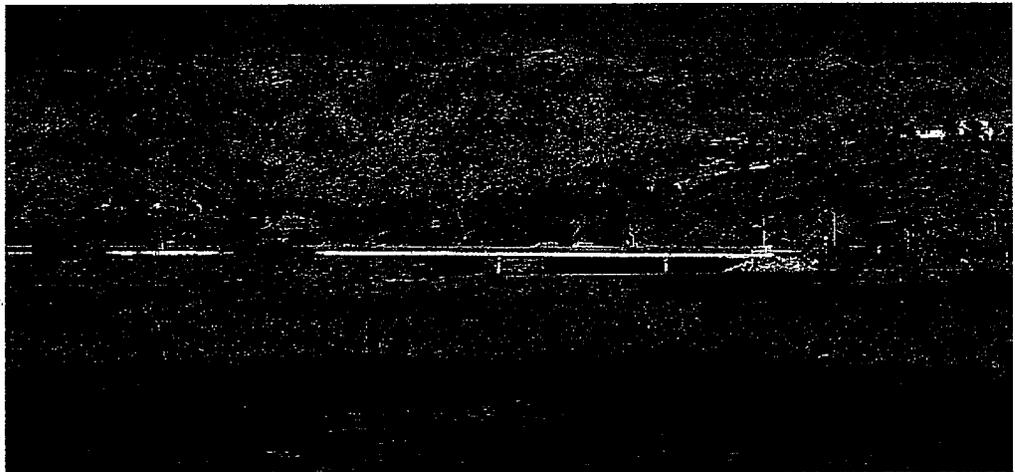


FINAL REPORT

STUDY OF WATER QUALITY IN THE MALIBU LAGOON AREA, CITY OF MALIBU, CALIFORNIA – PHASE II



Prepared for
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TABLE OF CONTENTS

Executive Summary	ES-1
Section 1 Introduction	1-1
1.1 Objectives of the Study	1-1
1.2 Site Background.....	1-2
1.3 Approach.....	1-3
1.4 Acknowledgements.....	1-5
Section 2 Study Methodology.....	2-1
2.1 Groundwater Sampling	2-1
2.2 Surface Water Sampling	2-2
2.3 Sediment Sampling	2-2
2.4 Sample Handling.....	2-2
2.5 Water Level Monitoring	2-3
Section 3 Results.....	3-1
3.1 Water Level Monitoring Results.....	3-1
3.2 Groundwater Sampling Results	3-2
3.3 Surface Water Sampling Results	3-3
3.4 Comparison of Results With CRWQCB Results.....	3-4
3.5 Sediment Sampling Results	3-4
Section 4 Discussion of Results.....	4-1
4.1 Hydrologic Conditions - Malibu Lagoon Area.....	4-1
4.2 Indicator Parameters at Sites In the Malibu Creek and Lagoon Area.....	4-2
4.3 Indicator Parameters at Beach and Ocean Sites.....	4-7
Section 5 Conclusions	5-1
Section 6 References.....	6-1

LIST OF TABLES

1	Laboratory Results, August 2, 1999 Sampling Event
2	Laboratory Results, August 9, 1999 Sampling Event
3	Laboratory Results, November 11, 1999 Sampling Event
4	Laboratory Results, November 15, 1999 Sampling Event
5	Laboratory Results, November 22, 1999 Sampling Event
6	Laboratory Results, November 29, 1999 Sampling Event
7	Laboratory Results for Sediment Samples Collected September 2, 1999

TABLE OF CONTENTS

LIST OF FIGURES

1	Site Location Map
2	Malibu Water Quality Study Area
3	Correlation of Indicator Bacteria Results
4	Malibu Lagoon Water Level at Malibu Bridge
5	Groundwater Level Monitoring at P-2
6	Groundwater Level Monitoring at C-1
7	Sample Site Well P-1
8	Sample Site Well P-2
9	Sample Site Well P-6
10	Sample Site Well P-7
11	Sample Site Well P-9
12	Sample Site Well C-1
13	Sample Site Well C-2
14	Sample Site B-1
15	Sample Site B-2
16	Sample Site B-3
17	Sample Site B-4
18	Sample Site B-5
19	Sample Site B-6
20	Sample Site B-7
21	Sample Site B-8
22	Sample Site B-9
23	Sample Site B-10
24	Sample Site B-11
25	Sample Site CS-1/CW-1
26	Sample Site CS-2/CW-2
27	Sample Site SD-1
28	Sample Site SD-2
29	Sample Site SD-3
30	Sample Site L-1
31	Sample Site OS-1
32	Sample Site OS-2
33	Sample Site OS-3
34	Sample Site OS-4
35	Sample Site OS-5
36	Sample Site OS-6
37	Sample Site OS-7
38	Sample Site OS-8
39	Sample Site OS-9
40	Sample Site OS-10
41	Sample Site OS-11
42	Fecal Coliforms
43	E. Coli
44	Enterococci

TABLE OF CONTENTS

LIST OF FIGURES (Continued)

- 45 Total Coliforms
- 46 Total Coliforms
- 47 Fecal Coliforms
- 48 Enterococci
- 49 E. Coli
- 50 Total Nitrogen In Cross Creek Plaza Area

LIST OF APPENDICES

- A Laboratory Reports
- B Assembly Bill 411 Regulations and Guidance

The City of Malibu originally contracted with URSGWC in 1997 to undertake a study to evaluate if septic systems could be a source of pathogens in the Malibu Lagoon and surf zone. This study was limited in scope to investigating the fate-transport of pathogens from a typical commercial septic disposal system near Malibu Creek. The study was performed during the summer and fall of 1998, and the final report for that study (Phase I) was completed in June 1999. The study found that as long as there was at least 1.5 feet of separation from the bottom of the leachfield to groundwater that the unsaturated soils in this zone effectively removed pathogens from the effluent before it reached groundwater. The study also showed that if this separation was not maintained, pathogens entering groundwater could potentially reach the creek, lagoon and surf zone. Due to heavy rainfall in 1998 the lagoon never closed during the testing period and groundwater separations were maintained.

This Phase II report has been prepared by URS Greiner Woodward Clyde (URSGWC) in accordance with the City of Malibu's (the City) request for proposals dated June 29, 1999 and URSGWC's proposal dated July 9, 1999 which was subsequently revised August 6, 1999.

The primary objective of this study is to expand upon findings in the Phase I Study and to investigate water quality at sites within the vicinity of Malibu Creek, Lagoon and surf zone to assess potential impacts from on-site septic systems and other sources of pathogens. The study evaluates the levels of indicator microorganisms (Total Coliforms, Fecal Coliforms, E. Coli, and Enterococci) at specific locations, or sites, in the study area as well as nutrients (ammonia, nitrate, nitrite, and organic nitrogen) and other wastewater markers (MBAS, and Biochemical Oxygen Demand), to assess the level of impact on water quality from potential sewage sources.

An important element of this Phase II study has been to associate the concentrations of indicator parameters (indicator microorganisms, nutrients and wastewater markers) with changes in water level in Malibu Lagoon as a result of the lagoon being closed, breached or open to flow out to the surf zone. In order to meet these objectives a water-quality and limited sediment-sampling program has been undertaken. The program included the sampling of groundwater, surface water and sediments at locations in and near Malibu Lagoon and Creek and along the beachfront of Malibu Colony and Malibu State Beach.

Results of the study indicate the lagoon is receiving microorganisms from Malibu Creek and the storm drains, with the creek providing approximately 100 times more colony forming total coliforms than the combined amount from the storm drains. Possible sources of the indicator bacteria include discharges from septic systems, domestic animals, stock animals, deer, rodents, birds, etc. Rainfall events increase the bacteria levels received by the lagoon.

The storm drains are also contributing bacteriological contamination to the lagoon. Discharges at SD-2 and SD-3 (see Figure 2 for sample locations) are consistent with sewage contamination, although, MBAS results do not provide evidence for wastewater from household or commercial septic systems. Sources for nutrient- and microbial-impacted water that enter the storm drains could be; infiltrating groundwater impacted by septic discharges, excessively fertilized fields (e.g. the golf course north of the Colony), surface water runoff containing animal feces and rinsing off of areas where septic leachate has daylighted due to a poorly operating septic system.

The study also confirmed that hydrologic conditions within Malibu Lagoon and the surrounding area are controlled by the state of the lagoon. With the lagoon closed, high groundwater levels in the alluvium resulted in high indicator bacteria levels in the Cross Creek Commercial Plaza leachfield area. As the separation between the groundwater surface and the leachfield bottom increased following the breach of the lagoon sand berm, measured indicator bacteria levels dropped nearly 3 orders of magnitude in concentration. This is a result in the increased efficiency of microorganism removal from discharged sewage due to increased separation between the base of the leachfields and the groundwater surface.

Changes in nitrogen concentrations in sampled wells during the study period indicate groundwater is moving toward the lagoon following the lagoon breach. Nutrients and microorganisms show a decrease in concentration downgradient from source areas toward the lagoon indicating the indicator parameters are being effectively attenuated with travel distance through the saturated alluvium.

Samples from wells C-1 and C-2, located between Malibu Colony and the lagoon, contain concentrations of indicator parameters that suggest possible impact from sewage disposal; variability in the results may be influenced by normal seasonal usage of homes in the Colony.

