

Appendix for Section 11

Clean Water Act Section 303(d) List

**Southeast Extension of Near Coronado Bridge
(Between Sampson and 28th Streets)
Hydrologic Subarea 908.22**

NEW 303(d) LISTINGS

Benthic Community Degradation and Sediment Toxicity

PREVIOUS 303(d) LISTINGS

This listing represents an extension of the Near Coronado Bridge extent of impairment. Near Coronado Bridge is an existing impaired waterbody area on the 303(d) list.

WATERSHED CHARACTERISTICS

The area of San Diego Bay between Sampson and 28th Streets is located along the eastern shore of San Diego Bay. This area is approximately 64 acres. San Diego Bay is designated with the following beneficial uses: EST, MAR, MIGR, WILD, BIOL, RARE, REC-1, REC-2, SHELL, COMM, NAV, AND IND.¹

WATER QUALITY OBJECTIVES NOT ATTAINED

Benthic degradation The Basin Plan¹ states that “all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Regional Board.”

Sediment toxicity The Basin Plan¹ states that “all waters shall be maintained free of toxic substances in concentrations that are toxic to, or that produce detrimental physiological responses in human, plant, animal or aquatic life. Compliance with this objective will be determined by use of indicator organisms, analyses of species diversity, population density, growth anomalies, bioassays of appropriate duration or other appropriate methods as specified by the Regional Board.”

EVIDENCE OF IMPAIRMENT

Benthic degradation Sediment sampled in San Diego Bay between Sampson and 28th Streets by the Bay Protection Toxic Cleanup Program (BPTCP)² in 1993 indicated the presence of elevated chemistry, toxicity, and benthic degradation. Cores were sampled with 3 replicates to identify and quantify the benthic community. A Relative Benthic Index (RBI) was used to determine benthic degradation. The RBI ranges on a scale from 0 to 1. “It combines use of benthic community data (i.e. species diversity) with the presence or absence of positive and negative indicator species in order to provide a measure of the relative degree of degradation within the benthic fauna.”² For example, *Capitella sp.* is a pollutant tolerant negative indicator species. Its presence in large numbers is indicative of a polluted benthic environment. Based on the results of the RBI, three samples (93210, 93211, and 90021) in San Diego Bay between Sampson and 28th Streets had degraded benthic community conditions.

Sediment toxicity Sediments sampled by the Bay Protection Toxic Cleanup Program (BPTCP)² in 1993 were also used for toxicity testing. Amphipod solid phase survival tests were performed using *Rhepoxynius abronius* that were exposed to sediments for 10 days. Sediment samples were divided into 5 replicates. The reference envelope approach that was utilized by the BPTCP indicated that toxicity for the amphipod

sediment test was significant when survival was less than 48% in samples tested. Three samples (93210, 93181, and 90030) in San Diego Bay between Sampson and 28th Streets showed amphipod survival rates below 48%.

Sea urchin embryo-larval development testing was performed on *Strongylocentrotus purpuratus* at the sediment / water interface for 96 hours. After the exposure period, larvae were examined to determine the proportion of normally developed larvae. The proportions of normal larvae were compared against control cultures to determine toxicity. Two samples (93210 and 93211) in San Diego Bay between Sampson and 28th Streets showed toxicity to *S. purpuratus*.

Chemistry Sediments sampled by the Bay Protection Toxic Cleanup Program (BPTCP)² in 1993 were also analyzed for chemicals of concern. Chemical pollution was demonstrated by using comparisons to established sediment guidelines; Effects Range Medians (ERMs) and Probable Effect Levels (PELs). The ERM reflects the 50th percentile of ranked data and represents the level above which effects are expected to occur. The PEL value is derived by taking the geometric mean of the 85th percentile of the “no effects” data and the 50th percentile of the “effects” data. Stations with any chemical concentrations >4 times its respective ERM or >5.9 times its respective PEL were considered to exhibit elevated chemistry. Additionally, an ERM summary quotient >0.85 or a PEL summary quotient >1.29 was indicative of stations where multiple chemicals were significantly elevated. Two samples (93211 and 90030) in San Diego Bay between Sampson and 28th Streets exceeded the individual ERM and PEL thresholds for antimony, copper, total PCB, and total PAH concentrations. Furthermore, four samples (93210, 93211, 90030, and 93181) between Sampson and 28th Streets were above the ERM and PEL summary quotients. Combining these high concentrations with evidence of benthic degradation and sediment toxicity satisfies the same criteria that was used to list other San Diego Bay locations in 1998 based upon the same BPTCP data.^{2,3}

