



Bay Protection and Toxic Cleanup Program



Proposed Regional Toxic Hot Spot Cleanup Plan

December 1997

SANTA ANA REGION

REGIONAL WATER QUALITY CONTROL BOARD
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY

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PROPOSED REGIONAL
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Part I

I. INTRODUCTION

In 1989, The California State legislature established the Bay Protection and Toxic Cleanup Program (BPTCP). The BPTCP has four major goals: (1) to provide protection of present and future beneficial uses of the bays and estuarine waters of California; (2) identify and characterize toxic hot spots; (3) plan for toxic hot spot cleanup or other remedial or mitigation actions; (4) develop prevention and control strategies for toxic pollutants that will prevent creation of new toxic hot spots or the perpetuation of existing ones within the bays and estuaries of the State.

This Regional Toxic Hot Spot Cleanup Plan is intended to provide direction for the remediation or prevention of toxic hot spots in the Santa Ana Region (pursuant to Water Code Sections 13390 et seq.). Pursuant to Sections 13140 and 13143 of the Water Code, this Cleanup Plan is necessary to protect the quality of waters and sediments of the State from discharges of waste, in-place sediment pollution and contamination, and any other factor that can impact beneficial uses of enclosed bays, estuaries and coastal waters. This plan shall be reviewed periodically to ensure that the plan is adequate to complete the mandates of the Bay Protection and Toxic Cleanup Program (Water Code Section 13390 et seq.).

This Plan includes a specific definition of a Toxic Hot Spot, site ranking criteria, and the monitoring approach used to identify the Water Code-mandated requirements for Regional Toxic Hot Spot Cleanup Plans.

Region Description

The Santa Ana Region is the smallest of the nine regions in the state (2800 square miles) and is located in southern California, roughly between Los Angeles and San Diego. Although small geographically, the region's four-plus million residents (1993 estimate) make it one of the most densely populated regions.

The climate of the Santa Ana Region is classified as Mediterranean: generally dry in the summer with mild, wet winters. The average annual rainfall in the region is about fifteen inches, most of it occurring between November and March.

Legislative Authority

California Water Code, Division 7, Chapter 5.6 established a comprehensive program to protect the existing and future beneficial uses of California's enclosed bays and estuaries. SB 475 (1989), SB 1845 (1990), AB 41 (1989), and SB 1084 (1993) added and modified Chapter 5.6 [Bay Protection and Toxic Cleanup (Water Code Sections 13390-13396.5)] to Division 7 of the Water Code.

The BPTCP has provided a new focus on RWQCBs efforts to control pollution of the State's bays and estuaries by establishing a program to identify toxic hot spots and plan for their cleanup.

Water Code Section 13394 requires that each RWQCB complete a toxic hot spot cleanup plan. Each cleanup plan must include: (1) a priority listing of all known toxic hot spots covered by the plan; (2) a description of each toxic hot spot including a characterization of the pollutants present at the site; (3) an assessment of the most likely source or sources of pollutants; (4) an estimate of the total costs to implement the cleanup plan; (5) an estimate of the costs that can be recovered from parties responsible for the discharge of pollutants that have accumulated in sediments; (6) a preliminary assessment of the actions required to remedy or restore a toxic hot spot; and (7) a two-year expenditure schedule identifying State funds needed to implement the plan.

Limitations

This proposed regional toxic hot spot cleanup plan contains information on sites that are believed to be the worst sites in the Region. Much of the data collected as part of the BPTCP have not been reported and some analyses have yet to be completed. Consequently, this regional toxic hot spot cleanup plan is subject to revision as new information on toxic hot spot identification becomes available. In future versions of the Plan there is an expectation that (1) other sites may be identified as candidate toxic hot spots; (2) potential toxic hot spots will be addressed in future versions of the cleanup plan; (3) cleanup levels for sites may be added to the cleanup plan; and (4) site rankings may change as new information becomes available.

