall test (Gilbert, 1987) to evaluate the apparent trends were statistically significant.

Some potential trends were observed based on this analysis. Tissue levels of chromium, selenium, zinc in tissue samples appeared to be increasing over time in some segments of Newport Bay. On the other hand, tissue levels of organic chemical pollutants and sediment levels of copper and lead appeared to be declining over time in some segments of Newport Bay.

However the available data were too limited and the apparent trends insufficiently clear to conclude either that:

- # waters which now exceed standards will meet standards within the next two years or
- # waters that now meet standards will exceed standards within the next two years.

Therefore, EPA concluded that no adjustments to the determinations of TMDL necessity were warranted based on the trend analysis.

IV. Discussion of numeric screening values used in decision process

Table 3 provides a compilation of screening values used in our decision process. Here we provide further explanation on selection of these values.

Water

Water quality criteria values are from California Toxics Rule (CTR), promulgated by EPA (2000a). As appropriate for certain metals, we have adjusted freshwater values to assume hardness equals 400 ppm (average conc. in San Diego Creek). Monitoring data for chromium (Cr) results in water samples are reported in two different ways, depending upon whether the available data identified valence states of chromium. First, Irvine Ranch Water District (IRWD) and Orange County Public Facilities Resources Department (OCPFRD) report dissolved Chromium results, so we have combined chromium CTR values (added Cr (3+) and Cr (6+)) to make the appropriate comparison with the OCPFRD data. This is reasonable based upon the analytical method to determine dissolved chromium in aqueous samples. Second, Lee and Taylor (2001a) report chromium speciation results so separate Cr (3+) and Cr (6+) data were interpreted against those individual CTR values.

Sediments

There are no *promulgated* sediment quality criteria, so we have chosen to use values from National Oceanic Atmospheric Association (NOAA) Sediment Quality Reference Tables (September 1999). According to NOAA, these numeric values are "intended for preliminary screening purposes only...to initially identify substances which may threaten resources of concern. [These multiple SQGs]… help portray the entire spectrum of [environmental] concentrations which have been associated with various probabilities of adverse biological effects." We recognize these NOAA values have been derived by associating nationwide sediment chemistry data sets with benthic toxicity results and there is no direct cause and effect relationship. Nonetheless, we have concluded that these values provide reasonable evidence of potential adverse aquatic life effects and therefore apply them as sediment quality guidelines (SQGs) to provide comparison for trace metals and organic compounds. Low SQGs (e.g., threshold effect levels (TELs) and effects range low (ERLs)) are presumed to be non-toxic levels and pose with a high degree of confidence no potential threat. High SQGs (e.g., probable effects levels (PELs) and effects range median (ERMs)) identify pollutants that are more probably elevated to toxic levels. SQG values for some pollutants do not exist; e.g., silver (in freshwater) and toxaphene.

We use freshwater SQGs for comparison to San Diego Creek sediment results and saltwater SQGs for the three saline segments of Newport Bay. Based upon methods explained by Long, *et al.* (1998), we have opted to use low SQG levels (TELs and ERLs) as protective levels for aquatic life. In that study, the authors determined that if sediment concentrations did not exceed *both* TELs and ERLs then one could reasonably predict non-toxicity in those sediments. We believe it is appropriate to apply these lower threshold values in TIER 2, when evaluating "gray area" data. When evaluating heavily contaminated sediments, we use the higher SQGs to indicate probable impairment (TIER1) since adverse effects are (nearly) always expected when PELs or ERMs are exceeded. Adverse effect threshold (AET) values were used only if other SQGs do not exist, since these values were derived from site-specific studies in Puget Sound.

EPA has drafted (2001a) equilibrium partitioning sediment guidelines (ESGs) for a limited group of pollutants-- six metals and two organic compounds. These ESGs are based upon a different approach than NOAA's screening guidelines and ESGs rely on considerably more data than is typically generated in sediment studies. In short, measurements of total organic carbon (for organic compounds) and acid volatile sulfides (for metals) are required to calculate ESGs for those sediment sites. To date, only one study (Bight '98/SCCWRP) has sufficient data to use ESG values, and these results apply only to sediments in Lower Newport Bay. We have included assessment of acid volatile sulfide and simultaneously extracted metal results for five metals at ten Lower Newport Bay sites. We have also evaluated metal porewater concentrations relative to interstitial water guidelines for those same Lower Bay sties. We were unable to perform ESG assessments for organic compounds but Bight '98 results for organic compounds were incomplete.

Tissue

Both EPA (2000b,c) and OEHHA (1999) have issued guidance for issuing fish consumption advisories to protect human health via sportfish and shellfish consumption. Tissue screening values (SVs) were determined for noncarcinogens and some carcinogens using a risk-based approach, assuming a risk level of 1 in 100,000. This risk based approach included assumptions on human body weight, reference dose and daily consumption rates. EPA has evaluated numerous fish consumption surveys and recommended that risk assessments assume consumption values of 17.5 grams per day for the general adult population and recreational fishers and 142.2 grams / day for subsistence fishers (2000d). OEHHA assumes recreational fishers consume 21 grams per day. We have found no data that a large number of anglers are subsistence fishers in Newport Bay, thus we have utilized screening values from EPA and OEHHA for recreational fishers and the general adult population.

For some metals for which EPA or OEHHA tissue SVs do not exist, we have opted to use either MTRLs or MIS values. California State Water Board's Mussel Watch Program developed MTRLs using a different approach than EPA and OEHHA. MTRLs are calculated by multiplying the applicable water quality objective by a bioconcentration factor specific for each chemical. State Water Board applies MTRLs to fish and shellfish results for Enclosed Bays and Estuaries. Median International Standards (MIS) values arise from a survey of international standards and legal limits by Food and Agriculture Organization of United Nations (1983). We acknowledge that MIS values were not developed in the United States; however, we have used them because fore certain pollutants values (Ag, Cr, Pb, Se, and Zn) have not been established by EPA, OEHHA or the State Water Board. Separate MIS values exist for freshwater fish and shellfish, thus we have applied them with respect to fish tissue results in San Diego Creek and shellfish results throughout Newport Bay. Total concentrations were compared to the lowest (or most protective) screening value provided by EPA, OEHHA, State Water Board, or MIS.

