

COMPLIANCE DETERMINATIONS

Chapter 2 COMPLIANCE DETERMINATIONS



INTRODUCTION

This chapter provides compliance results for the 2012-13 monitoring year for the Orange County Sanitation District's (District) Ocean Monitoring Program (OMP). The program includes sample collection, analysis, and data interpretation to evaluate potential impacts of wastewater discharge on the following receiving water characteristics:

- Bacterial
- Physical
- Chemical
- Biological
- Radioactivity

Each of these characteristics have specific criteria (Table 2-1) for which permit compliance must be determined each monitoring year. Compliance determinations were made by comparing OMP findings to the criteria specified in the District's NPDES permit (Order No. R8-2012-0035; NPDES Permit No. CA0110604).

Sampling locations included 17 core and 11 regional nearshore (surfzone) stations for monitoring fecal indicator bacteria only (no compliance criteria), 28 offshore water quality stations (Figure 3-1), 68 benthic stations to assess sediment chemistry and bottom-dwelling communities (Figures 4-1 and 5-1), 15 trawl stations to evaluate fish and macroinvertebrate communities (Figure 6-1), and two rig fishing zones for assessing human health risk from the consumption of sport fishes. Monitoring frequencies varied by component, and ranged from 2–5 days per week for surfzone water quality to annual assessments of fish health and tissue analyses.

The water quality compliance stations comprised of the offshore stations. The offshore group forms a fixed-grid pattern around the outfall. Eight of these stations were located within 3 miles of the shoreline, and are considered Rec-1 stations (Table A-1). These eight stations were sampled for bacteria and must comply with offshore bacterial standards. The 28 offshore stations were also separated into two zones (A and B) for determining compliance with physical and chemical water quality standards. Station locations were defined as either Zone A (stations located on the two innermost along-shelf transects) or Zone B (stations located on the two outermost along-shelf transects) as shown in Figure A-1.

Table 2-1. Listing of compliance criteria from NPDES ocean discharge permit (Order No. R8-2012-0035, Permit # CA0110604) and compliance status for each criterion in 2012-13.

Orange County Sanitation District, California.

Criteria	Description	Criteria Met	Comments
Bacterial Characteristics			
V.A.1.a	Total coliform (water contact)	Yes	Compliance was achieved 100% of the time in the Offshore Zone (Chapter 3).
V.A.1.a	Fecal coliform (water contact)	Yes	Compliance was achieved 100% of the time in the Offshore Zone (Chapter 3).
V.A.1.a	Enterococci (water contact)	Yes	Compliance was achieved 100% of the time in the Offshore Zone (Chapter 3).
V.A.1.b	<i>Enterococcus</i> (EPA Primary Rec)	Not applicable	No samples taken for this standard in federal waters.
V.A.1.c	Total coliform (shellfish harvesting)	Not applicable	Does not apply to offshore waters.
Physical Characteristics			
V.A.2.a	Floating particulates, oils, and grease	Yes	No wastewater particles, oils or grease were observed during the monitoring year in either the Nearshore or Offshore Zones (Chapter 3).
V.A.2.b	Water clarity and discoloration	Yes	Offshore compliance standards were met 100% of the time (Chapter 3).
V.A.2.c	Light transmittance	Yes	Greater than 99% of the Offshore values were in compliance. All out-of-compliance values fell within the range of natural variability and would not cause significant environmental effects (Chapter 3).
V.A.2.d	Inert solids	Yes	There were no measured effects to sediments from discharge-related inert solids (Chapter 4).
Chemical Characteristics			
V.A.3.a	Dissolved oxygen	Yes	Greater than 97% of the Offshore values were in compliance. All out-of-compliance values fell within the range of natural variability and would not cause significant environmental effects (Chapter 3).
V.A.3.b	Acidity (pH)	Yes	100% of the values were in compliance (Chapter 3).
V.A.3.c	Dissolved sulfides	Yes	Dissolved sulfide concentrations in sediments did not result in anaerobic conditions (Chapter 4).
V.A.3.d	Table B substances in sediments	Yes	Silver exceeded the Effects-Range-Median (ERM) at two stations in and near the ZID. No other metal in any sample exceeded the ERM. PCB concentrations were elevated near the outfall compared to other sites. DDT levels were low, below the ERM, and comparable at all sites. Whole sediment toxicity testing showed no measurable toxicity at any station tested (Chapter 4).
V.A.3.e	Organics in sediments	Yes	Sediment total organic carbon concentrations did not result in excessive organic loading or anaerobic conditions (Chapter 4).
V.A.3.f	Nutrients	Yes	Ammonium values were 20 to 30 times lower than California Ocean Plan objectives and there were no chlorophyll/plankton associated impacts (Chapter 3).
V.A.3.g	Table B substances in ZID	Yes	None of these constituents exceeded the effluent limitations established in the permit. Reported in Monthly Discharge Monitoring Reports.
Biological Characteristics			
V.A.4.a	Marine biological communities	Yes	Minor discharge effects were seen in infaunal assemblages near the outfall but no sample outside of the ZID indicated significant change to infaunal communities (Chapter 5). Trawl sampling results showed that invertebrate and fish populations were generally normal and healthy beyond the ZID and the outfall was not a disease epicenter (Chapter 6).
V.A.4.b	Fish tissue (taste, odor, and color)	Yes	All collected fish exhibited normal color or odor. All fish muscle appeared normal and comparable to other areas within the Southern California Bight (Chapter 6).
V.A.4.c	Fish tissue (bioaccumulation)	Yes	All muscle tissue samples contained mercury, PCB, and DDT concentrations below state and federal human consumption guidelines (Chapter 6).
Radioactivity Characteristics			
V.A.5	Radioactivity	Yes	Radioactivity is measured in effluent only and reported in the Discharge Monitoring Report. All limits met.