With the lagoon closed, the water quality in the surf zone was good. An increase in indicator microorganisms occurred in the surf zone at the mouth of the lagoon and along the shoreline down current following the breach. The levels of indicator parameters detected at the storm drains and in the lagoon for the last sampling event were slightly less than those measured during the previous events. The decrease in concentrations suggests the relatively high levels of these parameters entering the lagoon due to the sudden decrease in water level were beginning to taper.

Indication of sewage inputs along the Malibu Colony beach appeared minor, with the exception of the area at the far west end of the Colony where a storm drain discharges to the beach and ocean. In this area, levels of indicator microorganisms at levels above regulatory guidelines were detected.

1.1 OBJECTIVES OF THE STUDY

The City of Malibu originally contracted with URSGWC in 1997 to undertake a study to evaluate if septic systems could be a source of pathogens in the Malibu Lagoon and surf zone. This study was limited in scope to investigating the fate-transport of pathogens from a typical commercial septic disposal system near Malibu Creek. The study was performed during the summer and fall of 1998, and the final report for that study (Phase I) was completed in June 1999. The study found that as long as there was at least 1.5 feet of separation from the bottom of the leachfield to groundwater that the unsaturated soils in this zone effectively removed pathogens from the effluent before it reached groundwater. The study also showed that if this separation was not maintained, pathogens entering groundwater could potentially reach the creek, lagoon and surf zone. Due to heavy rainfall in 1998 the lagoon never closed during the testing period and groundwater separations were maintained.

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An important element of this Phase II study has been to associate the concentrations of the indicator parameters (indicator microorganisms, nutrients and wastewater markers) with changes in water level in Malibu Lagoon as a result of the lagoon being closed, breached, or open to flow out to the surf zone through a breach in the beach sand berm. In order to meet these objectives a water-quality and limited sediment-sampling program has been undertaken. The program included the sampling of groundwater, surface water and sediments at the locations identified on Figure 2.

Groundwater was sampled from:

- Seven (7) fixed observation wells
- Temporary well casings placed at eleven (11) beach sites

Surface water was sampled from:

- Malibu Creek at two (2) locations
- Malibu Lagoon at one (1) location
- The outfalls of three (3) storm drains
- The surf zone at eleven (11) locations

Sediment samples were collected at:

- The outfalls of three (3) storm drains that discharge into Malibu Lagoon

The water samples were collected during two events when the lagoon was closed (August 2 and 9, 1999); two events soon after the beach sand berm was breached and the lagoon began draining (November 11 and 15, 1999); and two events with the Lagoon open and flowing out to the surf zone (November 22 and 29, 1999).

Field sampling was completed in coordination with the California Regional Water Quality Control Board-Los Angeles Region (CRWQCB). The CRWQCB provided staff to assist with the field sampling and also collected split/duplicate samples to assess the quality of the resulting data.

The following sections of this report describe relevant background information and our approach to this study. Sampling methods, presentation of the results, a discussion of the results, and conclusions and recommendations of the study are also presented.

1.2 SITE BACKGROUND

Figure 1 shows the location of the study area. Figure 2 shows the study area with the specific sample sites identified. The study area is centered on Malibu Lagoon and the beach side of Malibu Colony. The lagoon is bounded by the Pacific Ocean and Malibu Colony residential area to the south, a golf course and the Cross Creek Plaza commercial center to the west, and the Serra Retreat residential area and historic Adamson House to the east.

Malibu Creek flows into Malibu Lagoon from the north. Treated wastewater is periodically discharged into Malibu Creek from the Tapia Wastewater Treatment Plant several miles upstream from the lagoon. During this study period, discharges to Malibu Creek from the Tapia Wastewater Treatment Plant began on November 7, 1999 (LVMWD, pers. com. February 14, 2000). Both the Cross Creek Plaza commercial center and the residential properties at Malibu

Colony have on-site septic wastewater systems. In the case of Cross Creek Plaza, an average of approximately 7,000 gallons of septic effluent is produced per day (Biosolutions, pers. com. March 3, 1999). This effluent is discharged to leachfields below the Plaza's parking areas. These leachfields typically consist of approximately 1.5 to 3 feet of 1.25-inch gravel fill, overlain by a 20-inch cover of site soils and topped with asphalt. The Malibu Colony includes ten houses on the north side of Malibu Colony Drive directly adjacent to the lagoon and twenty-six houses on the south side of Malibu Colony Drive adjacent to the ocean but near the lagoon. These homes have individual on-site septic systems. Assuming a wastewater flow rate of 50 to 82 gpd/person (Tchobanoglous, 1979), the 36 houses in the Colony area would generate approximately 7,200 to 11,800 gpd of effluent.

Due to beach processes, the mouth of Malibu Lagoon is periodically closed by a sand berm that prevents the lagoon from flowing into the surf zone. During periods when the lagoon is closed, the groundwater levels in the surrounding alluvium rise and during high stands of water in the lagoon causes adjacent on-site septic systems in Malibu Colony to backup. The sand berm is periodically eroded due to high inflows from rainfall, releases upstream at Tapia Wastewater Treatment Plant or from high surf, thereby, causing a channel to form that drains the lagoon into the surf zone. Groundwater levels also drop in response to the quick lowering of the lagoon level.

Previous studies in the area (Haile, R.W. et al., 1996) have reported fecal microorganism contamination in Malibu Lagoon and in discharges to Malibu Surf Rider Beach from the lagoon. URSGWC (URSGWC, 1999) completed a study that focused on the water quality in the lagoon area during a period when the lagoon was flowing to the sea. A conclusion from that investigation was that while the lagoon was open, groundwater levels in the Cross Creek Plaza area did not reach the bottom of the leachfields and microorganisms were effectively being removed from the effluent as it passed through the unsaturated zone. Nutrients were also being effectively assimilated and did not reach the lagoon through direct outflow of groundwater from the alluvium.

1.3 APPROACH

To address the study objectives, investigations have been undertaken to establish the water quality within the study area during transient hydrologic conditions. This program was based on the anticipated influence that transient hydrologic conditions would have on the movement of effluent from septic systems nearby the lagoon. For example, while the lagoon was closed it was anticipated that the lagoon would fill as a result of natural stream flow and upstream discharges

into Malibu Creek resulting in a rise in groundwater in the adjacent alluvium. During the rise in groundwater level previously unsaturated soils beneath the leachfields would be inundated. Following breaching of the berm it was anticipated that the rapid draining of the lagoon would cause local groundwater to flow under a higher than normal gradient to the creek and lagoon, which in turn would drain to the surf zone. To assess the impact these varying conditions might have on the quality of groundwater and surface water, six (6) sampling events were undertaken, as noted in the executive summary, at the following times:

1. Two sampling events (8/2/99 and 8/9/99) were completed when Malibu Lagoon was closed by a sand berm, resulting in a rise in lagoon levels and groundwater levels in the surrounding alluvium.
2. Two sampling events (11/11/99 and 11/15/99) were completed immediately after the sand berm breached and four (4) days later, as water levels in the lagoon and surrounding alluvium were draining.
3. Two sampling events (11/22/99 and 11/29/99) were completed under hydrologic conditions when Malibu Lagoon was open and flowing to the sea, and groundwater levels in the surrounding alluvium had dropped to base levels.

The sampling program consisted of collecting groundwater samples from existing wells and from temporary well casings placed in the beach adjacent to Malibu Colony and at Surf Rider Beach. Surface water samples were collected from the surf zone adjacent Malibu Colony and Surf Rider Beach, from Malibu Lagoon, at the outlets of three storm drains in the Lagoon, and from Malibu Creek. One set of soil samples was collected from the three (3) storm drain locations as part of the baseline data.

Collected water samples were tested for the following:

Microorganism Indicators

- Total Coliforms
- Fecal Coliforms
- E. Coli
- Enterococci

Nutrients

- Ammonia-Nitrogen
- Nitrite-Nitrogen
- Nitrate-Nitrogen

- Total Kjeldahl-Nitrogen (TKN)

Wastewater Markers

- Biochemical Oxygen Demand (BOD)
- MBAS (surfactants)

Following a review of the laboratory data from the first two sampling rounds, by staff from URSGWC and the CRWQCB, the total number of sampling sites was reduced for subsequent sampling events. This reduction in the number of beach and ocean sample sites was made based on similar water quality results at neighboring locations, and to allow sufficient time for field crews to complete sampling the more significant locations during the available low tide conditions.

Water levels were monitored with data loggers at three locations during the course of the study. The purpose of this monitoring was to record changes in groundwater levels and the water level in Malibu Lagoon prior to, during, and after a breach event. Groundwater level monitoring sites were selected for the Cross Creek Plaza leachfield and between Malibu Colony and the lagoon in order to monitor groundwater level fluctuations near septic systems at these locations.

1.4 ACKNOWLEDGEMENTS

The City of Malibu would like to thank Mario Quiros, of Quiros Surveys, 22249 Pacific Coast Highway, Malibu, for the donation of surveying services to this project.