For arsenic in tissue results we have formulated a side-by-side comparison to examine both total arsenic and inorganic arsenic concentrations. The goal was to evaluate the relative contribution from inorganic arsenic, the carcinogenic form of arsenic. We used updated EPA guidance (2000b) to provide an inorganic arsenic screening value, whereas OEHHA (1999) used total arsenic concentrations. Our comparison uses reported total arsenic results and calculated inorganic arsenic data (from the total results) using 4% in finfish and 60% in shellfish. These percentages arise from conclusions in scientific literature. Donohue and Abernathy (1996) completed a broad literature review of total and inorganic arsenic results in both types of tissue and Schoof, *et al.* (1999) performed a market basket survey of inorganic arsenic in food, including finfish. Estimates of inorganic arsenic results in shellfish are provided by Francesconi and Edmonds (1994) and Creed (pers. commun.).

To address protection of aquatic wildlife and aquatic dependent species as well as human health, we have reviewed available literature and selected the lowest screening value from several sources. (Again, there are no promulgated wildlife criteria fish tissue values.) For example, National Academy of Sciences *recommended* maximum concentrations of organic chemicals in animals in freshwater systems (NAS Blue Book 1973). These NAS values were designed to protect aquatic organisms themselves as well as wildlife predators. US Fish and Wildlife (1998) have compiled scientific information to provide guidelines for interpreting biological effects of some chemicals in biota, water and sediment. For most chemicals of concern, the EPA or OEHHA tissue screening values are both the most protective tissue value; copper is one exception (see Table 4). Moreover, EPA and OEHHA values are based upon the most recent scientific information.

Table 4. Fish tissue values: Human Health vs. Wildlife protection

	EPA (2000a) Human health	OEHHA (1999) Human health	NAS (1973) Aquatic Wildlife	U.S Fish & Wildlife (1998) Biological Effects
Arsenic (As)	1.2	1.0	--	0.25
Copper	--	--	--	15
Mercury	0.3*	0.3	--	0.3#
Chlordane	114	30	50	--
Dieldrin	2.5	2.0	5	--
DDT (total)	117	100	50¥	wide range
PCB (total)	20	20	500	--

all values expressed in wet weight: total metal in ppm; organic in ppb; -- means no data available)

*0.3 mg/kg wet wt. for methylmercury conc in fish tissue

#from Canadian study on bird reproduction

¥another DDT value is 150 ppb ww from EPA water quality criteria (1980)

[*EPA (1995) defined aquatic freshwater wildlife criteria for three analytes: DDT, PCBs and mercury based upon studies in Great Lakes Region. Those aquatic wildlife criteria apply only to water bodies within the Great Lakes Region, due to site-specific bioaccumulation factors, and were not used in this assessment of Newport Bay watershed.*]

Table 3. Overview of numeric screening values for METALS

	WATER (ppb)						**SEDIMENT** (ppm dry wt.)							**TISSUE** (ppm wet)		
	fresh acute	fresh chronic	salt acute	Salt Chronic	Water & org.	Org. only	Fresh TEL	Fresh PEL	Salt TEL	Salt ERL	Salt PEL	Salt ERM	Salt AET	EPA	OEHHA	MTRL or MIS
As	340	150	69	36			5.9	17	7.24	8.2	41.6	70	35	1.2	1.0	1.4
Cd	19	6.2	42	9.3			0.596	3.53	0.67	1.2	4.2	9.6	3.0	4.0	3.0	0.3 / 1
Cr-tot	1724	565	1100	50			37.3	90	52.3	81	160.4	370	260			1.0
Cr6+	16	11	1100	50												
Cu	50	29	4.8	3.1	1300		35.7	197	18.7	34	108	270	390			15@
Pb	281	11	210	8.1			35	91.3	30.2	46.7	112	218	400			2.0
Hg	1.4	0.77	1.8	0.94	0.050*	0.051*	0.174	0.486	0.13	0.15	0.696	0.71	0.41	0.3	0.3	0.37#
Ag	37		1.9						0.73	1	1.77	3.7	3.1			
Se	20	5	300	71									1	20	20	2 / 0.3
Zn	380	380	90	81	1.7	6.3	123.1	315	124	150	271	410	410			45 / 70

Blank space indicates no value available

Water values from CTR (EPA 2000a) , freshwater values calculated at 400 ppm hardness
*mercury CTR values (for human health consumption of water and / or organisms) do not reflect most current fish bioconcentration factor, thus EPA fish tissue value (0.3 ppm wet wt. MeHg as determined in 2000b) is most appropriate.

Sediment values from NOAA SQuiRTS (1999)
TEL = threshold effects level; PEL = probable effects level; ERL = effects range low; ERM = effects range median; AET = apparent effects threshold

Tissue values from EPA (2000b), OEHHA (1999)
¥most recent available inorganic arsenic value is 1.2 ppm (EPA 2000b)
#MTRL value from State Mussel Watch (2000), @Copper value from US Fish & Wildlife (1998)
MIS values from Median International Standards from United Nations survey (1983); first value presented for freshwater fish and second for shellfish

Table 3. (cont'd) Overview of numeric screening values for ORGANICS

	WATER (ppb)						**SEDIMENT** (ppb dry wt.)							**TISSUE** (ppb wet)		
	fresh acute	fresh chronic	salt acute	Salt chronic	Water & org.	Org. only	fresh TEL	fresh PEL	Salt TEL	Salt ERL	Salt PEL	Salt ERM	Salt AET	EPA	OEHHA	MTRL
Chlorbenside																
Chlordane	2.4	0.0043	0.09	0.004	.00057	.00059	4.5	8.9	2.26	0.5	4.79	6	2.8	114	30	8.3
Dieldrin	0.24	0.056	0.71	0.0019	.00014	.00014	2.85	6.67	0.715	0.02	4.3	8	1.9	2.5	2.0	0.7
DDT-tot	1.1	0.001	0.13	0.001	.0059	.0059	6.98	572*	3.89	1.58	51.7	46.1	11	117	100	109
Endosulfan- tot#	0.44	0.112	0.068	0.0174	220	480								24 (ppm)	20 (ppm)	64.8 (ppm)
PCBs-tot	2	0.014	10	0.03	.00017	.00017	34.1#	277	21.5	22.7	189	180	130	20	20	5.3
Toxaphene	0.73	0.0002	0.21	0.0002	.00073	.00075								36.3	30	9.8