II. TOXIC HOT SPOT DEFINITION

Codified Definition of A Toxic Hot Spot

Section 13391.5 of the Water Code defines toxic hot spots as:

"...[L]ocations in enclosed bays, estuaries, or adjacent waters in the 'contiguous zone' or the 'ocean' as defined in Section 502 of the Clean Water Act (33. U.S.C. Section 1362), the pollution or contamination of which affects the interests of the State, and where hazardous substances have accumulated in the water or sediment to levels which (1) may pose a substantial present or potential hazard to aquatic life, wildlife, fisheries, or human health, or (2) may adversely affect the beneficial uses of the bay, estuary, or ocean waters as defined in the water quality control plans, or (3) exceeds adopted water quality or sediment quality objectives."

Specific Definition of A Toxic Hot Spot

Although the Water Code provides some direction in defining a toxic hot spot, the definition presented in Section 13391.5 is broad and somewhat ambiguous regarding the specific attributes of a toxic hot

spot. The following specific definition provides a mechanism for identifying and distinguishing between "candidate" and "known" toxic hot spots. A Candidate Toxic Hot Spot is considered to have enough information to designate a site as a Known Toxic Hot Spot except that the candidate hot spot has not been approved by the RWQCB and the SWRCB. Once a candidate toxic hot spot has been adopted into the consolidated statewide toxic hot spot cleanup plan then the site shall be considered a known toxic hot spot and all the requirements of the Water Code shall apply to that site.

Candidate Toxic Hot Spot:

A site meeting any one or more of the following conditions is considered to be a "candidate" toxic hot spot.

1. The site exceeds water or sediment quality objectives for toxic pollutants that are contained in appropriate water quality control plans or exceeds water quality criteria promulgated by the U.S. Environmental Protection Agency (U.S. EPA).

This finding requires chemical measurement of water or sediment, or measurement of toxicity using tests and objectives stipulated in water quality control plans. Determination of a toxic hot spot using this finding should rely on recurrent measures over time (at least two separate sampling dates). Suitable time intervals between measurements must be determined.

2. The water or sediment exhibits toxicity associated with toxic pollutants that is significantly different from the toxicity observed at reference sites (*i.e.*, when compared to the lower confidence interval of the reference envelope), based on toxicity tests acceptable to the SWRCB or the RWQCBs.

To determine whether toxicity exists, recurrent measurements (at least two separate sampling dates) should demonstrate an effect. Appropriate reference and control measures must be included in the toxicity testing. The methods acceptable to and used by the

BPTCP may include some toxicity test protocols not referenced in water quality control plans (e.g., the Bay Protection and Toxic Cleanup Program Quality Assurance Project Plan). Toxic pollutants should be present in the media at concentrations sufficient to cause or contribute to toxic responses in order to satisfy this condition.

3. The tissue toxic pollutant levels of organisms collected from the site exceed levels established by the United States Food and Drug Administration (FDA) for the protection of human health, or the National Academy of Sciences (NAS) for the protection of human health or wildlife. When a health advisory against the consumption of edible resident non-migratory organisms has been issued by Office of Environmental Health Hazard Assessment (OEHHA) or Department of Health Services (DHS), on a site or water body, the site or water body is automatically classified a "candidate" toxic hot spot if the chemical contaminant is associated with sediment or water at the site or water body.

Acceptable tissue concentrations are measured either as muscle tissue (preferred) or whole body residues. Residues in liver tissue alone are not considered a suitable measure for known toxic hot spot designation. Animals can either be deployed (if a resident species) or collected from resident populations. Recurrent measurements in tissue are required. Residue levels established for one species for the protection of human health can be applied to any other consumable species.

Shellfish: Except for existing information, each sampling episode should include a minimum of three replicates. The value of interest is the average value of the three replicates. Each replicate should be comprised of at least 15 individuals. For existing State Mussel Watch information related to organic pollutants, a single composite sample (20-100 individuals), may be used instead of the replicate measures. When recurrent measurements exceed one of the levels referred to above, the site is considered a candidate toxic hot spot.

Fin-fish: A minimum of three replicates is necessary. The number of individuals needed will depend on the size and availability of the animals collected; although a minimum of five animals per replicate is recommended. The value of interest is the average of the three replicates. Animals of similar age and reproductive stage should be used.

4. Impairment measured in the environment is associated with toxic pollutants found in resident individuals.

Impairment means reduction in growth, reduction in reproductive capacity, abnormal development, histopathological abnormalities. Each of these measures must be made in comparison to a reference condition where the endpoint is measured in the same species and tissue is collected from an unpolluted reference site. Each of the tests shall be acceptable to the SWRCB or the RWQCBs.