URSGWC, with the assistance of staff from the CRWQCB, undertook each sampling round with several teams of samplers in order to complete the beach and ocean sampling within tidal constraints. Sampling locations are identified on Figure 2. During the first two sampling rounds, which were the most extensive, groundwater samples were taken from existing wells P-1, P-2, P-6, P-7, P-9, C-1, and C-2, and in the case of the beach groundwater sampling, at locations B-1 through B-11 from temporary well casings. Surface water sampling locations included the storm drains at SD-1, SD-2, and SD-3, Malibu Creek at CS-1 for the first round and at CS-1 and CS-2 for the second round (sample sites CS-1 and CS-2 are the same as CW-1 and CW-2 collected during later sampling events), Malibu Lagoon at L-1 and the surf zone sites OS-1 through OS-11. The number of sampling sites for subsequent sampling events was reduced following the first two rounds with the deletion of locations B-5 through B-8, and OS-5 through OS-8. Collected water samples were tested for nutrients, wastewater markers and indicator microorganisms.

During the second sampling event only, two samples, SP-1 and SP-2, were collected from water that was discharged from pipes exiting the bulkheads of two residences in the Malibu Colony. These samples were tested for indications of microorganisms.

A single round of sediment sampling was completed at the outfalls of the three storm drains that discharge into Malibu Lagoon (OF-1, OF-2, and OF-3 which correspond to surface water samples at SD-1, SD-2 and SD-3, respectively). These samples were tested for nutrients, wastewater markers and indicator microorganisms.

Soil and groundwater sampling followed standard URSGWC sampling and chain-of-custody procedures. Split samples at selected sites were collected by CRWQCB Staff and submitted to their contract laboratory to evaluate the quality of the resulting data.

Sampling procedures included safeguards against sample contamination or cross-sample contamination, such as using disposable bailers and wearing new disposable gloves for each sample collected, and cleaning sample equipment before sampling.

2.1 GROUNDWATER SAMPLING

Existing wells were purged of up to 3 casing volumes of water with a dedicated disposable bailer prior to sample collection. Purging was considered complete when the field-measured parameters of pH, temperature and electrical conductivity stabilized to within 10 percent of previous readings.

Prior to sampling, the depth to water in the existing wells was measured. Groundwater samples were collected with dedicated disposable bailers and poured directly into containers supplied by the analytical laboratory. Groundwater samples were monitored for pH, electrical conductivity, and temperature, and a description of the observed and measured water characteristics was noted on the sample collection data sheet.

Post-hole diggers and hand augers were used to install temporary casings used for collecting the beach groundwater samples. The beach groundwater samples were collected from between the mid- and high-tide levels during the low tide slack period. Samples were collected from the casings with disposable bailers. After collecting the sample the casings were removed and cleaned by brushing.

2.2 SURFACE WATER SAMPLING

Surface water samples from Malibu Creek and Lagoon and from the surf zone were collected at locations with approximately 6 to 12 inches of water depth. The samples were collected at approximately mid-depth at these sites. Samples collected at the storm drain outlets were sampled from ponded or flowing areas within, or at, the mouth of the drain, whichever was the most feasible. The surface water samples were collected directly into the laboratory supplied bottles by submerging the bottle below the surface of the water and allowing the bottle to fill. Filled bottles were used to subsequently fill sample containers that required preservatives, such as the bottles for biological and nutrient samples.

2.3 SEDIMENT SAMPLING

Sediment samples collected at the mouth of the storm drains were contained in laboratory-supplied glass jars.

2.4 SAMPLE HANDLING

Collected samples were stored in chilled coolers and transported as soon as possible to the analytical laboratory. Completed chain-of-custody forms were prepared for each set of samples and accompanied the samples to the laboratory. Samples were couriered for analysis to Calscience Environmental Laboratories, Inc. (Calscience), in Garden Grove, California. Calscience is a laboratory certified by the California Environmental Protection Agency (Cal-EPA) to conduct tests for organic and inorganic chemicals. Calscience has a QA/QC program that consists of internal checks and external audits on precision and accuracy of analytical

results. Calscience subcontracted to Silliker Laboratory in Carson, California to conduct the tests for microorganisms. Like Calscience, Silliker follows a QA/QC program that consists of internal checks and external audits on precision and accuracy of their analytical results.

2.5 WATER LEVEL MONITORING

Three data loggers with pressure transducers were installed in the study area to monitor water levels. One was installed in existing well P-2 adjacent to a Cross Creek Plaza leachfield. A second data logger was installed in existing well C-1 between Malibu Colony and Malibu Lagoon. The third data logger was attached to the Pacific Coast Highway Bridge crossing Malibu Lagoon with the tip of the pressure transducer approximately 1.6 feet above the base of the lagoon. The data loggers were set to collect a water level measurement every hour. Level measurements were recorded from September 2, 1999 to December 31, 1999.

This section presents results of the water level monitoring in the wells and in the lagoon and the results of laboratory testing of soil and groundwater samples collected during each sampling event. The laboratory results are summarized for each sampling event in Tables 1 through 6. The laboratory reports for the data are included in Appendix A.

3.1 WATER LEVEL MONITORING RESULTS

Hydrographs for the data loggers installed at the three sites are shown in Figures 4, 5, and 6. The water level in Malibu Lagoon was relatively stable until a rapid rise on October 28, 1999, reportedly due to an upstream release at Malibu Lake (LVMWD per com February 14, 2000). This was followed by another rapid rise starting on November 8, which culminated with the lagoon breaching. This last lagoon level rise was in response to a light rain and releases from the Tapia Wastewater Treatment Plant. Based on the monitored water level data the breach occurred sometime between 8:00 and 9:00 am on the morning of November 11, 1999. Following the breach the lagoon level rapidly dropped (over 5 feet in 5 hours), before quickly reverting to a cycle of normal high tide levels, and more slowly, low tides. Normal tidal cycles following the breach appear to have resumed around November 20, 1999 prior to the final two sampling rounds.

Water level monitoring at P-2 indicates the groundwater level at this location was relatively stable between 4.5 to 4 feet amsl (5.3 to 5.8 feet below ground level) until a rapid rise to about 5 feet amsl (4.8 feet below ground level) around October 28, 1999. Another rapid rise in water level occurred from November 8, 1999 to November 11, 1999 when the Malibu lagoon breached and the groundwater level in this well dropped rapidly after 9:00 am on November 11. In the 24 hours between 9:00 am on November 11 and 9:00 am November 12, 1999, the water level in this well dropped 3.1 feet. In the following 24 hours it dropped another 0.5 feet, and after this, the level slowly decreased to a tidally influenced level at about 2 feet amsl (7.5 feet below ground level). Two periods of data collected at P-2 (before 10/1/99 and between 10/14/99 and 10/18/99) show erratic readings and are inconsistent with manually measured readings and data collected at the other locations. It is likely that the data during these periods are not representative of true groundwater levels.

The groundwater levels recorded at C-1 show a similar pattern of rises around October 28, 1999 and November 8, 1999 to P-2 however this location experiences a stronger tidal influence. The effects of the breach are recorded in this well between 9:00am and 10:00am on November 11, 1999. In the 24 hours between 9:00 am on November 11 and 9:00 am November 12, 1999 the water level in this well dropped 2.8 feet. In the following 24 hours it dropped only 0.2 feet.

Comparison of all three hydrographs shows a good correlation between changes in water levels, indicating hydraulic connection between the lagoon and groundwater in the surrounding alluvium.

3.2 GROUNDWATER SAMPLING RESULTS

Groundwater samples were collected from observation wells P-1, P-2, P-6, P-7, P-9, C-1 and C-2 and from beach sample sites B-1 through B-11. Figures 7 through 13 present the results of nutrients, wastewater markers and indicator microorganisms for each of the observation wells and 14 to 24 show the results for the beach sample sites. Samples were not collected during the November 11 and 22, 1999 sampling events at P-1, as a car was parked on this well during those times making the well inaccessible.

Concentrations of Ammonia-Nitrogen ranged from not detected to 29.4 milligrams/liter (mg/L) with the highest level detected at well P-2. Nitrite-Nitrogen ranged from not detected to 0.22 mg/L with the highest concentration detected at well P-2. Nitrate-Nitrogen ranged from not detected to 12 mg/L with the highest concentration detected in well P-1. TKN ranged from not detected to 35.6 mg/L with the highest concentration detected in well P-2. Wastewater markers were detected at levels that ranged from not detected to 4 mg/L for MBAS and not detected to 13 mg/L for BOD with the highest concentrations of the markers detected in samples from well P-2. The microorganism indicators ranged from not detected to 9,000 most probable number/100 milliliters (mpn/100 ml) for Total Coliforms, not detected to 9,000 mpn/100 ml for Fecal Coliforms, not detected to 9,000 mpn/100 ml for E. Coli and not detected to 500 mpn/100 ml for Enterococcus with the highest levels of indicator microorganisms all detected at well P-6 during the November 11, 1999 sampling event (Table 3).