Blank space indicates no value available

Water values from CTR (EPA 2000a) ; #sum of endosulfan α & β values
"water & org." and "org. only" refer to human health criteria for consuming water and / or organisms from same waterbody

Sediment values from NOAA SQuiRTS (1999)
TEL = threshold effects level; PEL = probable effects level; ERL = effects range low; ERM = effects range median; AET = apparent effects threshold
*freshwater PEC (probable effects concentration) from Ingersoll, et al. (2000), range of values cited therein: SEL = 120, ERM = 350, PEL = 4450
#freshwater TEL from NOAA, MacDonald et al. (2000) have reviewed the range of total PCB values for freshwater and saltwater (see values cited therein) and provide threshold effects concentrations (TEC) determined by consensus: freshwater TEC = 35 ppb and saltwater TEC = 48 ppb

Tissue values from EPA (2000b), OEHHA (1999), MTRL values from State Mussel Watch (2000) for Enclosed Bays and Estuaries

V. Data QA/QC issues

Sound scientific practice calls for applying quality assurance and quality control measures when assessing sampling design and analytical results. Relevant issues are presented below. We applied QA / QC issues to monitoring data as part of the two-tier decision scheme. Best professional judgment was also required as each project and data set has unique nuances.

a. To determine present day water quality condition and support of aquatic uses, recent data (past 5 years) was given more significance than older data (past ten years). Data greater than 10 years old was not used in the evaluation process except to generate trend analyses.

b. Ideal monitoring studies supply robust data sets, which address spatial and temporal variability and include relevant speciation or congener data. However, robust data sets are not always available so we used the best of data available.

c. Only dissolved (<0.45 um filter) water data were used for comparison to CTR values, since the dissolved fraction best approximates bioavailable metals and organics. Metals are hardness dependent and CTR values were adjusted to appropriate water hardness measurements.

d. Results generated from best sampling and analysis protocols were preferred over those studies that use inappropriate or outdated practices. (Historical evidence has demonstrated that sampling, storage and analytical protocols have yielded contaminated water column samples and consequently high bias data for aqueous mercury and other priority pollutant metals.) Representative ambient water samples are best collected via trace metal clean techniques (EPA Method 1669), handled carefully to minimize contamination within the laboratory (Method 1669), and analyzed by optimal analytical methods (EPA 1600 series). Also, accurate detection of metals in seawater requires specific preparation methods to remove and account for salt matrix interferences (EPA Methods 1638, 1639 and 1640). Simple dilution of seawater samples is not sufficient for accurate detection of aqueous metals in comparison to marine CTR values.

e. Water--Four (consecutive) day composite samples were computed using OCPFRD data for San Diego Creek and tributaries and we made comparisons to CTR chronic water values (assuming mean hardness value of 400 ppm).

f. Tissue–Data from fish fillets were compared to human health screening values, whereas whole fish data were based against ecological criteria if they exist. Ideally, fish tissue data include arsenic speciation results; that is, inorganic values are measured directly and compared to EPA’s inorganic arsenic tissue values. In this assessment, finfish inorganic values were calculated as 4% of total arsenic values. For shellfish, total arsenic data and inorganic data (60% of total) were compared to MTRL values.

g. If method detection limits were insufficiently low then we found it difficult to make definitive evaluations with data relative to water quality criteria, sediment guidelines or tissue screening values. If datum was stated “<x” or “-x” then datum was interpreted as “x/2” for numerical value in comparisons or statistical calculations.

h. If datum was reported “~~yy~~” then datum was not used in numerical comparisons or statistical calculations. Presumably this datum was considered suspect by laboratory or sampling staff and required further verification prior to use in comparisons or calculations.

i. Trend analyses were applied to program results using consistent sampling and analytical protocol; e.g., State Mussel Watch Program. If a change in protocol was made to comply with improved methods or techniques then trend analyses clearly identified the date(s) and the distinction.

j. “Hits” were defined as data above WQC, SQG or tissue screening levels. EPA Region 9 evaluated frequency of hits and magnitude of hits. Two important considerations were applied.

   a. Extreme magnitude exceedences were heavily weighted with regard to frequency of exceedence and minimum sample size. For example, if sample results were more than 20fold higher than the appropriate WQS, SQG or tissue screening value and sufficient samples existed (>five) then this was viewed as evidence of impairment similar to TIER 1 decisions. See mercury sediment concentrations in Rhine Channel.

   b. We also evaluated the magnitude of these exceedences by considering the analytical error for monitoring results relative to the screening criteria/values. For example, two “hits” at levels three times the CTR acute value were valid exceedences and deserved recognition of possible adverse effects. Whereas two “hits” at levels very close to the CTR value (within analytical error, ±20%) were considered borderline cases and warranted further convincing evidence from other categories. Both of these examples are TIER 2 type decisions.

Monitoring Data for San Diego Creek and Newport Bay

EPA has considered all readily available and most recent data (as of March 2002) in our assessment. Since Santa Ana Regional Board staff issued their Problem Statement (December 2000), we have added three new data sets (cited by name here): Lee report, City dredge report, and Bight '98. We have also updated three data sets: OCPFRD, Toxic Substances Monitoring Program (TSMP) and State Mussel Watch to include more recent (still preliminary) results. Two Southern California Coastal Research Water Project (SCCWRP) studies are still pending and results are currently unavailable.