Growth Measures: Reductions in growth can be addressed using suitable bioassay acceptable to the State or Regional Boards or through measurements of field populations.

Reproductive Measures: Reproductive measures must clearly indicate reductions in viability of eggs or offspring, or reductions in fecundity. Suitable measures include: pollutant concentrations in tissue, sediment, or water which have been demonstrated in laboratory tests to cause reproductive impairment, or significant differences in viability or development of eggs between reference and test sites.

Abnormal Development: Abnormal development can be determined using measures of physical or behavioral disorders or aberrations. Evidence that the disorder can be caused by toxic pollutants, in whole or in part, must be available.

Histopathology: Abnormalities representing distinct adverse effects, such as carcinomas or tissue necrosis, must be evident. Evidence that toxic pollutants are capable of causing or contributing to the disease condition must also be available.

5. Significant degradation in biological populations and/or communities associated with the presence of elevated levels of toxic pollutants.

This condition requires that the diminished numbers of species or individuals of a single species (when compared to a reference site) are associated with concentrations of toxic pollutants. The analysis should rely on measurements from multiple stations. Care should be taken to ensure that at least one site is not degraded so that a suitable comparison can be made.

In summary, sites are designated as "candidate" hot spots after generating information which satisfies any one of the five conditions constituting the definition.

Known Toxic Hot Spot:

A site meeting any one or more of the conditions necessary for the designation of a "candidate" toxic hot spot that has gone through a full SWRCB and RWQCB hearing process, is considered to be a "known" toxic hot spot. A site will be considered a "candidate" toxic hot spot until approved as a known toxic hot spot in a Regional Toxic Hot Spot Cleanup Plan by the RWQCB and approved by the SWRCB.

III. MONITORING APPROACH

As part of the legislative mandates, the BPTCP has implemented regional monitoring programs to identify toxic hot spots (Water Code Section 13392.5). The BPTCP has pioneered the use of effects-based measurements of impacts in California's enclosed bays and estuaries. The Program has used a two-step process to identify toxic hot spots.

The first step is to screen sites using toxicity tests. In the second step, the highest priority sites with observed toxicity are retested to confirm the effects. This section presents descriptions of the BPTCP monitoring objectives and sampling strategy.

Monitoring Program Objectives

The four objectives of BPTCP regional monitoring are:

1. Identify locations in enclosed bays, estuaries, or the ocean that are potential or candidate toxic hot spots. Potential toxic hot spots are defined as suspect sites with existing information indicating possible impairment but without sufficient information to be classified further as a candidate toxic hot spot.
2. Determine the extent of biological impacts in portions of enclosed bays and estuaries not previously sampled (areas of unknown condition);
3. Confirm the extent of biological impacts in enclosed bays and estuaries that have been previously sampled; and
4. Assess the relationship between toxic pollutants and biological effects.

Sampling Strategy

Screening Sites and Confirming Toxic Hot Spots

In order to identify toxic hot spots a two step process was used. Both steps are designed around an approach with three measures (sediment quality triad analysis) plus an optional bioaccumulation component. The triad analysis consists of toxicity testing, benthic community analysis, and chemical analysis for metals and organic chemicals.

The first step is a screening phase that consists of measurements using toxicity tests or benthic community analysis or chemical tests or

bioaccumulation data to provide sufficient information to list a site as a potential toxic hot spot or a site of concern. Sediment grain size, total organic carbon (TOC), NH₃ and H₂S concentration are measured to differentiate pollutant effects found in screening tests from natural factors.

A positive result or an effect in any of the triad tests would trigger the confirmation step (depending on available funding). The confirmation phase consists of performing all components of the sediment quality triad: toxicity, benthic community analysis, and chemical analysis, on the previously sampled site of concern. Assessment of benthic community structure may have not be completed if there was difficulty in measuring or interpreting the information for a water body.