Beach samples were collected for all six sampling events at sites B-1 through B-4, for the first and second sampling events at sites B-5 through B-8, and for the first two and last two sampling events at sites B-9 through B-11. Concentrations of Ammonia-Nitrogen ranged from not detected to 1.3 mg/L with the highest level detected at site B-1. Nitrite-Nitrogen ranged from not detected to 0.026 mg/L with the highest concentration detected at site B-3. Nitrate-Nitrogen ranged from not detected to 12 mg/L with the highest concentration detected at site B-1. TKN ranged from not detected to 5.6 mg/L with the highest concentration detected at site B-6. Wastewater markers were detected at levels that ranged from not detected to 0.4 mg/L for MBAS and not detected to 15 mg/L for BOD with the highest concentrations of the markers detected in samples from sites B-1 and B-10, respectively. The microorganism indicators ranged from not detected to 8,000 mpn/100 ml for Total Coliforms, not detected to 2,400 mpn/100 ml for Fecal

Coliforms, not detected to 2,400 mpn/100 ml for E. Coli and not detected to 300 mpn/100 ml for Enterococcus with the highest levels of indicator microorganisms all detected at site B-11 during the last two sampling events (Tables 5 and 6)

3.3 SURFACE WATER SAMPLING RESULTS

Surface water samples were collected from Malibu Creek at sites CS-1/CW-1 and CS-2/CW-2, from the outfalls of the three storm drains at sites SD-1, SD-2 and SD-3 and from Malibu Lagoon at site L-1. The samples collected at these sites were freshwater. Surface water samples were also collected from the surf zone at sites OS-1 through OS-11 that were adjacent the beach sample sites of the same number.

Figures 25 through 30 present the results of nutrients, wastewater markers and indicator microorganisms for each of the surface freshwater sample sites. Concentrations of Ammonia-Nitrogen ranged from not detected to 27.6 mg/L with the highest level detected at site SD-2. Nitrite-Nitrogen ranged from not detected to 0.092 mg/L with the highest concentration detected at site SD-2. Nitrate-Nitrogen ranged from not detected to 3.3 mg/L with the highest concentrations detected at sites CS-1/CW-1 and CS-2/CW-2. TKN ranged from not detected to 50 mg/L with the highest concentration detected at site SD-2. Wastewater markers were detected at levels that ranged from not detected to 0.8 mg/L for MBAS and not detected to 536 mg/L for BOD with the highest concentrations of the markers detected in samples from sites SD-3 and SD-2, respectively. The microorganism indicators ranged from not detected to >16,000 mpn/100 ml for Total Coliforms with the highest concentrations detected at sites SD-1, SD-2 and SD-3. Fecal Coliforms ranged from not detected to >16,000 mpn/100 ml with the highest concentration detected at site SD-2. E. Coli ranged from not detected to >16,000 mpn/100 ml with the highest concentration detected at site SD-2 and Enterococcus ranged from not detected to >1,600 mpn/100 ml with the highest levels of this indicator microorganisms detected at sites SD-2, SD-3 and L-1. The highest microorganism concentrations for most of the freshwater surface sites were detected during the last four sampling events (see Tables 1 through 6).

Figures 31 through 41 present the results of nutrients, wastewater markers and indicator microorganisms for each of the surf zone sample sites. Concentrations of Ammonia-Nitrogen and Nitrite-Nitrogen were not detected at the eleven (11) surf zone sites. Nitrate-Nitrogen ranged from not detected to 0.37 mg/L with the only detection of this compound at site OS-3. TKN ranged from not detected to 2.3 mg/L with the highest concentration detected at site OS-1. The wastewater marker MBAS was detected only at site OS-10, at a level of 0.2 mg/L and the marker

BOD ranged from not detected to 24 mg/L with the highest concentration detected in the sample from site OS-4. The microorganism indicators ranged from not detected to >2,300 mpn/100 ml for Total Coliforms; Fecal Coliforms ranged from not detected to >2,300 mpn/100 ml; and E. Coli ranged from not detected to >2,300 mpn/100 ml with the highest concentration of these three indicators detected at site OS-3 during the November 29, 1999 sampling event (Table 6). Enterococcus ranged from not detected to >1,600 mpn/100 ml with the highest levels of this indicator microorganisms detected at sites OS-4 and OS-11 during the August 9, 1999 sampling event (Table 2).

3.4 COMPARISON OF RESULTS WITH CRWQCB RESULTS

The results for samples collected by the CRWQCB were provided to the City, and are presented in parentheses in Tables 2 through 6. In general, the CRWQCB results compare well with the results obtained for the City's Study. Differences in nutrient levels and wastewater markers are mostly due to differences in laboratory detection levels. However, the values for these parameters are comparable. Indicator bacteria results show more variability, with differences for some samples up to 3 orders of magnitude. The City and CRWQCB results for samples collected from P-6 on November 11, 1999 have the greatest difference (Table 3). The high levels detected in the City's sample suggest possible contamination of this sample during sampling or laboratory processing. In general, though, the reported City and CRWQCB indicator bacteria values are comparable as represented on the correlation chart shown in Figure 3.

3.5 SEDIMENT SAMPLING RESULTS

Sediment samples collected at the outfalls of the three (3) storm drains that discharge into Malibu Lagoon were tested for nutrients, wastewater markers, and indicator microorganisms. The three samples identified as OF-1, OF-2, and OF-3 were collected at the surface water sites SD-1, SD-2 and SD-3, respectively. The results of these tests are presented on Table 7.

The results of nutrient tests identified levels of 62 and 59 mg/kg Ammonia-Nitrogen and 784 and 504 mg/kg TKN at OF-2 and OF-3, respectively. Elevated levels of BOD, 2,020 mg/kg at OF-2 and 1,050 mg/kg at OF-3, were also detected in these two samples. A Total Coliform concentration of 230 mpn/100 ml extract was detected in sample OF-2 and 930 mpn/100 ml extract was detected in sample OF-3. Fecal Coliforms detected in these two samples were 23 mpn/100 ml extract and 15 mpn/100 ml extract, respectively.

As previously described, water samples were collected at various locations within and near Malibu Creek and Lagoon, along Surf Rider Beach and along the beach adjacent Malibu Colony (Figure 2). The purpose for collecting these water samples was to evaluate the quality of the water for indications of impact from sewage disposal. Collected water samples were tested for indicator microorganisms, nutrients, and wastewater markers to evaluate potential sewage impacts.

4.1 HYDROLOGIC CONDITIONS - MALIBU LAGOON AREA

The six sample events were completed during three distinct hydrologic conditions that occurred at Malibu Lagoon. The first two sample events were completed in the summer of 1999 while the lagoon was closed. The other four events were completed in late fall of 1999, with two sample events completed shortly after the lagoon had breached, and the last two events completed with the lagoon open and freely flowing into the ocean.

With the lagoon closed, water levels in the lagoon rose to a level where flow into the lagoon was in equilibrium with evaporation, transpiration from flora and underflow through beach sand to the ocean. The early part of the water level curve shown on Figure 4 represents the lagoon level during closed conditions. Inputs of indicator parameters from Creek inflows were likely accumulating in the lagoon while it was in this state. Groundwater in the alluvium surrounding the lagoon also rose in response to the water level in the lagoon. This is evident in the water level curves for observation wells P-2 and C-1 (Figures 5 and 6). As the groundwater rose, the distance between the base of the septic leachfields and the groundwater surface decreased to less than 2 feet at Cross Creek Plaza, and less than 1 foot at the eastern end of Malibu Colony, thereby limiting the ability of these systems to effectively filter septic discharges.

On November 11, 1999, the water level in the lagoon rose steadily due to a recent light rain and upstream releases. The accumulation of the surface flow in the lagoon caused the sand berm to breach prior to 9:00 am on that day. Following the breach there was a rapid draining of the lagoon onto the beach and into the adjacent surf zone of the Pacific Ocean. The breach event is evident in the lagoon level shown on Figure 4. Long shore currents drive flow easterly along this stretch of beach and would have carried the discharge from the lagoon in this direction. Concurrent with the rapid draining of the lagoon, groundwater levels in the surrounding alluvium began to drop. This is evident in the groundwater levels shown on Figures 5 and 6 for wells P-2 and C-1. This response in groundwater level represents flow through the alluvium towards the lagoon. Contaminants contained in the groundwater would tend to move with the groundwater towards the lagoon. Depending on the contaminant, the rate of its movement may be quicker or

slower than the groundwater flow rate and the ability of the contaminant to reach the lagoon is dependent on a number of factors. As an example, inorganic nitrogen compounds would tend to move at the same rate as groundwater with attenuation related to uptake or assimilation controlled by biologic constraints. The indicator microorganisms and other pathogens, however, would tend to be attenuated with distance from their source. This attenuation was demonstrated with biophage by URSGWC in their study of pathogen transport in groundwater at the Cross Creek Commercial Center reported in June 1999.

Approximately one week following the breach, the lagoon level and groundwater levels reached a minimum. This condition is shown on Figures 4, 5 and 6 for the lagoon and for groundwater levels in wells P-2 and C-1. During this time, flow into the lagoon from Malibu Creek and the storm drains, and outflow of groundwater from the alluvium, would move into the lagoon and out to the surf zone of the Pacific Ocean. Contaminants entering the lagoon while it is in this condition would also be expected to flow out into the surf zone.