Compliance evaluations were based on statistical comparisons to the corresponding upcurrent Zone A or Zone B reference station (OCS D 1999). This matching of Zone A or Zone B stations allowed comparisons of data from similar water depths.

RESULTS AND DISCUSSION

A compliance summary is presented in Table 2-1 and Figure B-2.

Offshore Bacterial Criteria

State water contact criteria have bacterial standards that need to be sustained. Criteria V.A.1.a and V.A.1.b require that the discharge not cause exceedences to offshore water contact standards for total coliform, fecal coliform, and enterococci bacteria. Total coliform bacteria have a 30-day geometric mean limit of 1,000/100 mL and a single sample standards of <10,000/100 mL and <1,000 per 100 mL when FC:TC ratio >0.1. Fecal coliform bacteria have a 30-day geometric mean limit of 200/100 mL and a single sample standard of <400/100 mL. Enterococci have a 30-day geometric mean limit of 35/100 mL and a single sample standard of <104/100 mL. Federal water contact criteria have bacterial standards for *Enterococcus* that need to be sustained as well. *Enterococcus* has a 30-day geometric mean limit of 35/100 mL and a single sample standard based on usage ranging from designated bathing beaches (<104/100 mL) to infrequent use (<501/100 mL). The District does not sample offshore waters for bacteria outside of state waters. Chapter 3 and Appendix A contain more information on the analysis of the offshore water quality data.

The Rec-1 stations achieved 100% compliance for total, fecal, and enterococci bacteria (Tables B-1 to B-3). The highest recorded values were 1,122 and 299 MPN/100 mL for total and fecal coliforms, respectively. Enterococci concentrations were low with greater than 88% of values less than the minimum detection level. The highest recorded concentration was 175 MPN/100 mL. This suggests that it was unlikely that the wastewater discharge impacted bacterial levels in recreational waters. Since the onset of effluent disinfection in August 2002, the incidence of detectable bacterial concentrations in offshore waters has decreased markedly.

Physical Criteria

The criteria for determining compliance with physical characteristics (V.A.2.a–d) are narrative and apply to the discharge of floatable material, substances that could alter the color or transparency of the water, and/or contaminate sediments and degrade biological communities.

Floating Particulates and Oil and Grease

Criterion V.A.2.a states that "floating particulates and oil and grease shall not be visible." There were no observations of oils and grease at any offshore or nearshore station in 2012-13 (Tables B-4 and B-5). Therefore, compliance was achieved 100% for this criterion.

Ocean Discoloration and Transparency

These criteria specify that "the discharge of waste shall not cause aesthetically undesirable discoloration of the ocean surface" (V.A.2.b) and that "natural light shall not be significantly

reduced at any point outside the initial dilution zone” (V.A.2.c).

The lowest surface water clarity was at stations closer to shore and near the Newport Canyon, with progressively clearer water with distance offshore (see Chapter 3). The lower water clarity at the shallower stations typically reflects higher natural turbidity due to runoff and resuspension of sediment due to wave activity. Photosynthetically active radiation (PAR) results further confirmed the lack of an outfall signal for surface water clarity. There were no impacts from the wastewater discharge relative to ocean discoloration at any offshore station.