Current sediment quality data collected in August 2001 supports the results from the BPTCP that elevated chemical concentrations are present between Sampson and 28th Streets.⁴ Twelve samples exceeded the individual ERM and PEL thresholds for copper, mercury, zinc, and total PCBs. The chemistry data is currently being evaluated to determine its potential effects on toxicity and degraded benthic community conditions.

Of the nine BPTCP sediment samples collected in San Diego Bay between Sampson and 28th Streets, one sample (93210) had synoptic “hits” on all three components of the “Triad of Evidence” (i.e., elevated sediment chemistry, toxicity, and degraded benthic community) and two samples (93211 and 90030) had synoptic “hits” on two of three components. The weight of evidence from these samples indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28th Streets. This level of benthic degradation, sediment toxicity and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR and SHELL.

EXTENT OF IMPAIRMENT

Benthic degradation Area between the foot of Sampson and 28th Streets, extending to the edge of the piers.

Sediment toxicity Area between the foot of Sampson and 28th Streets, extending to the edge of the piers.

POTENTIAL SOURCES

Benthic degradation Elevated concentrations of copper, mercury, zinc, antimony, total PCBs, and total PAHs and/or contaminant mixtures could be the cause. National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. occupy the shoreline between Sampson and 28th Streets. The current and historic activities at these shipyards may be a source because the elevated levels of contaminants are consistent with those produced as a result of shipyard operations. The shipyard operations consist of repair, construction, and maintenance of U.S. Navy and commercial ships. NASSCO and Southwest Marine are currently conducting an extensive investigation to determine the presence or absence of degraded benthic community conditions. Other potential sources are urban runoff and non-point sources.

Sediment toxicity Elevated concentrations of copper, mercury, zinc, antimony, total PCBs, and total PAHs and/or contaminant mixtures could be the cause. National Steel and Shipbuilding Company (NASSCO) and Southwest Marine, Inc. occupy the shoreline between Sampson and 28th Streets. The current and historic activities at these shipyards may be a source because the elevated levels of contaminants are consistent with those produced as a result of shipyard operations. The shipyard operations consist of repair, construction, and maintenance of U.S. Navy and commercial ships. The shipyard operations consist of repair, construction, and maintenance of U.S. Navy and commercial ships. NASSCO and Southwest Marine are currently conducting an extensive investigation to determine the presence or absence of sediment toxicity. Other potential sources are urban runoff and non-point sources.

TMDL PRIORITY

Benthic degradation High

Sediment toxicity High

INFORMATION SOURCES

Water Quality Objectives

¹ Water Quality Control Plan for the San Diego Basin (9), 1994. California Regional Water Quality Control Board, San Diego Region.

Data Sources

² Bay Protection Toxic Cleanup Program, 1996. Chemistry, Toxicity, and Benthic Community Conditions in Sediments of the San Diego Bay Region. California State Water Resources Control Board.

³ Bay Protection Toxic Cleanup Program, 1998. Chemistry, Toxicity and Benthic Community Conditions in Sediments of the San Diego Bay Region. Final Addendum Report. California State Water Resources Control Board.

⁴ Exponent, 2001. Technical Memorandum 1 – Phase 1 Sediment Chemistry Data for the NASSCO and Southwest Marine Detailed Sediment Investigation. Bellevue, WA.

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Copper

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28 th Streets)
Stressor/Media/Beneficial Use	Copper/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	<ul style="list-style-type: none"> ● BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = 93211. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Copper is one of several contaminants used to calculate the quotient values. ● NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = NA17, SW01, SW02, SW04, SW08, SW09, and SW13. ● BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. ● BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. ● BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach. ● BPTCP Stations 93211 and 90030 had synoptic

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Copper

	“hits” on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard Methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28 th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Mercury

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28 th Streets)
Stressor/Media/Beneficial Use	Mercury/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	<ul style="list-style-type: none"> ● BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = None. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Mercury is one of several contaminants used to calculate the quotient values. ● NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = NA06 and SW02. ● BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. ● BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. ● BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach.