Table 5. Overview of monitoring data

Attach-ment	**Title** / org.	Data dates	Type	Comments
J	**Lee & Taylor** / 319(h) report to Santa Ana RWQCB	'99-'00	Water chem. & tox test	Metals and OP pesticides in watershed, Draft report provided Feb. 2001
K	IRWD WWSP Report	'97-'99	Water & Sediment	metals and organics measured using APPROPRIATE sampling and analytical techniques, one day composites, year round, NO storm events
L	**OCPFRD** Stormwater	'95-'00	Water	seven metals, year round sampling, includes dry and wet weather events; four consecutive day sampling data can be used for chronic comparisons; most dissolved samples in 1996—'00 (one dissolved sample in 1995 for SDC)
M	OCPFRD	'91-'00	Sediment	semi-annual sediment data for same metals and some organics
N	**Ogden Environ.** / for City of Newport Beach	'99	Sediment	Metals and few organics in dredge studies of only four sites, most in LNB
O	BPTCP / SWRCB / NOAA / EPA	'94 & '96	Sediment triad study	metals and organics measured, some porewater results, toxicity on six organisms, and benthic community index, APPROPRIATE sampling and analytical techniques, only two sites in '96
P	Bight '98 / Coordinated by SCCWRP	'98	Sediment chemistry	Metals and few organics at 11 LNB sites, AVS & SEM data, interstitial porewater data for SEM; no Rhine Channel site
Q	Orange County Coastkeeper / MEC Consultants	'99	Sediment chemistry	Metals at two Rhine sites and one in Turning Basin; two surface sediment samples and one sediment core sample
R	Calif. Fish Contam. Study (SWRCB & OEHHA)	'99–'00	Sport fish Tissue	Total As, Cd, Se, Hg and organics in fish fillets of UNB & LNB
S	**SMW** / SWCRB	'80-'00	Shellfish Tissue	Total metals and organics in resident or transplanted mussels, no recent data in SDC, useful for trends analysis
T	**TSMP** / SWRCB	'83–'98	Fish Tissue	Total metals and organics in whole fish
U	Fish Bioaccumulation / SCCWRP	pending	Tissue	sportfish samples for two seasons, some data available in Summer 2001
V	Sediment Toxicity / SCCWRP	pending	sed & water Toxicity	sediments and water in UNB & LNB, some data available in Summer 2001

VII. Question sequence for weight of evidence approach:

- # Does **water (dissolved) monitoring data** exist in past 5 years?
- # Were appropriate sampling and analysis techniques used for ambient surface waters?
- # Compare data to CTR values, using hardness adjustments for freshwater samples.
- # Per chemical parameter, do data exceed CTR value (either chronic or acute) more than 10% frequency in 5 years?
- # Are there at least 10 water samples? If yes, TIER 1 = develop TMDL (If less than ten samples then default into TIER 2.)

- # Per chemical parameter, do four day composite data exceed chronic CTR value twice or more in 5 years? If yes, then TIER 2; i.e., examine sediment and tissue data for additional exceedances.
- # Per chemical parameter, do grab sample data exceed acute CTR value twice or more in 5 years? If yes, then TIER 2.
- # Any water TIE studies available for this waterbody in past 5 years? Were water TIE studies completed for more than one sampling event to evaluate "representative" conditions of waterbody? If yes, then develop TMDL for identified pollutants.

- ➢ Does **sediment monitoring data** exist in past 5 years?
- ➢ Were samples composited or individually analyzed in study? If composites were used then proceed. Whereas if grabs were analyzed, then consider use median (in lieu of mean) to evaluate data skewed by individual data.
- ➢ Compare chemistry data to NOAA sediment quality guidelines.
  (If AVS and SEM results exist, determine ESG values.)
- ➢ Per chemical parameter, do data exceed PEL or ERM or ESG values more than 25% frequency in 5 years?
- ➢ Are there at least ten samples? If yes, TIER 1 = develop TMDL (If less than ten samples then default into TIER 2.)

- ➢ Per chemical parameter, do data exceed *both* ERLs *and* TELs values more than 10% frequency in 5 years? If yes then TIER 2; i.e., examine water and tissue data for additional exceedances.
- ➢ Any sediment TIE studies for this waterbody in past five years? Do sediment triad studies establish impairment of benthic organisms? Are there chemistry results to make correlations with high or low SQGs?
- ➢ If porewater concentration results exist, convert them to interstitial water guideline units and compare them to (total) chronic saltwater CTR values (as in water data above).

- ▪ Do **finfish or shellfish tissue** monitoring data exist in past 5 years?
- ▪ Were samples composited or individually analyzed in study? If mixture of results provided then consider use median (in lieu of mean) to evaluate data skewed by individual data.
- ▪ Fish filet results are best compared to human health SVs; whole fish data to predator tissue values.
- ▪ Compare total concentrations to various tissue screening values. For arsenic, compare

both total and inorganic arsenic concentrations to tissue screening values.

- Per chemical parameter, do data exceed lowest screening value more than 25% frequency in 5 years?
- Are there at least ten samples? If yes, TIER 1 = develop TMDL (If less than ten samples then default into TIER 2.)

- Per chemical parameter, do data exceed lowest screening value more than 10% frequency in 5 years?
- If yes, then TIER 2; i.e., examine water and sediment data for additional exceedances.
- Use MTRL or MIS values only if no EPA or OEHHA value exists.

• # Are **trends** evident in any of the above monitoring data? Be sure to compare “apples to apples” and create graphs from data collected over longer than five-year timeframe, preferably ten or twenty years at the same site. If graphs indicate expected impairment or “threatened water bodies” based upon increasing concentrations soon above screening values, then perform statistical tests to elucidate confidence in such a comparison. If graphs indicate improving water quality and presently below screening levels, then no TMDL is required.

• # How does impairment information for subject segment related to impairment information for **adjacent segments?**

• # Is evidence of potential impairment . available for the subject segment (e.g. exceeds one TIER 2 criterion or potential water quality threat indicated based on other data or studies) ? If yes, proceed to next question.

• # Is there impairment evidence for one or more adjacent segments that is very strong e.g., very high frequency or magnitude exceedence of objectives or screening values)? If yes, TMDL development is warranted.

VIII. Assessment Summary

This section discusses how the weight of evidence decision rules were applied for individual pollutants and waterbody segments in the Newport Bay watershed. In general, TMDLs are warranted in cases where one TIER 1 criterion is met, two TIER 2 criteria are met, or where there is TIER 2 evidence in a segment and very strong evidence of impairment in an adjacent segment.

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

Upper Newport Bay Determination: no TMDL
No (0/6) water quality criteria exceedances
12% (1/8) sediment results above low SQGs = TIER 2
0% (0/9) tissue exceedances vs. inorganic As value (1.2 ppm) in past five years

Lower Newport Bay Determination: no TMDL
no (0/3) water quality criteria exceedances
68% (17/25) sediment results above low SQGs. = TIER 2
0% (0/22) tissue exceedances vs. inorganic As value (1.2 ppm)in past five years

Rhine Channel Determination: no TMDL
no water column data
(2/2) sediment results above low SQGs = TIER 2
0% (0/11) shellfish exceedances vs. inorganic As (0.026 ppm)in past five years

Cadmium (Cd)
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**

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

Potential increasing trends in tissue data since 1980s.