Water clarity standards were met 100% and 99.5% of the time for Zone A and B stations, respectively (Table 2-2). For all stations combined, overall compliance was 99.8%, which represents a slight increase from the previous year. This small number of out-of-compliance values was not environmentally significant. For example, all transmissivity values were within natural ranges of variability to which marine organisms are exposed (OCSD 1996a). Additionally, no discharge related patterns were observed for PAR.

Inert Solids

Criterion V.A.2.d states that "the rate of deposition and the characteristics of inert solids in ocean sediments shall not be changed such that benthic communities are degraded." No effects on sediments from effluent solids discharge were evident from the sediment characteristics or marine community data (Chapters 4, 5, and 6).

Chemical Criteria

These criteria (V.A.3.a–g) include limits to the water column and sediments. With the exception of dissolved oxygen and acidity (pH), all of the criteria are narrative.

Dissolved Oxygen

Criterion V.A.3.a states that "the dissolved oxygen (DO) concentration outside the zone of initial dilution shall not at any time be depressed more than 10 percent from that which occurs naturally as the result of the discharge of wastes." In 2012-13, compliance with this standard was met 98.6% and 96.7% of the time for Zone A and B station groups, respectively. Overall compliance was met 97.7% of the time for all stations combined (Table 2-2). This represents a decrease in compliance of about 0.5% from the 2011-12 monitoring year and continues to remain in the upper end of the range seen since 1998 (86.1–97.8%). The DO values were well within the range of long-term monitoring results (OCSD 1996b, 2004b). No environmentally significant effects to DO from the wastewater discharge were observed.

Acidity (pH)

Criterion V.A.3.b specifies that "the pH shall not be changed at any time more than 0.2 units from that which occurs naturally outside the zone of initial dilution as a result of the waste discharge." Compliance with this standard was met 100% of the time for both Zone A and B station groups. Overall compliance was met 100% of the time for all stations combined (Table 2-2). Compliance shows a slight increase from previous year's value of 99.3% and within the range seen since 1998 (95–100%). The pH values measured were within the range to which marine organisms are naturally exposed. Therefore, there were no environmentally significant effects to pH from the wastewater discharge.

Table 2-2. Summary of offshore water quality compliance testing results for dissolved oxygen, pH, and transmissivity for 2012-13.

Orange County Sanitation District, California.

Parameter	Number of Observations	Number of Out-of-Range Occurrences	Percent of Out-of-Range Occurrences	Number Out-of-Compliance	Percent Out-of-Compliance
Zone A Stations					
Dissolved Oxygen	436	38	8.7	6	1.4
pH	436	19	4.4	0	0.0
%Transmissivity	436	152	34.9	0	0.0
Zone B Stations					
Dissolved Oxygen	426	62	14.6	14	3.3
pH	426	16	3.8	0	0.0
%Transmissivity	426	62	14.6	2	0.5
Total (Zone A and Zone B Stations Combined)					
Dissolved Oxygen	862	100	11.6	20	2.3
pH	862	35	4.1	0	0.0
%Transmissivity	862	214	24.8	2	0.2

Dissolved Sulfides

This criterion (V.A.3.c) requires that "the dissolved sulfide concentration of waters in and near sediments shall not be significantly increased above that present under natural conditions." Sediment sulfide concentrations were low throughout the monitoring area and comparable at outfall and non-outfall sites (see Chapter 4).

Total Organic Carbon (TOC)

Criterion V.A.3.e states that "the concentrations of organic materials in marine sediments shall not be increased to levels which would degrade marine life." Sediment TOC concentrations were low, varied little among the middle shelf stations, and were not likely to be ecologically significant (see Chapters 4 and 5). Thus, the monitoring results for sediment quality indicate that deposition of effluent-derived organic material did not cause excessive loading or anaerobic conditions and compliance was achieved for this criterion.

Sediment Chemistry/Toxics

Criterion V.A.3.d states that "the concentrations of substances, set forth in Chapter IV, Table B, of the 1983 Water Quality Control Plan for Ocean Waters of California, in marine sediments shall not be increased to levels which would degrade indigenous biota". There are no numeric limits for sediment chemical contaminants. For compliance assessment, sediment contaminant levels were evaluated by comparing chemical concentrations against background concentrations from control sites and benchmarked against the sediment quality guidelines (SQG) that were developed for the National Oceanographic and Atmospheric Administration (NOAA) Status and Trends Program (Long *et al.* 1995; see Chapter 4). The benchmarks, Effects-Range-Low (ERL) and Effects-Range-Median (ERM), are defined as the 10th percentile concentration of a chemical in sediment below which a toxic effect is unlikely and the 50th percentile concentration above which a toxic effect occurs frequently, respectively.