IV. CRITERIA FOR RANKING TOXIC HOT SPOTS

A value for each criterion described below was developed if appropriate information existed or estimates were possible. Any criterion for which no information exists was assigned a value of “No Action”. The RWQCB created a matrix of the scores of the ranking criteria. If the majority of ranking criteria were “High” then the site was listed in the “High” priority list of Toxic Hot Spots. The following ranking criteria was used:

Human Health Impacts

Human Health Advisory issued for consumption of non-migratory aquatic life from the site (assign a “High”); Tissue residues in aquatic organisms exceed FDA/DHS action level and U.S. EPA screening levels (“Moderate”).

Aquatic Life Impacts

For aquatic life, site ranking was based on an analysis of the preponderance of information available (*i.e.*, weight-of-evidence). The measures considered were: the sediment quality triad (sediment chemistry, toxicity, and benthic

community analysis), water toxicity, toxicity identification evaluations (TIEs), and/or bioaccumulation.

Stations with hits in any two of the measures if associated with high chemistry, were assigned a “High” priority. A hit in one of the measures associated with high chemistry was assigned “Moderate”. Stations with high sediment or water chemistry only were assigned “Low”.

Water Quality Objectives¹:

Any chemistry data used for ranking under this section was no more than 10 years old, and was analyzed with appropriate analytical methods and quality assurance.

Water quality objective or water quality criterion: Exceeded regularly (assign a “High” priority), occasionally exceeded (“Moderate”), infrequently exceeded (“Low”).

Areal Extent of Toxic Hot Spot

Select one of the following values: More than 10 acres, 1 to 10 acres, less than 1 acre.

Pollutant Source

Select one of the following values: Source(s) of pollution identified (assign a “High” priority), Source(s) partially known (“Moderate”), Source is unknown (“Low”).

1. Water quality objectives to be used are found in Regional Water Quality Control Board Basin Plans or the California Ocean Plan (depending on which plan applies to the water body being addressed). Where a Basin Plan contains a more stringent value than the statewide plan, the regional water quality objective will be used.

Natural Remediation Potential

Select one of the following values: Site is unlikely to improve without intervention (“High”), site may or may not improve without intervention (“Moderate”), site is likely to improve without intervention (“Low”).

V. FUTURE NEEDS

Several sites in the Region need additional characterization work to either include or exclude from Candidate Toxic Hot Spot designation. These sites are listed in the following table.

Sites of Concern (Sites that do not qualify as Candidate Toxic Hot Spots)

Waterbody Name	Segment Name	Site Identification	Reason for Listing	Pollutants present at the site	Report reference
Huntington Harbour	Middle Reach	BPTCP Site # 80027, Latitude - 33,42,80N, Longitude - 118,03,67W	Sediment toxicity	zinc, chlordane, DDT	4, 5
Huntington Harbour	Upper Reach	80028, 33,42,80N, 118,03,67W	Sediment toxicity	zinc, chlordane, DDT	4, 5
Seal Beach NWR	Middle Reach	82002, 33,44,44N, 118,04,40W	Sediment toxicity	arsenic	4
Huntington Harbour	Launch ramp	82005, 33,43,61N, 118,03,91W	Sediment toxicity	lead, zinc	4
Bolsa Bay	Mouth Of EGGW	82024, 33,42,40N, 118,03,35W	Sediment toxicity	Unknown	4
Seal Beach NWR	Left Reach	82040, 33,44,26N, 118,05,18W	Sediment toxicity	Unknown	4
Lower Newport Bay	Arches Drain	85015, 33,37,199N, 117,55,697W	Exceeds objectives	Chlordane	1

Part II

Candidate Toxic Hot Spot List

Waterbody Name	Segment Name	Site Identification	Reason for Listing	Pollutants present at the site	Report reference
Seal Beach NWR	Navy Marsh	BPTCP Site # 82001, Latitude - 33,43,88N, Longitude - 118,04,72W	Sediment toxicity	DDE	4
Seal Beach NWR	Bolsa Ave.	82023, 33,44,65N, 118,04,66W	Sediment toxicity	arsenic	4
Bolsa Chica Ecological Reserve		82039, 33,41,75N, 118,02,76W	Sediment toxicity	DDE	4
Upper Newport Bay	Narrows	85001, 33,38,083N, 117,53,454W	Sediment toxicity Exceeds objectives	chlordanne, zinc	1, 3, 4
Lower Newport Bay	Rhine Channel	85013, 33,36,721N, 117,55,670W	Sediment toxicity Exceeds objectives	arsenic, copper, lead, mercury, zinc	1, 2, 3, 4
Lower Newport Bay	Newport Island	85014, 33,37,251N, 117,56,174W	Exceeds objectives	copper, lead, mercury, zinc, chlordanne	1, 3