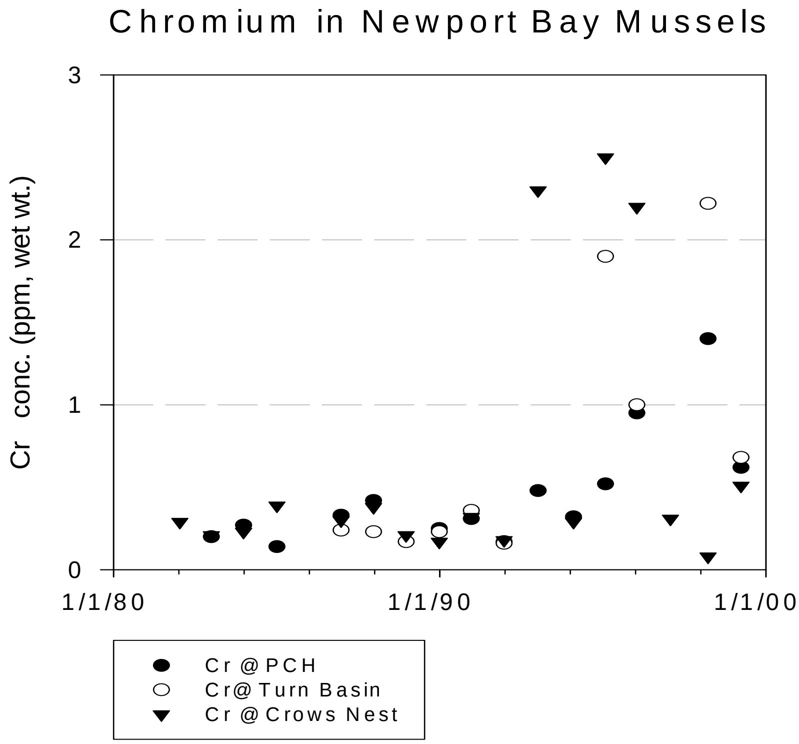

Figure H-1. Cr in Newport Bay Mussels (SMW database). Screening value is 1.0 ppm ww.

Copper (Cu) **Assessment Summary**

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 = TIER 2

no (0/10) water quality criteria exceedances based on IRWD data

17% (7/42) sediment results above low SQGs = TIER 2

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

acid volatile sulfide results indicate no 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

Potentially increasing trends in mussel tissue in Newport Bay

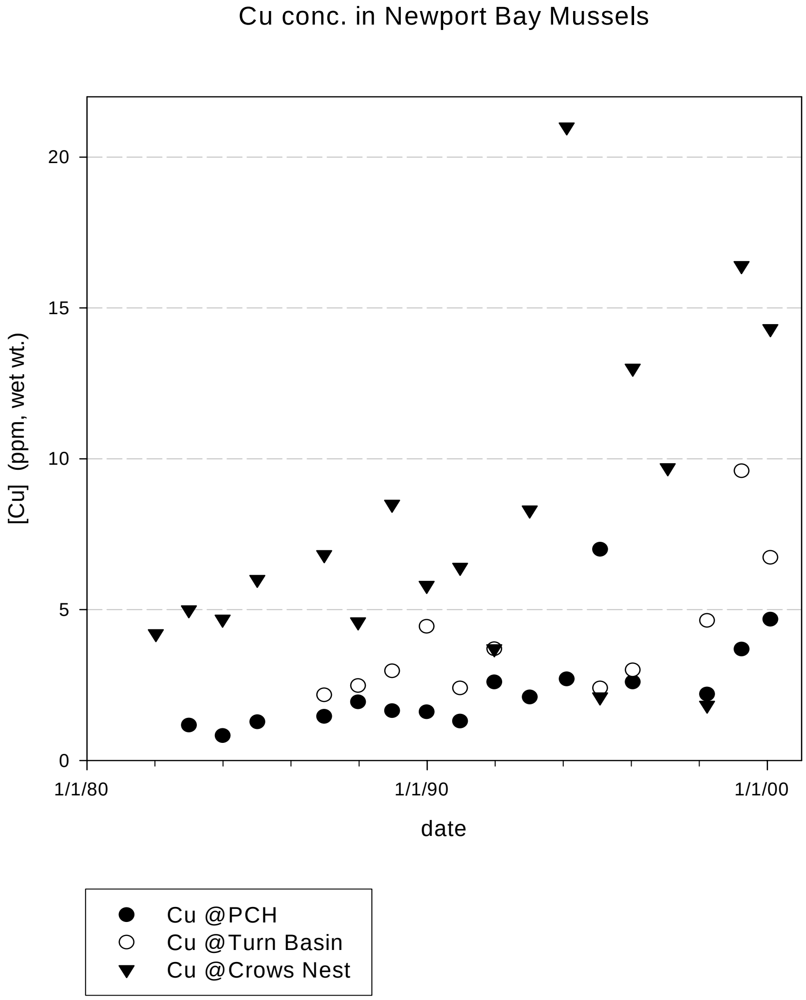

Figure H-2. Copper in Newport Bay mussels (SMW database). Screening value is 15 ppm

Lead (Pb) **Assessment Summary**

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 low freshwater SQGs
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 low SQGs
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% (2/42) sediment results above low SQGs = TIER 2
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 high* ERMs = TIER 1
acid volatile sulfide and porewater results indicate no problem
No (0/13) shellfish tissue exceedances in past five years; and trend analysis shows declining conc. below SV