Sediment Metals

Cadmium, copper, mercury, and silver concentrations showed an outfall signal, though concentrations were generally low and below toxicity thresholds. Two stations near the outfall (Stations 4 and 73) had silver concentrations above the ERM in Winter 2012. However, whole sediment toxicity tests using amphipod crustaceans on those sediments showed no measurable toxicity suggesting that the silver was not in a bioavailable form or the concentration was not sufficient to elicit a toxic response. No other ERM exceedances occurred in either survey.

Sediment Trace Organics

Total DDT (tDDT) was detected at all stations and routinely exceeded the ERL, but not the ERM. There was no evident spatial pattern relative to the outfall. This is consistent with past results, which have shown that this legacy contaminant is distributed throughout the Southern California Bight (SCB). Nearly 63% of SCB middle shelf sediments (30–120 m) have tDDT concentrations above the ERL (Schiff *et al.* 2006).

Total PCB (tPCB) concentrations were comparable at middle shelf within-ZID and non-ZID stations with no outfall influence evident. Station 3, located about 500 m offshore of the outfall terminus, had an anomalously high concentration of 244 µg/kg. This is in contrast to the within-ZID station mean of 7.83 µg/kg. Total PAH (tPAH) concentrations were comparable throughout the middle shelf stations and were well below the value of biological

concern. Overall, these results indicate minor impacts to sediment quality within the ZID and to a lesser degree at a few stations near the ZID, but with low possibility of adverse effects to biota from these compounds.

Toxicity

Although not a requirement of the District's NPDES permit, the District conducted whole sediment toxicity testing on samples collected from nine middle shelf, outfall-depth semi-annual stations in Winter 2013. Results showed no measurable whole-sediment toxicity at any station tested. This is consistent with the predicted low-level of toxicity by the Mean-ERM-Quotient (mERMq) analysis based on sediment geochemistry concentrations. The mERMq at Stations 4 and 73 in winter indicated a moderate likelihood of high toxicity due to high sediment concentrations of silver. However, no measureable toxicity was found at either station.

Quarterly acute and monthly chronic effluent toxicity testing was performed throughout the year. All tests were within the acceptable levels defined in the District's NPDES permit. These results are reported in the monthly Discharge Monitoring Reports (DMR).

Nutrients

Criterion V.A.3.f specifies, "nutrient materials shall not cause objectionable aquatic growths or degrade indigenous biota." The District determines compliance with this criterion using ammonia concentrations in the water column. During 2012-13, 86% (n = 1,581) of the samples contained ammonia concentrations that were below the detection limit (Chapter 3). Detectable ammonia concentrations ranged from 0.02 to 0.46 mg/L, with 90% (n = 202) of the detected values collected from samples taken below 15 m. Plume-related changes in ammonia were not considered environmentally significant as maximum values were 20 to 30 times, respectively, less than California Ocean Plan receiving water objectives for chronic (4 mg/L) and acute (6 mg/L) toxicity to marine organisms (OCSD 2004a). The one exception was a single surface sample collected at the end of the 78-inch outfall (0.99 mg/L) during the fall J-112 diversion. Average values at all depths and for all seasons were two orders of magnitude lower than the chronic objective. In addition, there were no detectable plankton associated impacts (i.e., excessive plankton blooms caused by the discharge) (see Chapter 3).

Organics in the Water Column

Criterion V.A.3.g states that "the concentrations of substances set forth in Table B of the California Ocean Plan shall not be exceeded in the area within the waste field where initial dilution is completed." Based on the reasonable potential analysis conducted when the permit was adopted, eight constituents from Table B of the Ocean Plan have effluent limitations established in this discharge permit (Order No. R8-2012-0035; NPDES Permit No. CA0110604). During the period from July 2012 through June 2013, none of these constituents exceeded the effluent limitations established in the permit (OCSD 2011).