Reference list

1. Anderson, B., Hunt, J., Tudor, S., Newman, J., Tjeerdema, R., Fairey, R., Oakden, J., Bretz, C., Wilson, C., La Caro, F., Stephenson, M., Puckett, M., Long, E., Fleming, T., Summers, K. 1996. *Chemistry, Toxicity and Benthic Community Conditions in Sediments of the Southern California Bays and Estuaries*. Report to the California State Water Resources Control Board, Environmental Protection Agency, National Oceanic and Atmospheric Administration, California Department of Fish and Game, University of California, Santa Cruz, and the Moss Landing Marine Laboratories. 140 pp + appendices.
2. California Regional Water Quality Control Board - Santa Ana Region. 1990. *Evaluation of Boat Yard Waste Treatment Technologies Within the Santa Ana Region*. 117 pp.
3. Moore, B., Klein, E., Hines, D., Au, M, Boon, R., Ashby, K., Nguyen, D. 1997. *Annual Progress Report 1997 (NPDES Permit CAS618030)*. Report to the Santa Ana Regional Water Quality Control Board. 60 pp. + appendices.
4. Moss Landing Marine Laboratories. 1997. BPTCP data for California Regional Water Quality Control Board - Santa Ana Region (Region 8). Computer files.
5. Sapudar, R., Wilson, C., Reid, M., Long, E., Stephenson, M., Puckett, M., Fairey, R., Hunt, J., Anderson, B., Holstad, D., Newman, J., Birosik, S., Smythe., H. 1994. *Sediment Chemistry and Toxicity in the Vicinity of the Los Angeles and Long Beach Harbors*. Final Report to the California State Water Resources Control Board and the National Oceanic and Atmospheric Administration. 81 pp + appendices.

Ranking Matrix

Waterbody Name	Site Identification	Human Health Impacts	Aquatic Life Impacts	Water Quality Objectives	Areal Extent	Pollutant Source	Remediation Potential
Seal Beach NWR - Navy Marsh	BPTCP Site # 82001, Latitude - 33,43,88N, Longitude - 118,04,72W	Low	Low	Low	1 to 10 acres	Low	Moderate
Seal Beach NWR - Bolsa Ave.	82023, 33,44,65N, 118,04,66W	No Action	Low	No Action	1 to 10 acres	Low	Moderate
Bolsa Chica Ecological Reserve	82039, 33,41,75N, 118,02,76W	No Action	Low	Low	1 to 10 acres	Low	Moderate
UNB - Narrows	85001, 33,38,083N, 117,53,454W	No Action	Moderate	Low	1 to 10 acres	Low	Moderate
LNB - Rhine Channel	85013, 33,36,72IN, 117,55,670W	Moderate	High	Moderate	1 to 10 acres	High	High
LNB - Newport Island	85014, 33,37,25IN, 117,56,174W	No Action	High	Low	1 to 10 acres	Low	Moderate

Part III

High Priority Candidate Toxic Hot Spot Characterization

I. Lower Newport Bay - Rhine Channel

A. Areal extent of the THS.

Between 1.5 and 2.5 acres.

B. An assessment of the most likely sources of pollutants (potential discharger).

The area was the site of a fish cannery during the 1930's-40's and a Navy dock during World War II. Boat yards have been located in the vicinity of the channel since the 1960's. Currently six boat yards operate along RhineChannel. The boat yards are currently regulated by General Waste Discharge Requirements (see section C). Historic practices at the boat yards are the most likely source of pollutants in Rhine Channel, although a characterization of the depth of pollution has never been undertaken. An investigation of the extent of pollution depth and area would help to either eliminate or include likely historic sources.

C. A summary of actions that have been initiated by the Regional Boards to reduce the accumulation of pollutants at existing THSs and to prevent the creation of new THSs.