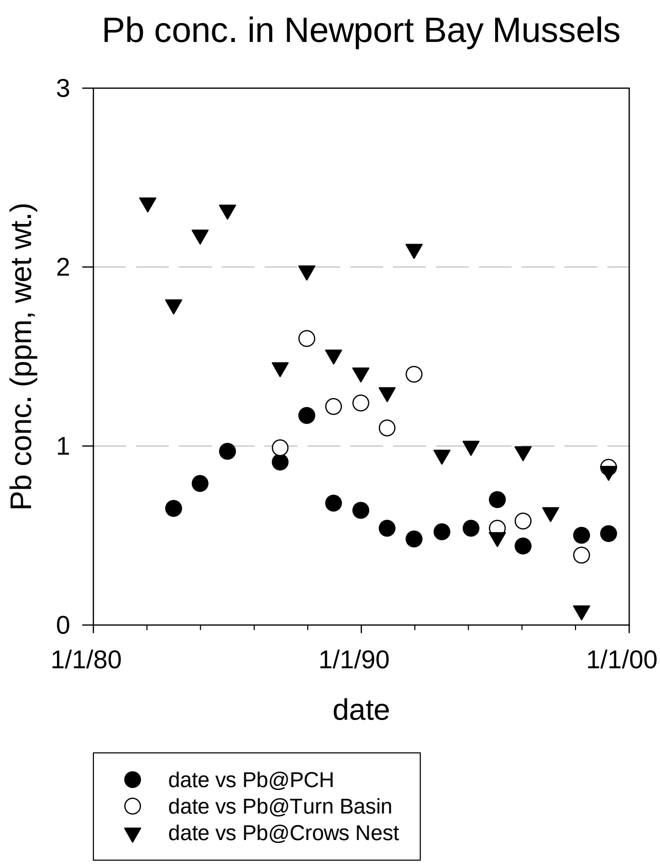

Figure H-3. Lead in Newport Bay mussels (SMW database) Screening value is 2.0 ppm ww.

Mercury (Hg) Assessment Summary
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

Selenium Assessment Summary

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 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.

Silver (Ag) Assessment Summary

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

<u>Upper Newport Bay</u> 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

<u>Lower Newport Bay</u> 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

<u>Rhine Channel</u> 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
<u>San Diego Creek</u> 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 SQGs
20% (3/15) tissue exceedances in past five years = TIER 2

<u>Upper Newport Bay</u> 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 low SQGs = TIER 2
10% (1/10) tissue exceedances in past five years =TIER 2

<u>Lower Newport Bay</u> 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 low SQGs = TIER 2
acid volatile sulfide and porewater results indicate no problem
No (0/10) tissue exceedances in past five years

<u>Rhine Channel</u> Determination: yes TMDL
no reliable water column data
38% (5/13) sediment results above low SQGs; 15% results above high SQGs = TIER 2
acid volatile sulfide and porewater results indicate no problem
69% (9/13) shellfish tissue exceedances in past five years = TIER 1

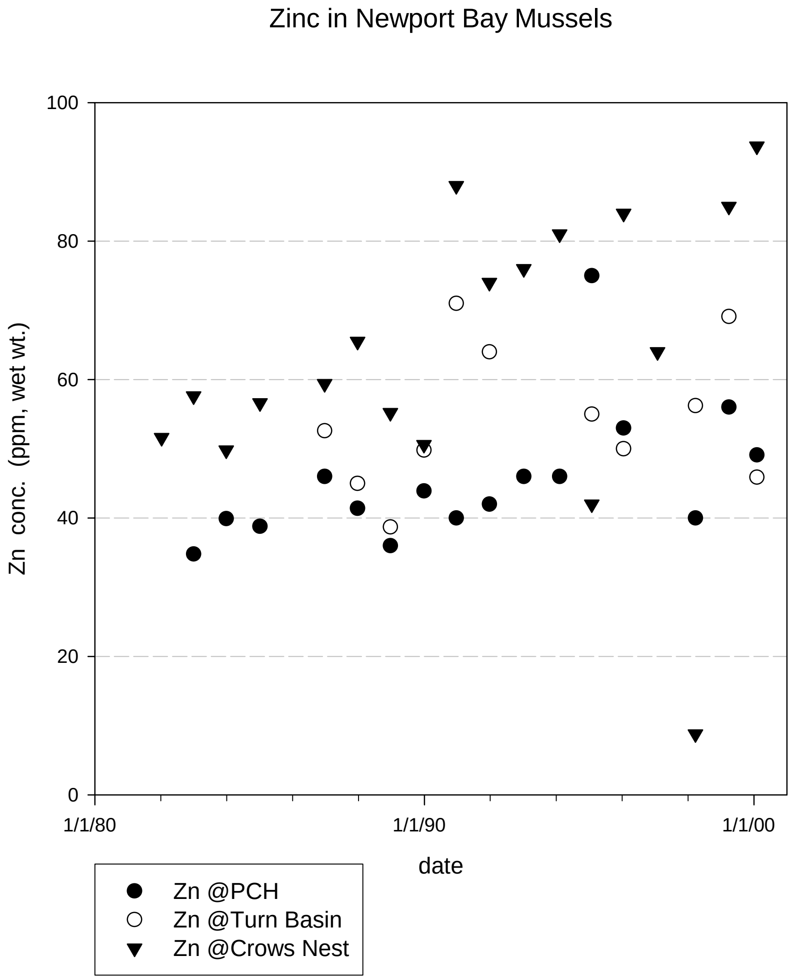

Figure H-4. Zinc in Newport Bay Mussels (SMW database) Screening value is 70 ppm ww.

Chlorbenside Assessment Summary

San Diego Creek — Determination: no TMDL

no water quality data
no sediment data
no shellfish tissue detections in 1983—'93

Upper Newport Bay — Determination: no TMDL

no water quality data
no sediment data
no tissue detections in 1982—'94

Lower Newport Bay — Determination: no TMDL

no water quality data
no sediment data
two shellfish tissue detections in 1982 & 1983; no detections in 1984—'90

Rhine Channel — Determination: no TMDL

no water quality data
no sediment data
one shellfish tissue detections in 1982; no detections in 1983—'94

Chlorpyrifos Assessment Summary

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

Diazinon **Assessment Summary**

San Diego Creek — Determination: yes TMDL

Water Quality: 87% (68/78) exceed acute freshwater numeric target of 80 ng/L = TIER 1
(Seventy-eight water samples from San Diego Creek)
(2/98) sediment detections, but no sediment criteria guidelines available
3% (1/34) tissue exceedances of OEHHA screening value (300 ppb)

Upper Newport Bay — Determination: no TMDL

Water Quality: 0% (0/26) exceed *Americamysis bahia* LC-50 of 4,500 ng/L
(lowest LC50 available in literature for diazinon in saltwater; no other numeric targets available)
(2/64) sediment detections, no sediment criteria guidelines available
no (0/14) tissue exceedance of OEHHA screening value (300 ppb)

Lower Newport Bay — Determination: no TMDL

no data

Rhine Channel — Determination: no TMDL

no data

Chlordane (total) **Assessment Summary**

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.