Biological Criteria

Three narrative compliance criteria are specified in the NPDES permit for biological communities: (1) "marine communities, including vertebrates, invertebrates, and plant species, shall not be degraded" (V.A.4.a); (2) "the natural taste, odor, and color of fish, shellfish, or other marine resources used for human consumption shall not be altered"

(V.A.4.b); and (3) “the concentration of organic materials in fish, shellfish, or other marine resources used for human consumption shall not bioaccumulate to levels that are harmful to human health” (V.A.4.c). The concept of a degraded community implies a loss of diversity or a significant change and/or loss of community function.

Invertebrates

Infaunal Community

In 2012-13, infaunal community measures showed healthy benthic communities throughout the District’s monitoring area. Benthic Response Index (BRI) and Infaunal Trophic Index (ITI) scores in the middle shelf area were comparable at within-ZID and non-ZID stations with no outfall gradient evident. This is in contrast to the changes in benthic community health seen from 2005 through 2010. A trend towards recovery was first observed in January 2012 and has continued to improve to date. The only middle shelf stations not classifying as reference or normal per the BRI or ITI were within-ZID Station 0, Station 38, and Newport Canyon Station C2, which showed marginal deviation from reference or changed. Overall, there were no indications of a degraded infaunal community in the area of the discharge or within the District’s monitoring area.

Trawl Macroinvertebrates

Results of community monitoring from the trawl monitoring stations showed that macroinvertebrate communities at outfall Station T1 were similar to the other 60-m stations, as well as to regional reference areas. These results indicate that macroinvertebrate communities were not degraded (Chapter 6).

Vertebrates (Fishes)

Fish Community

Analysis of the demersal fish data indicated that the fish community at the outfall was similar to other 60-m sites and was similar to regional reference areas. Fish Response Index (FRI) scores at all stations were indicative of reference conditions (Chapter 6). Overall, there were no indications of a degraded demersal fish community in the area of the discharge or within the District’s monitoring area.

Fish Tissue Contaminants

In 2012-13, fish tissue contaminant concentrations were generally low in all target species. No fish analyzed exceeded the State of California fish consumption guidelines for the legacy contaminants tDDT and tPCB, or for mercury in muscle tissue.

Fish Health

Fishes were examined visually for external parasites and abnormalities, such as skeletal deformities, tumors, lesions, and abnormal coloring. Less than 1% of the fishes collected in 2012-13 showed evidence of irregularities. The most common irregularity was the presence of the eye parasite *Phrixocephalus cincinnatus* in Pacific sanddabs (*Citharichthys sordidus*), which occurred in 0.25% of the fishes examined (Chapter 6). These results are comparable to background levels found within the SCB and do not indicate a degraded biota.

Fish Consumption

Compliance criteria (V.A.4.b and V.A.4.c) for fish consumption address the quality of seafood for human consumption relative to the taste, odor, color, and tissue contaminant concentrations of fish and shellfish. There are no numerical or objective criteria for assessing taste, odor, and color of organism tissues, so the evaluation was qualitative, based on observations only.

Fishes collected during 2012-13 appeared normal in both color and odor. All fish muscle tissue appeared to be normal and comparable to that found in fresh specimens from other areas along the southern California coast. Estimates of carcinogenic and noncarcinogenic health risks from human consumption of seafood were not performed. However, all fish muscle tissue contaminant levels were below federal and state human consumption guidelines for organic contaminants (Chapter 6). These results are comparable to results from other seafood consumption/health risk studies for this region, which show little risk from consuming fish from the monitoring area.

Radioactivity

This criterion (V.A.5) states that the “discharge of radioactive wastes shall not degrade marine life.” The District measures the effluent for radioactivity, but not the receiving waters. The results of the effluent analyses consistently meet both state and federal standards and are published in the District’s Discharge Monitoring Reports. As fish and invertebrate communities are generally diverse and healthy, compliance with this criterion is considered to be met.

CONCLUSIONS

In 2012-13, the District achieved compliance for all permit criteria. The overall frequency of compliance for all monitoring parameters cannot be expressed as a single numerical value because many of the criteria are descriptive rather than numeric. In summary, California Ocean Plan criteria for water quality were met. Bacterial standards were consistently achieved at near- and offshore stations. Sediment quality was not degraded by excessive loading of measured chemical contaminants or by physical changes to the sediment from the discharge of wastewater solids. Normal infaunal communities were present throughout the monitoring area. Fish and trawl invertebrate communities in the monitoring area were healthy and diverse, and federal and state fish consumption guidelines were met with no outfall influence indicated. These results indicate that the receiving environment was not degraded by the discharge of the treated wastewater, all permit compliance criteria were met, and environmental and human health was protected.

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