The Regional Board currently regulates the discharge of process wastewater from all boat yard facilities in Lower Newport Bay and Huntington Harbour through General Waste Discharge Requirements (Order No. 94-26 as amended by 96-52). The boat yards have been under NPDES permits since 1975, with reissuances occurring in 1980-86. The main feature of the Order No. 96-52 is the elimination of the discharge of process wastewater in accordance with the Water Quality Control Policy for the Enclosed Bays and Estuaries of California. This action was to occur by April, 1996. However, at this time, only two of the six boatyards in Rhine Channel have complied with this requirement of the permit.

The Newport Bay watershed is one of two watersheds within the Santa Ana Region that are the focus of intensive watershed management activities. Outcomes of this planning and management effort will include a further refinement of water quality problems both in the Bay and watershed, the development and implementation of a watershed management plan that addresses these problems, and mechanisms for measuring the success of the plan and improvements in water quality.

Additionally, Lower Newport Bay is currently listed as water quality limited for metals and organics pursuant to Section 303 (d) of the Clean Water Act. A Total Maximum Daily Load (TMDL) for metals and organics will be developed by the Regional Board to address this impairment. The contamination occurring in Rhine Channel and the boat yard activities will be included in the TMDLs.

D. Preliminary Assessment of Actions required to remedy or restore a THS to an unpolluted condition, including recommendations for remedial actions.

The ex-situ treatment of contamination at Rhine Channel could include either chemical separation or immobilization. Chemical separation would separate the weakly bound metals from the sediment and the clean sediment would then be disposed of. The problem with this treatment is the limited application of the method, the need for further treatment systems integration for a complete separation, and the need for a treatment site. This last factor is significant due to the urban setting of the site. Significant transportation costs would be incurred by hauling the sediment to a non-local treatment area.

Immobilization of trace metals by chemical fixation is another possible treatment. This treatment has been used extensively for solid wastes. A limitation with this treatment is the high moisture content of the sediment in Rhine Channel and the need for a treatment site.

The capping or containment of the site is not an option due to the shallow depth of Rhine Channel. Capping would effectively eliminate any

navigation in the channel and adversely affect the economic activities of business that use the channel (i.e., the boatyards).

The only other viable treatment is dredging and off-site disposal.

E. An estimate of the total cost to implement the cleanup plan.

The dredging of Rhine Channel would involve the removal of approximately 23,000 cubic yards of sediment (2 acres x 7 feet deep). This is a rough estimate because there has not been a through characterization of the areal extent of contamination. These amounts should be considered conservative. Additional costs could be incurred if alternative disposal transportation is required.

Sediment Removal

Hydraulic dredge	(23,000 cy @ \$10 cy)	\$230,000
Silt screen (material, labor)	(600 ft @ \$3 ft)	\$1,800

Sediment Transport

Truck	(23,000 cy @ \$200 cy)	\$4,600,000
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Sediment Disposal

Class I disposal facility (Hazardous waste)	(23,000 cy @ \$250 cy)	\$5,750,000
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Total		\$10,581,800
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F. An estimate of recoverable costs from potential dischargers.

The recoverable costs from dischargers would be insufficient to perform cleanup activities. Many of the boat yard operations are small businesses that have had financial difficulty or have been otherwise reluctant to implement control measures required by the Regional Board. If the Regional Board was to issue Cleanup and Abatement Orders to the boat yards in an attempt to recover costs for the proposed cleanup activities, it is envisioned that several of the boatyards would claim bankruptcy rather

than participate. It is estimated that recoverable costs from dischargers would be from 1 to 10 %.

- G. A two-year expenditure schedule identifying funds to implement the plans that are not recoverable from potential dischargers.

Year 1.

The activities conducted during the first year would be further site pollution characterization. These activities would include extensive sampling to determine the aerial extent, depth, and severity of pollution in Rhine Channel. The cost would be approximately \$900,000.

Year 2.

The activities conducted during the second year would be the development of an engineering report and operating plan for the cleanup site, obtaining the appropriate permits (e.g., 401/404), and producing appropriate environmental documentation (e.g., NEPA/CEQA). These services would be provided by a consulting firm. This would cost approximately \$500,000.