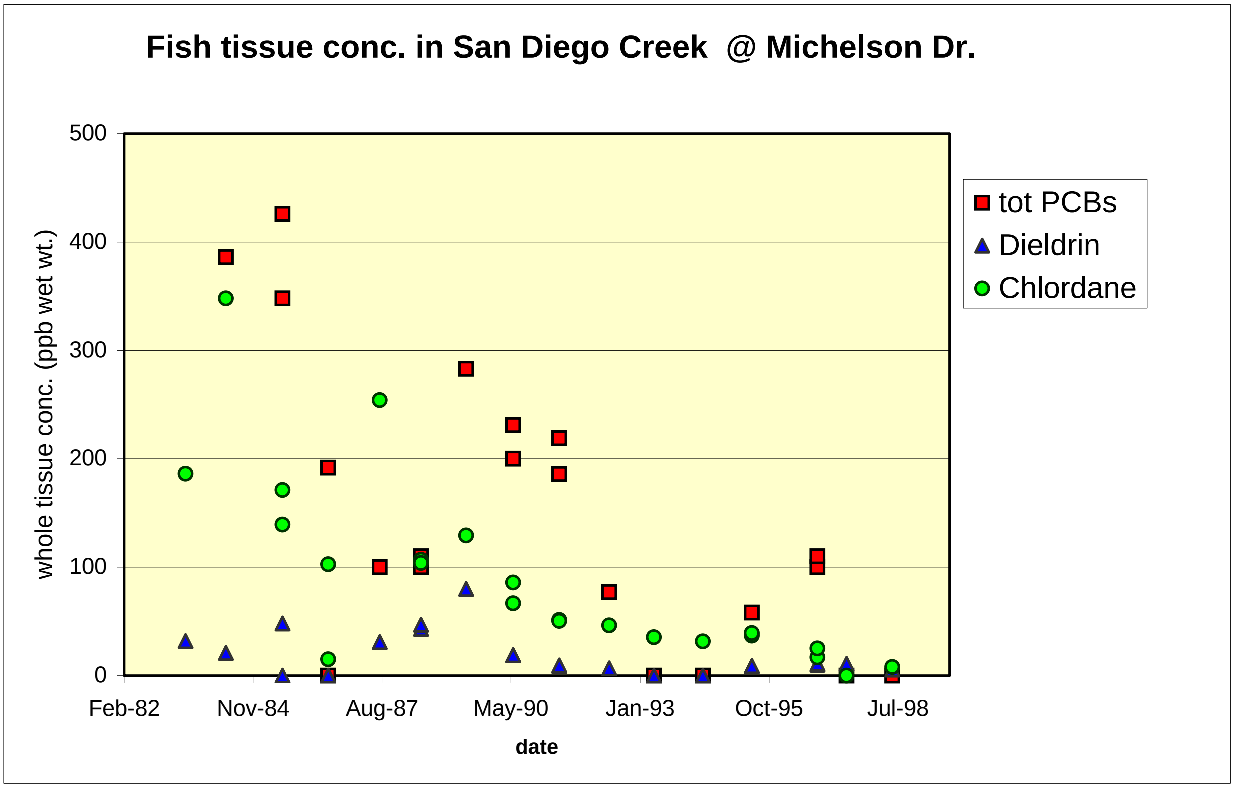

Figure H-5. Chlordane, Dieldrin and total PCBs in fish tissue at San Diego Creek. (TSMP database) Chlordane screening value is 30 ppb; Dieldrin value is 2.0 ppb; total PCBs value is 20 ppb wet wt.

Dieldrin **Assessment Summary**

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 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.

<u>Rhine Channel</u> 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

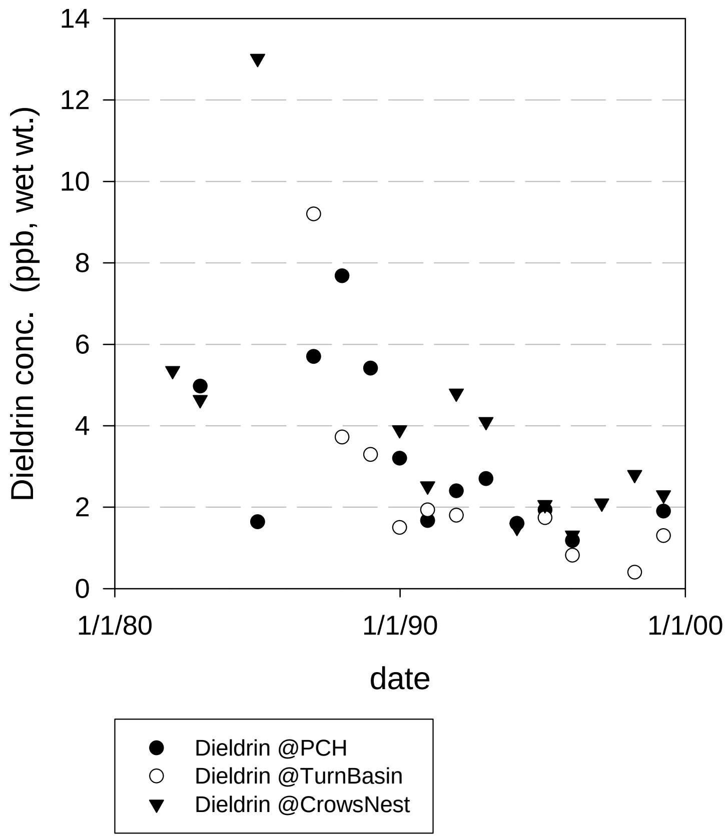

Figure H-6. Dieldrin in Newport Bay mussels. (SMW database) Tissue screening value is 2.0 ppb.