4.2 INDICATOR PARAMETERS AT SITES IN THE MALIBU CREEK AND LAGOON AREA

Samples collected at locations where surface flows enter the lagoon are CS-1/CW-1, CS-2/CW-2, SD-1, SD-2 and SD-3 (Figure 2). Location CS-1/CW-1 is at the Serra Retreat crossing of Malibu Creek. During each of the six sampling events, the water in the creek was flowing past this point. Sample Site CS-2/CW-2 is about 1,000 feet downstream of location CS-1/CW-1. While the lagoon was closed, the creek entered the lagoon at this sample site. With the lagoon open, water in the creek was flowing past this location and entered the lagoon approximately 300 feet farther downstream. Figures 25 and 26 show the results of water quality testing for samples collected at these two sites. Total Coliforms are generally between 100 and 1,000 mpn/100 ml and the indicator microorganisms are between 10 and 500 mpn/100 ml. BOD and nitrogen levels are generally less than 5 mg/L and MBAS is not detected. The levels of Fecal Coliforms, E. Coli, or Enterococcus detected in 6 of the 11 samples from CS-1/CW-1 and CS-2/CW-2 exceed the regulatory levels for these indicator parameters established for freshwater beaches by California State Assembly Bill 411 (AB 411), and implemented by the California Department of Health Services (CDHS; see Figures 42, 43, and 44). Appendix B contains information obtained from the CDHS web site on AB 411 regulation and draft guidance for this regulation prepared by CDHS. The indicator bacteria results indicate that the lagoon is receiving microorganisms indicative of bacteriological contamination from upstream sources. The indicator parameters do not discriminate between human and animal sources and, therefore, possible sources could be from septic tanks or from stock animals, deer, rodents, birds, etc.

Water and sediment samples were also collected from the three storm drains that discharge into Malibu Lagoon. Sample location SD-1 is at the discharge point of the Civic Center storm drain. This drain does not pass near known leachfields. Sample site SD-2 is at the discharge point of the Commercial Center storm drain. The Commercial Center storm drain is located near the leachfields in the Cross Creek Plaza area. Sample site SD-3 is at the discharge point of the Colony storm drain (also known as the "Mystery" drain). The Colony storm drain is located between the Colony and the golf course to the north. Water quality results for samples collected at these locations are shown on Figures 27, 28 and 29.

Water samples collected at SD-1 contained concentrations of Fecal Coliforms, E. Coli, Enterococcus or Total Coliforms that exceeded regulatory levels established for freshwater beaches by AB 411 for 5 of the 6 sampling events (see Figures 42 through 45). MBAS was detected in two samples at 0.2 mg/L; one sample from prior to the breach and one from a sampling event after the breach. The sediment sample collected at this location did not contain detectable levels of indicator microorganisms or MBAS but did contain detectable levels of the nitrogen compounds and BOD (Table 7).

Water samples collected at SD-2 contained concentrations of Fecal Coliforms, E. Coli, Enterococcus or Total Coliforms that exceeded regulatory levels established for freshwater beaches by AB 411 for 5 of the 6 sampling events (see Figures 42 through 45). In addition, levels of ammonia, TKN, and BOD exceeded 10 mg/L following the breach, with concentrations of these compounds increasing approximately an order of magnitude from the November 11, 1999 sampling event to the November 29, 1999 sampling event. MBAS was not detected in samples from this location before the breach and was detected at levels between 0.1 and 0.4 mg/L following the breach. The sediment sample collected at this location contained levels of the indicator parameters comparable to the water results (Table 7).

Water samples collected at SD-3 contained concentrations of Fecal Coliforms, E. Coli, Enterococcus or Total Coliforms that exceeded regulatory levels established for freshwater beaches by AB 411 for 5 of the 6 sampling events (also shown on Figures 42 through 45). Levels of ammonia and TKN increase following the lagoon breach, although the concentrations of these compounds in samples from SD-3 remain less than 10 mg/L. BOD was also detected in samples from this site at levels from 2 to 20 mg/L. Prior to the breach, MBAS was detected in a sample from this site at 0.3 mg/L. Following the breach, MBAS was detected in samples collected from SD-3 at levels from 0.1 to 0.8 mg/L. The sediment sample collected at this location contained levels of the indicator parameters comparable to the water results.

The results from testing the storm drain discharges indicate that the three storm drains are contributing bacteriological contamination to the lagoon. The levels of ammonia, TKN and BOD detected in samples from SD-2, and to a lesser extent in samples from SD-3, are suggestive of storm drain discharges impacted with organics and nutrients that have been depleted of oxygen due to microbial activity. These indicator parameters are consistent with sewage contamination. Although, MBAS levels detected in samples collected at the storm drains do not provide evidence that wastewater from household or commercial septic systems are probable sources. As the lagoon level decreases the flow from the storm drains increases. This increase in flow allows movement of nutrient- and microbial-impacted water into and through the storm drains. Sources for the nutrient- and microbial-impacted water could be from septic system discharges, excessively fertilized fields (e.g. the golf course north of the Colony), surface water runoff containing animal feces and rinsing off of areas where septic leachate has daylighted due to a poorly operating system.

Groundwater sampling from observation wells was completed in order to evaluate levels of indicator parameters for areas upgradient, within, and downgradient of septic system leachfields. The results of the testing are shown on Figures 7 through 13 for sample locations at wells P-1, P-2, P-6, P-7, P-9, C-1 and C-2, respectively (see Figure 2 for site locations).

Observation well P-1 is an upgradient monitoring point with most of the tested parameters not detected in collected samples. Concentrations of nitrate at approximately 10 mg/L or less were detected in this well, and one detection of *Enterococcus* above the detection level of 2 mpn/100 ml was recorded for the August 2, 1999 sampling event (see Figure 7).

Samples collected from observation well P-2 show relatively high levels of ammonia, TKN, MBAS and BOD compared to samples from other wells. This well is located at the edge of an active leachfield in the Cross Creek Commercial Plaza. Concentrations of Total Coliforms, Fecal Coliforms, and *E. Coli* are initially about 1,000 mpn/100 ml prior to the lagoon breach and then drop nearly 3 orders of magnitude following the breach (see Figure 8). *Enterococcus* levels increase from the first to the last sampling event. The other detected indicator parameters generally decrease from the first to the last sampling event, though not as dramatically as the three indicator microorganisms described above. The quality of the water at this location appears to be heavily influenced by discharges from the nearby leachfield, prior to the water level at this location dropping. Following the lagoon breach and subsequent drop in groundwater level, detected concentrations of indicator microorganisms (except *Enterococcus*) decrease markedly. This is most likely a result of the increase in distance between the base of the leachfield and the groundwater level, thereby, allowing attenuation of the indicator

microorganisms in the unsaturated soils. As mentioned previously, this phenomenon was demonstrated by URSGWC during biophage testing at this location. At that time, the lagoon was open and groundwater levels were similar to the levels measured during the last sampling event on November 29, 1999.

Wells P-6, P-7 and P-9 are downgradient of the Commercial Plaza leachfields. Results from these three wells present little concern for microbial contamination, except for the November 29, 1999 Enterococci sample results and the November 11, 1999 result for the sample from well P-6. The November 11, 1999 sample result for well P-6 may be a false positive due to sample contamination as discussed in Section 3.4.

Inorganic nitrogen compounds (ammonia, nitrite and nitrate) are very mobile and move with groundwater at approximately the same flow rate. Figure 50 shows total nitrogen concentration (inorganic nitrogen compounds only) for Wells P-1, P-2, P-6, P-9 and SD-2 over the test period. The concentration trends depicted in the figure show that total nitrogen at P-1 and P-2 decrease following the breach; P-6 and P-9 are less than 1 mg/L prior to the lagoon breach and increase to slightly greater than 1 mg/L following the breach; and SD-2 increases 2 orders of magnitude following the breach. The concentration levels measured for these wells and the storm drain are all equal to or greater than the level measured in samples from the lagoon. These results suggest that in upgradient and near leachfield areas, nitrogen levels decrease with lowering of the water table. This is possibly due to an influx of fresh water containing less nitrogen into the upgradient and leachfield areas. The downgradient wells show a slight increase in nitrogen level due possibly to downgradient movement of higher nitrogen-containing water from the upgradient and leachfield areas. These trends in nitrogen concentrations for samples from the wells are consistent with groundwater movement toward the Lagoon following the breach. The results show a lower level in nitrogen concentration in downgradient wells that are consistent with the lower levels of indicator bacteria found in the downgradient wells. This suggests that the microbial contaminants are being attenuated with distance from the leachfield areas. This result is consistent with the results presented in the Phase 1 study of potential impacts from on-site septic systems (URSGWC, June 1999).

The increase in nitrogen level in the sample from SD-2 may be due to nitrogen-containing groundwater from upgradient and leachfield areas infiltrating the Commercial Plaza storm drain following the Lagoon breach. The increase is consistent with the other indicator parameters except for MBAS.

Wells C-1 and C-2 are located between Malibu Colony and the lagoon and are used in this study to indicate water quality in these areas. The samples collected from these two wells contain concentrations of the indicator parameters that suggest possible impact from sewage disposal (see Figures 12 and 13). Well C-2 contains greater concentrations of the indicator parameters prior to the lagoon breach whereas C-1 contains greater concentrations of the indicator parameters following the lagoon breach. These results may be influenced by the normal seasonal usage of some of the homes in the Colony.