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Mercury

	<ul style="list-style-type: none"> BPTCP Stations 93211 and 90030 had synoptic “hits” on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28 th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PAHs

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28 th Streets)
Stressor/Media/Beneficial Use	Total PAHs/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	<ul style="list-style-type: none"> ● BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = 90030. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Total PAHs is one of several contaminants used to calculate the quotient values. ● NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = None. ● BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. ● BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. ● BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach. ● BPTCP Stations 93211 and 90030 had synoptic

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
 Total PAHs

	“hits” on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28 th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PCBs

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28 th Streets)
Stressor/Media/Beneficial Use	Total PCBs/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	<ul style="list-style-type: none"> ● BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = 93211. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Total PCBs is one of several contaminants used to calculate the quotient values. ● NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = SW01, SW02, SW04, SW05, SW08, SW20, SW21, and SW28. ● BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. ● BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. ● BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach.

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Total PCBs

	<ul style="list-style-type: none"> BPTCP Stations 93211 and 90030 had synoptic “hits” on two of three components of the Triad Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28 th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Zinc

Water Body	Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28 th Streets)
Stressor/Media/Beneficial Use	Zinc/Sediment/MAR, WILD, BIOL, EST, RARE, MIGR, and SHELL.
Data quality assessment. Extent to which data quality requirements met.	High quality for sediment data (See BPTCP report and NASSCO/SWM Technical Memorandum 1.
Linkage between measurement endpoint and beneficial use or standard	Degraded benthic community and toxicity may be associated to pollutant concentration (no toxics in toxic amounts).
Utility of measure for judging if standards or uses are not attained	Use of the “Triad Approach” (i.e., sediment chemistry, toxicity, and benthic community) is a well-established weight of evidence approach that provides an integrated assessment of the sediment.
Water Body-specific Information	BPTCP regional monitoring program conducted by SWRCB (1992-1994). Sediment quality investigation conducted by NASSCO and SWM shipyards (August 2001).
Data used to assess water quality	<ul style="list-style-type: none"> ● BPTCP Sediment Chemistry: Station >4x ERM or >5.9x PEL = None. Stations > 0.85 ERMq or >1.29 PELq = 93210, 93211, 90030, and 93181. Zinc is one of several contaminants used to calculate the quotient values. ● NASSCO/SWM Sediment Chemistry: Stations >4x ERM or > 5.9x PEL = SW04. ● BPTCP Toxicity: Stations < 48% amphipod survival rate = 93210, 93181, and 90030. Stations that exhibited toxicity to the sea urchin = 93210, and 93211. ● BPTCP Benthic Community Structure: Stations with a degraded benthic community = 93210, 93211, and 90021. ● BPTCP Station 93210 had synoptic “hits” on all three components of the Triad Approach. ● BPTCP Stations 93211 and 90030 had synoptic “hits” on two of three components of the Triad

Region 9: NEW: Southeast Extension of Near Coronado Bridge (Area of San Diego Bay Between Sampson and 28th Streets)
Zinc

	Approach.
Spatial representation	Spatial representation provides adequate coverage of the area of concern. BPTCP sampled 9 stations within the area of concern. NASSCO/SWM study sampled 35 stations within the area of concern.
Temporal representation	2 sampling periods (1993 by BPTCP and 2001 by NASSCO/SWM)
Data type	Numerical sediment chemistry, toxicity, and benthic community data.
Use of standard method	Standard methods were used for data analysis.
Potential Source(s) of Pollutant	Point and non-point.
Alternative Enforceable Program	NPDES program.
RWQCB Recommendation	The weight of evidence from the samples collected from the area of concern indicates that the benthic community is being adversely affected in San Diego Bay between Sampson and 28 th Streets. This level of benthic degradation, sediment toxicity, and sediment chemistry is direct evidence of impairment of the following beneficial uses: BIOL, EST, WILD, RARE, MAR, MIGR, and SHELL.
SWRCB Staff Recommendation	