DDT (total) **Assessment Summary**

<u>San Diego Creek</u> 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

<u>Upper Newport Bay</u> 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

<u>Lower Newport Bay</u> 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

<u>Rhine Channel</u> 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

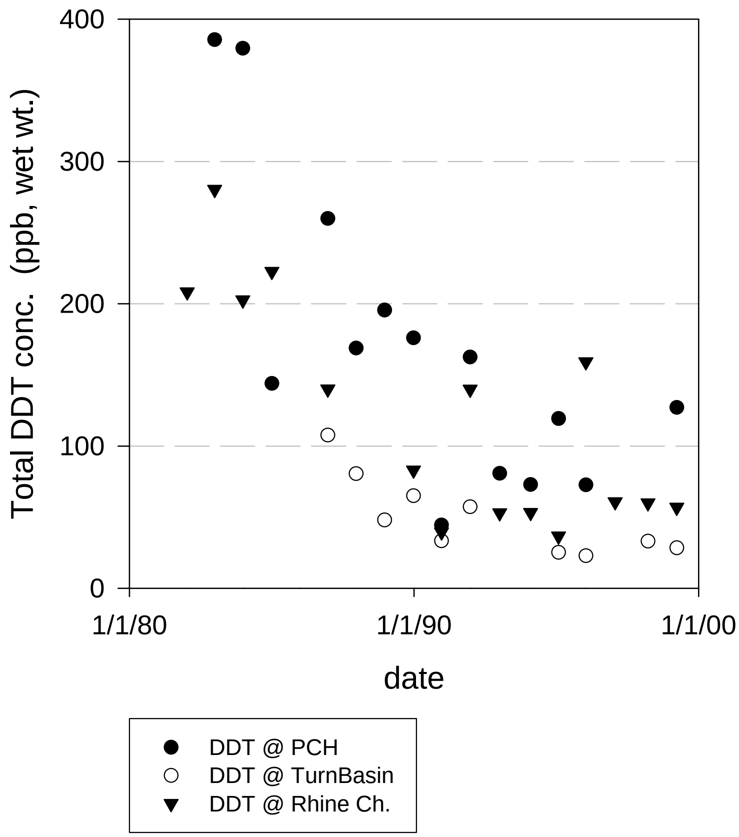

Figure H-7a. DDT in Newport Bay Mussels (SMW database). Tissue screening value is 100 ppb.

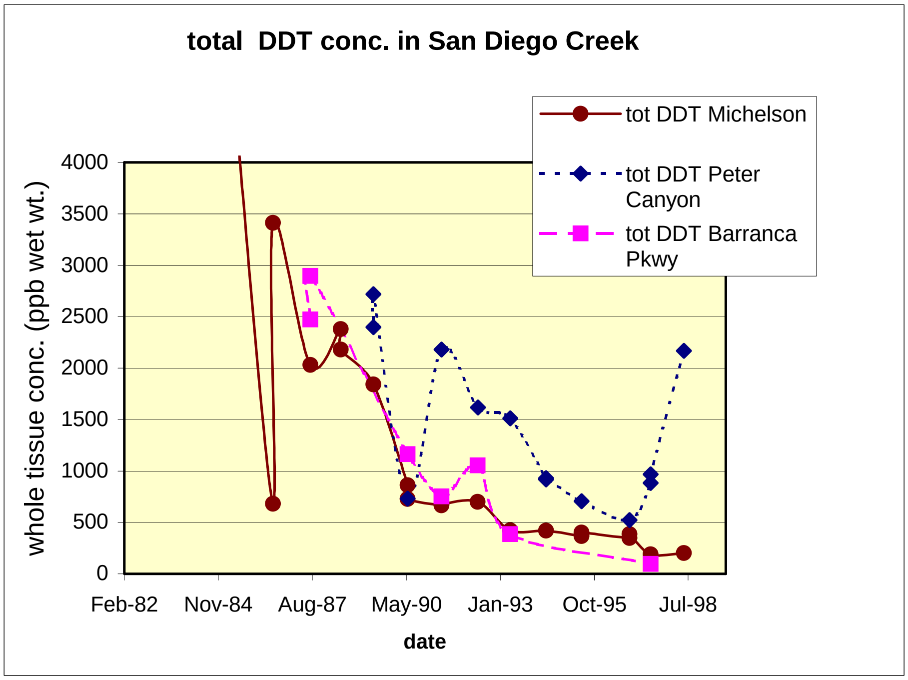

Figure H-7b. Total DDT fish tissue conc. in San Diego Creek (TSMP database). Total DDT screening value is 100 ppb wet wt.

Endosulfan (total) **Assessment Summary**

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**

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

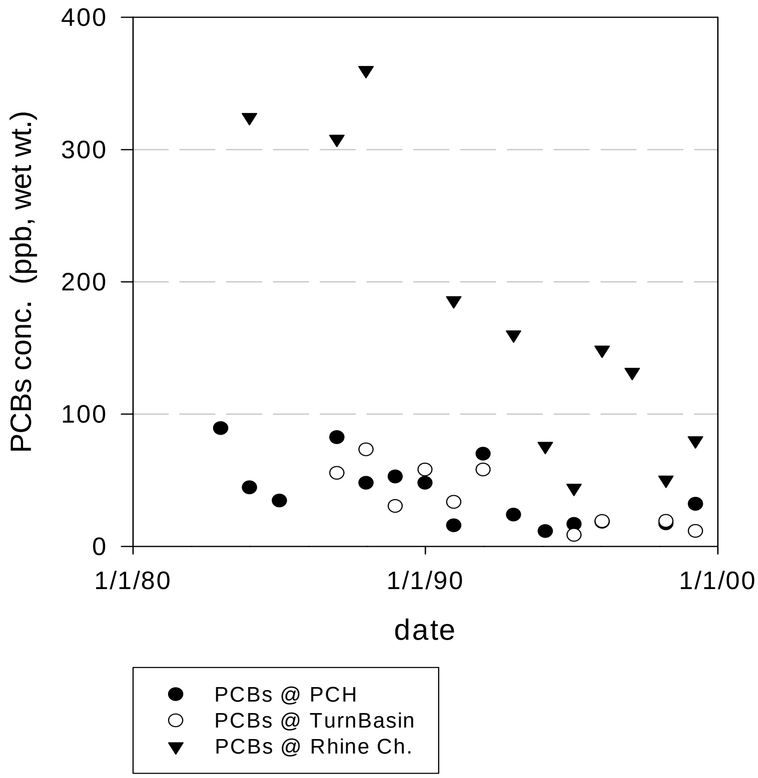

Figure H-8. PCBs in Newport Bay mussels (SMW database). Tissue screening value is 20 ppb.

Toxaphene **Assessment Summary**

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

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