Figure 30 presents the results for samples collected from the lagoon near the point where the breach occurred. This is also a location where many birds that inhabit the lagoon roost. Levels of indicator microorganisms are above detectable limits for all six of the sampling events. TKN and BOD are also detected in samples prior to and just following the breach. Except for Enterococci, the indicator microorganisms increase following the breach and then drop off for the last event. As shown on Figures 42 and 43, Fecal Coliforms and E. Coli exceed the regulatory levels for freshwater beaches established by AB 411 for the three sampling events following the lagoon breach. These results indicate that inflows into the lagoon which are impacted with indicator bacteria, i.e. the three storm drains and Malibu Creek, are having a significant influence on the bacteria levels measured in the lagoon. The roosting birds and inflows from Malibu Creek, while contributing to the level of indicator microorganisms measured in the lagoon, do not explain the one to two order of magnitude increases in concentration of these microorganisms following the breach of the lagoon. The higher levels of indicator microorganisms are more consistent with the levels detected at the outfalls of the three storm drains (particularly the Commercial Plaza and Malibu Colony storm drains) in combination with Malibu Creek inflows.

Microorganism mass contributed to the lagoon is dependent on both concentration and flow rate. When considering the Total Coliforms, the average concentration at the storm drains is estimated to be approximately 16,000 mpn/100ml, with a discharge rate of approximately 1.5 liters/min, while the average concentration of Total Coliforms in Malibu Creek is estimated to be 1,000 mpn/100ml, with a flow rate of about 5 cubic feet/sec or approximately 8,500 liters/min (based on information supplied by LVMWD). These values indicate Malibu Creek is contributing 100 times more colony forming total coliforms than the three storm drains combined. This analysis points to the significant contributions of indicator bacteria to the lagoon by Malibu Creek, but should not mask the contributions from the storm drains.

Another possible explanation for the increase in indicator bacteria following the breach is the dispersion of fine sediments containing bacteria that may have been deposited on the floor of the

lagoon. Sediment samples collected at the outfalls of storm drains 2 and 3 indicated the presence of Total and Fecal Coliforms at both these locations (Table 7). With the sudden fall in lagoon level following the breach, currents that began moving through the lagoon likely scoured and dispersed throughout the water column the veneer of fine sediments from the lagoon floor, along with any microorganisms present. This would also contribute to an increase in the concentration of the indicator bacteria in the lagoon following the breach.

4.3 INDICATOR PARAMETERS AT BEACH AND OCEAN SITES

In addition to investigating flow and contaminant conditions in the lagoon and surrounding areas, the beach and adjacent surf zones were also investigated to quantify potential contamination from sewage outputs. The beach and surf zone to the east of the lagoon outlet (B-1 through B-3 and OS-1 through OS-3) and one location several hundred feet west of the outlet (B-4 and OS-4) were sampled for each of the six sampling events (Figure 2). Two of these sample sites (B-2 and B-3) were located on the sand berm between the lagoon and ocean. These sites allowed characterization of indicator parameters in water samples collected from beach and ocean sites near or down current of the lagoon and its outlet prior to, and following, the breach of the lagoon sand berm.

Sample sites on the beach and in the surf zone along Malibu Colony (B-5 through B-8 and OS-5 through OS-8; Figure 2) were sampled at least twice during the six sampling events. The three sample sites at the west end of the colony (B-9 through B-11 and OS-9 through OS-11; Figure 2) were sampled for the first two and last two sampling events. These sample sites provided analysis of sewage inputs from septic systems in Malibu Colony that could potentially flow out to the ocean through the beach sands. A storm drain is located at the west end of the colony that was investigated by sample sites B-11 and OS-11.

As shown on Figures 14 through 24, with few exceptions, the indicator parameters for samples collected from the beach sites are below levels for concern. The main exception is the samples collected from Beach Site 11 (B-11) during the November 22 and 29, 1999 sampling events. Total and Fecal Coliforms and E. Coli were above 1,000 mpn/100 ml in the sample from this site during these two sampling events (see Figure 24). The outfall of a nearby storm drain may influence the water quality of this site. Figures 46 through 48 show the levels of the indicator microorganisms Total Coliforms, Fecal Coliforms and Enterococci, detected in samples from beach sites compared to the regulatory levels for these microorganisms established by AB 411 for saltwater beaches. E. Coli does not have an established regulatory level for saltwater beaches

but the results are shown in Figure 49. In addition to Beach Site B-11, sites B-1 and B-3 each had one sample event with Enterococci exceeding the regulatory level (see Figure 48).

Results of samples collected from Ocean Sites OS-1 through OS-11 are shown on Figures 31 through 40. The results show that the indicator microorganisms are the primary indicators of poor water quality. TKN and BOD are detected in samples from a few sites, but at levels that do not raise concern.

Established regulatory levels for saltwater beaches for the indicator microorganisms Fecal Coliforms and Enterococci are exceeded in samples collected at OS-1, OS-3, OS-4, OS-6 and OS-11. Concentrations of these microorganisms tend to be greater in samples for OS-1, OS-2 and OS-3 following the breach of the lagoon, although only a few actually exceed the established regulatory levels (Figures 46 through 49). One sample prior to the breach and one sample after the breach at OS-4 exceeded the regulatory level for Fecal Coliforms and one sample prior to the breach exceed the regulatory level for Enterococci. At OS-6 and OS-11 one sample from prior to the breach exceeded the regulatory levels for Fecal Coliforms and Enterococci. These occurrences appear to be somewhat random for OS-4, OS-6 and OS-11.

When the lagoon is closed, water levels in the lagoon and surrounding alluvium rise. With high groundwater levels in the alluvium, the efficiency of microbial removal from on-site septic system discharges is reduced.

Indicator bacteria results indicate the lagoon is receiving microorganisms from Malibu Creek and the storm drains, with the creek providing approximately 100 times more colony forming total coliforms than the combined amount from the storm drains. Possible sources of the indicator bacteria include discharges from septic systems, domestic animals, stock animals, deer, rodents, birds, etc. Rainfall events increase the bacteria levels received by the lagoon.

The storm drains are also contributing bacteriological contamination to the lagoon. Discharges at SD-2 and SD-3 are consistent with sewage contamination, although, MBAS results do not provide evidence for wastewater from household or commercial septic systems. Sources for nutrient- and microbial-impacted water that enter the storm drains could be from infiltrating groundwater impacted by septic discharges, excessively fertilized fields, surface water runoff containing animal feces and rinsing off of areas where septic leachate has daylighted due to a poorly operating system.

Hydrologic conditions within Malibu Lagoon and the surrounding area are controlled by the state of the lagoon. With the lagoon closed, high groundwater levels in the alluvium resulted in high indicator bacteria levels in the Cross Creek Commercial Plaza leachfield area. As the separation between the groundwater surface and the leachfield bottom increased following the breach of the lagoon sand berm, measured indicator bacteria levels dropped nearly 3 orders of magnitude in concentration. This increased separation between the base of the leachfields and the groundwater surface increases the efficiency of microorganism removal from discharged sewage.

Changes in nitrogen concentrations in sampled wells during the study period indicate groundwater is moving toward the lagoon following the lagoon breach. Nutrients and microorganisms show a decrease in concentration downgradient from source areas toward the lagoon indicating the indicator parameters are being effectively attenuated with travel distance through the saturated alluvium.

Samples from wells C-1 and C-2, located between Malibu Colony and the lagoon, contain concentrations of indicator parameters that suggest possible impact from sewage disposal; variability in the results may be influenced by normal seasonal usage of homes in the Colony.

With the lagoon closed, the water quality in the surf zone was good. An increase in indicator microorganisms occurred in the surf zone at the mouth of the lagoon and along the shoreline

down current following the breach. The levels of indicator parameters detected at the storm drains and in the lagoon for the last sampling event were slightly less than those measured during the previous events. The decrease in concentrations suggests the relatively high levels of these parameters entering the lagoon due to the sudden decrease in water level were beginning to taper. Indication of sewage inputs along the Malibu Colony beach appeared minor, with the exception of the area at the far west end of the Colony where a storm drain discharges to the beach and ocean. In this area, levels of indicator microorganisms at levels above regulatory guidelines were detected.

- Haile, R.W. et al., 1996. *An epidemiological study of possible adverse health effects of swimming in Santa Monica Bay*. Prepared for the Santa Monica Bay Restoration Project.
- Tchobanoglous, G. 1979. *Wastewater Engineering: Treatment, Disposal, Reuse*. (2nd Edition) Published by Metcalf & Eddy, Inc.
- URS Greiner Woodward Clyde, 1999. *Study of Potential Water Quality Impacts on Malibu Creek and Lagoon from On-site Septic Systems*. Unpublished report prepared for the City of Malibu by URS Greiner Woodward Clyde. June 1999.

TABLE 1
LABORATORY RESULTS
AUGUST 2, 1999 SAMPLING EVENT

	Ammonia-N (mg/L)	Nitrite-N (mg/L)	Nitrate-N (mg/L)	Total Kjeldahl-N (mg/L)	MBAS (mg/L)	BOD (mg/L)	Total Coliforms (mpn/100ml)	Fecal Coliforms (mpn/100ml)	E. Coli (mpn/100ml)	Enterococci (mpn/100ml)
P-1	ND ¹	ND	12	ND	ND	2	<2	<2	<2	8
P-2	26.6	ND	ND	28	4	13	>1,600	>1,600	1,600	4
P-6	1.1	ND	ND	2.2	ND	2	<2	<2	<2	<2
P-7	ND	ND	ND	1	ND	1	<2	<2	<2	<2
P-9	0.4	ND	3	1.3	ND	3	<2	<2	<2	4
C-1	ND	ND	ND	0.8	ND	4	<2	<2	<2	<2
C-2	11	ND	ND	11.9	0.3	9	30	30	30	130
SD-1	0.2	0.02	2	1.1	ND	8	>1,600	>1,600	30	170
SD-2	ND	ND	ND	1.4	ND	6	>1,600	34	12	13
SD-3	0.3	0.02	ND	3.5	0.3	18	>1,600	900	300	1,600
CS-1/CW-1	ND	ND	ND	1.1	ND	4	11	8	8	8
CS-2/CW-2	-- ²	--	--	--	--	--	--	--	--	--
L-1	ND	ND	ND	2.2	ND	6	50	50	30	4
B-1	ND	ND	0.2	3.1	ND	7	<2	<2	<2	2
OS-1	ND	ND	ND	1	ND	7	2	2	2	2
B-2	ND	ND	ND	2.4	ND	11	<2	<2	<2	4
OS-2	ND	ND	ND	0.8	ND	8	11	11	11	<2
B-3	0.3	ND	ND	2.5	ND	14	110	110	110	13
OS-3	ND	ND	ND	0.6	ND	7	2	2	2	2
B-4	ND	ND	0.3	0.8	ND	11	15	<2	<2	80
OS-4	ND	ND	ND	0.6	ND	7	<2	<2	<2	4
B-5	ND	ND	ND	ND	ND	8	<2	<2	<2	<2
OS-5	ND	ND	ND	0.7	ND	6	2	<2	<2	2
B-6	ND	ND	ND	5.6	ND	11	<2	<2	<2	<2
OS-6	ND	ND	ND	0.6	ND	8	500	500	9	23
B-7	ND	ND	ND	1	ND	12	<2	<2	<2	<2
OS-7	ND	ND	ND	ND	ND	9	<2	<2	<2	<2
B-8	ND	ND	0.6	0.7	ND	13	<2	<2	<2	<2
OS-8	ND	ND	ND	0.6	ND	3	<2	<2	<2	8
B-9	ND	ND	0.5	0.8	ND	13	<2	<2	<2	<2
OS-9	ND	ND	ND	0.8	ND	3	<2	<2	<2	<2
B-10	ND	ND	2.6	0.8	ND	15	13	<2	<2	<2
OS-10	ND	ND	ND	0.7	ND	3	<2	<2	<2	<2
B-11	ND	ND	0.2	1.1	ND	6	<2	<2	<2	<2
OS-11	ND	ND	ND	0.7	ND	4	2	<2	<2	<2

1. Not Detected. See Laboratory Report for detection limit.

2. Not Sampled

TABLE 2

LABORATORY RESULTS
AUGUST 9, 1999

	Ammonia-N (mg/L)	Nitrite-N (mg/L)	Nitrate-N (mg/L)	Total Kjeldahl-N (mg/L)	MBAS (mg/L)	BOD (mg/L)	Total Coliforms (mpn/100ml)	Fecal Coliforms (mpn/100ml)	E. Coli (mpn/100ml)	Enterococci (mpn/100ml)
P-1	ND ¹	ND	12	ND	ND	ND	<2	<2	<2	<2
P-2	27.9	ND	ND	30.7	4	9	1,600	900	900	8
P-6	0.6	ND	ND	2.2	ND	2	<2	<2	<2	<2
P-7	ND	ND	ND	1.1	ND	2	17	<2	<2	<2
P-9	ND	ND	2.1	0.8	ND	2	2	<2	<2	<2
C-1	ND	ND	ND	1.4	ND	2	<2	<2	<2	<2
C-2	9.6	ND	ND	10.6	0.2	7	8	<2	<2	23
SD-1	ND	0.04	ND	3.2	0.2	2	80	8	8	13
SD-2	ND	ND	ND	2.1	ND	5	1,600	220	140	170
SD-3	ND	0.02	1.8	0.7	ND	4	500	22	22	6
CS-1/CW-1	ND	ND	ND	1.3	ND	3	900	22	22	130
CS-2/CW-2	ND	0.06	1.1	1	ND	3	900	70	26	30
L-1	ND	ND	ND	2	ND	ND	17	17	7	4
B-1	ND	ND	ND	3.1	ND	ND	<2	<2	<2	<2
OS-1	ND	ND	ND	0.6	ND	ND	<2	<2	<2	2
B-2	ND (0.2) ²	ND (ND)	ND (ND)	1.3	ND (0.181)	2	<2 (<20)	<2 (<20)	<2	<2
OS-2	ND	ND	ND	ND	ND	ND	<2	<2	<2	<2
B-3	ND	ND	ND	1.8	ND	3	<2	<2	<2	<2
OS-3	ND	ND	ND	ND	ND	ND	<2	<2	<2	<2
B-4	ND	ND	0.3	0.8	ND	ND	2	2	2	<2
OS-4	ND	ND	ND	ND	ND	ND	1,600	1,600	1,600	>1,600
B-5	ND	ND	ND	0.6	ND	ND	2	<2	<2	<2
OS-5	ND	ND	ND	0.7	ND	ND	2	2	2	50
B-6	ND	ND	ND	3.6	ND	3	<2	<2	<2	2
OS-6	ND	ND	ND	1	ND	ND	<2	<2	<2	<2
B-7	ND (0.3)	ND (ND)	ND (ND)	0.6	ND (0.043)	ND	50 (<20)	21 (<20)	21	23
OS-7	ND	ND	ND	0.6	ND	ND	2	2	2	<2
B-8	ND	ND	ND	0.6	ND	ND	<2	<2	<2	<2
OS-8	ND	ND	ND	1.4	ND	ND	<2	<2	<2	<2
B-9	ND (0.2)	ND (ND)	0.3 (1.5)	0.8	ND (0.106)	2	<2 (<20)	<2 (<20)	<2	2
OS-9	ND	ND	ND	ND	ND	ND	<2	<2	<2	<2
B-10	ND	ND	0.6	3.4	ND	2	2	2	2	<2
OS-10	ND	ND	ND	0.6	ND	ND	<2	<2	<2	<2
B-11	ND	ND	0.7	2.1	ND	3	<2	<2	<2	4
OS-11	ND	ND	ND	0.6	ND	ND	>1,600	240	240	>1,600
SP-1	NA ³	NA	NA	NA	NA	NA	2	NA	2	NA
SP-2	NA	NA	NA	NA	NA	NA	>1,600	NA	23	NA

1. Not Detected. See Laboratory Report for detection limit.

2. CRWQCB split sample results shown in brackets

3. Not Analyzed

TABLE 3

**LABORATORY RESULTS
NOVEMBER 11, 1999 SAMPLING EVENT**

	Ammonia-N (mg/L)	Nitrite-N (mg/L)	Nitrate-N (mg/L)	Total Kjeldahl-N (mg/L)	MBAS (mg/L)	BOD (mg/L)	Total Coliforms (mpn/100ml)	Fecal Coliforms (mpn/100ml)	E. Coli (mpn/100ml)	Enterococci (mpn/100ml)
P-1	-- ¹	--	--	--	--	--	--	--	--	--
P-2	29.4 (37.4) ²	0.01 (ND)	ND (ND)	35.6	1.9 (6.64)	11	5000 (2,400)	23 (23)	23 (23)	<2 (<2)
P-6	ND ³ (1.3)	0.01 (ND)	ND (ND)	2	ND (0.136)	ND	9,000 (50)	9,000 (<2)	9,000 (<2)	500 (<2)
P-7	ND (0.2)	ND (ND)	ND (ND)	0.6	ND (0.115)	ND	8 (4)	<2 (<2)	<2 (<2)	<2 (8)
P-9	ND (0.5)	ND (ND)	ND (ND)	1.1	ND (0.066)	ND	<2 (4)	<2 (<2)	<2 (<2)	4 (2)
C-1	6.6	ND	ND	11.6	ND (0.281)	ND	130 (50)	130 (30)	130 (30)	300 (170)
C-2	ND (0.4)	ND (ND)	ND (ND)	0.6	ND (0.168)	ND	4 (80)	<2 (<2)	<2 (<2)	23 (13)
SD-1	ND (ND)	0.014 (ND)	0.82 (1.0)	1.1	ND (0.159)	ND	3,000 (>16,000)	500 (230)	500 (230)	240 (900)
SD-2	3.4	0.092	0.19	7.6	0.4 (0.485)	20	16,000 (>16,000)	16,000 (>16,000)	6,000 (>16,000)	130 (>16,000)
SD-3	ND (4.2)	0.03 (ND)	ND (0.2)	2	0.1	4	>16,000	230	230	240
CS-1/CW-1	ND	0.019	2.6	0.9	ND	ND	240	240	240	<2
CS-2/CW-2	ND (ND)	0.021 (ND)	2.5 (2.5)	1.4	ND (0.223)	ND	80 (300)	30 (170)	30 (170)	30 (80)
L-1	ND	ND	ND	1.4	0.1	6	800	500	500	17
B-1	ND (ND)	ND (ND)	3.4 (3.4)	0.8	0.1 (ND)	ND	<2 (<2)	<2 (<2)	<2 (<2)	7 (2)
OS-1	ND	ND	ND	0.6	ND	1	800	230	230	23
B-2	ND	ND	0.35	0.8	ND	1	11	11	11	14
OS-2	ND	ND	ND	0.6	ND	1	800	130	130	80
B-3	ND (ND)	0.026 (ND)	1.1 (1.2)	1.1	ND (0.080)	1	23 (4)	13 (4)	13 (4)	4 (8)
OS-3	ND	0.012	ND	0.8	0.1	3	800	170	170	130
B-4	ND (ND)	ND (ND)	ND (ND)	ND	ND (0.046)	ND	2 (<2)	2 (<2)	2 (<2)	<2 (<2)
OS-4	ND	ND	ND	ND	ND	ND	2	2	2	<2
B-5	--	--	--	--	--	--	--	--	--	--
OS-5	--	--	--	--	--	--	--	--	--	--
B-6	--	--	--	--	--	--	--	--	--	--
OS-6	--	--	--	--	--	--	--	--	--	--
B-7	--	--	--	--	--	--	--	--	--	--
OS-7	--	--	--	--	--	--	--	--	--	--
B-8	--	--	--	--	--	--	--	--	--	--
OS-8	--	--	--	--	--	--	--	--	--	--
B-9	--	--	--	--	--	--	--	--	--	--
OS-9	--	--	--	--	--	--	--	--	--	--
B-10	--	--	--	--	--	--	--	--	--	--
OS-10	--	--	--	--	--	--	--	--	--	--
B-11	--	--	--	--	--	--	--	--	--	--
OS-11	--	--	--	--	--	--	--	--	--	--

1. Not Sampled

2. CRWQCB split sample results shown in brackets

3. Not Detected. See Laboratory Report for detection limit.

TABLE 4
LABORATORY RESULTS
NOVEMBER 15, 1999 SAMPLING EVENT

	Ammonia-N (mg/L)	Nitrite-N (mg/L)	Nitrate-N (mg/L)	Total Kjeldahl-N (mg/L)	MBAS (mg/L)	BOD (mg/L)	Total Coliforms (mpn/100ml)	Fecal Coliforms (mpn/100ml)	E. Coli (mpn/100ml)	Enterococci (mpn/100ml)
P-1	ND ¹	0.014	6.4	0.8	ND	ND	<2	<2	<2	<2
P-2	17.9	ND	ND	18.2	2	2	110 (130)	27 (13)	27 (13)	4 (2)
P-6	1.2	0.027	0.14	1.4	ND	1	80 (800)	<2 (<2)	<2 (<2)	4 (7)
P-7	ND	ND	ND	2.5	ND	ND	2	<2	<2	<2
P-9	1.7	ND	ND	1.7	0.2	ND	<2	<2	<2	<2
C-1	7.9	0.012	ND	8.1	ND	1	50	4	4	240
C-2	0.1	ND	ND	2	ND	ND	<2 (<2)	<2 (<2)	<2 (<2)	4 (50)
SD-1	0.1	0.01	1.2	1.4	ND	ND	>16,000	80	80	7
SD-2	23.4	ND	ND	25.2	0.1	70	>16,000 (>16,000)	>16,000 (>16,000)	>16,000 (>16,000)	240 (>1,600)
SD-3	3	0.028	ND	7.3	0.2	2	>16,000	500	500	13
CS-1/CW-1	ND	0.024	3.3	1.1	ND	ND	170	23	23	80
CS-2/CW-2	ND	0.028	3.3	1.1	ND	ND	900	170	170	30
L-1	0.4	0.052	1.1	1.4	ND	2	2,400	2,400	2,400	80
B-1	1.3	ND	12	2	ND	ND	4	<2	<2	12
OS-1	ND	ND	ND	2.3	ND	ND	27	13	13	<2
B-2	ND	ND	ND	1.4	ND	ND	<2	<2	<2	<2
OS-2	ND	ND	ND	0.8	0.1	ND	220	27	27	2
B-3	ND (ND) ²	ND (ND)	ND (ND)	ND	0.2 (0.363)	1	<2 (23)	<2 (13)	<2 (30)	<2 (2)
OS-3	ND (ND)	ND (ND)	ND (ND)	0.8	ND (0.168)	ND	230 (1,100)	130 (170)	130 (60)	23 (2)
B-4	ND	ND	0.12	1.1	ND	ND	23	2	2	<2
OS-4	ND	ND	ND	0.6	ND	ND	<2	<2	<2	<2
B-5	-- ³	--	--	--	--	--	--	--	--	--
OS-5	--	--	--	--	--	--	--	--	--	--
B-6	--	--	--	--	--	--	--	--	--	--
OS-6	--	--	--	--	--	--	--	--	--	--
B-7	--	--	--	--	--	--	--	--	--	--
OS-7	--	--	--	--	--	--	--	--	--	--
B-8	--	--	--	--	--	--	--	--	--	--
OS-8	--	--	--	--	--	--	--	--	--	--
B-9	--	--	--	--	--	--	--	--	--	--
OS-9	--	--	--	--	--	--	--	--	--	--
B-10	--	--	--	--	--	--	--	--	--	--
OS-10	--	--	--	--	--	--	--	--	--	--
B-11	--	--	--	--	--	--	--	--	--	--
OS-11	--	--	--	--	--	--	--	--	--	--

1. Not Detected. See Laboratory Report for detection limit.
2. CRWQCB split sample results shown in brackets
3. Not Sampled

TABLE 5
LABORATORY RESULTS
NOVEMBER 22, 1999 SAMPLING EVENT

	Ammonia-N (mg/L)	Nitrite-N (mg/L)	Nitrate-N (mg/L)	Total Kjeldahl-N (mg/L)	MBAS (mg/L)	BOD (mg/L)	Total Coliforms (mpn/100ml)	Fecal Coliforms (mpn/100ml)	E. Coli (mpn/100ml)	Enterococci (mpn/100ml)
P-1	-- ¹	--	--	--	--	--	--	--	--	--
P-2	13	0.22	0.22	14	0.9	2	800 (60) ³	800 (60)	<2 (4)	13 (<2)
P-6	0.6	0.058	0.1	1.4	ND	2	17 (13)	17 (2)	<2 (2)	4 (<2)
P-7	ND ²	0.014	ND	0.8	ND	ND	<2	<2	<2	2
P-9	2	0.011	0.12	2.5	0.1	ND	<2 (<2)	<2 (<2)	<2 (<2)	<2 (<2)
C-1	7	0.011	ND	8	ND	ND	23 (<2)	<2 (<2)	<2 (<2)	<2 (4)
C-2	0.2	ND	ND	0.8	ND	ND	<2	<2	<2	2
SD-1	ND	ND	0.94	ND	0.2	ND	9000	70	70	240
SD-2	20	ND	0.11	46	0.2	146	>16,000 (>16,000)	>16,000 (>16,000)	>16,000 (>16,000)	>1,600 (900)
SD-3	3.6	0.052	ND	7.3	0.8	20	>16,000	>2,400	>2,400	7
CS-1/CW-1	ND	ND	1.9	0.8	ND	ND	230	80	80	23
CS-2/CW-2	ND	0.012	1.8	ND	ND	ND	700	170	130	240
L-1	ND	0.018	0.68	ND	ND	ND	900	900	800	13
B-1	ND	ND	0.57	2.4	ND	ND	<2	<2	<2	<2
OS-1	ND	ND	ND	0.8	ND	4	170	170	170	130
B-2	ND	ND	ND	ND	ND	ND	<2	<2	<2	<2
OS-2	ND	ND	ND	ND	ND	ND	130	130	130	18
B-3	ND	ND	0.13	ND	ND	ND	23	23	23	240
OS-3	ND	ND	0.37	ND	ND	ND	300	300	300	240
B-4	ND	ND	0.1	ND	ND	1	80	6	<2	8
OS-4	ND	ND	0.11	2.5	0.1	24	800	800	800	13
B-5	--	--	--	--	--	--	--	--	--	--
OS-5	--	--	--	--	--	--	--	--	--	--
B-6	--	--	--	--	--	--	--	--	--	--
OS-6	--	--	--	--	--	--	--	--	--	--
B-7	--	--	--	--	--	--	--	--	--	--
OS-7	--	--	--	--	--	--	--	--	--	--
B-8	--	--	--	--	--	--	--	--	--	--
OS-8	--	--	--	--	--	--	--	--	--	--
B-9	ND	ND	ND	ND	ND	ND	<2	<2	<2	2
OS-9	ND	ND	ND	ND	ND	ND	42	4	4	<2
B-10	0.1	ND	ND	0.5	ND	ND	<2 (<2)	<2 (<2)	<2 (<2)	4 (13)
OS-10	ND	ND	0.11	ND	ND	ND	70 (41)	50 (14)	50 (14)	23 (23)
B-11	ND	ND	ND	ND	ND	ND	3,000 (3,000)	2,400 (800)	2,400 (800)	300 (240)
OS-11	ND	ND	ND	ND	ND	ND	13 (2)	13 (2)	13 (2)	80 (8)

1. Not Sampled
2. Not Detected. See Laboratory Report for detection limit.
3. CRWQCB split sample results shown in brackets

TABLE 6

**LABORATORY RESULTS
NOVEMBER 29, 1999 SAMPLING EVENT**

	Ammonia-N (mg/L)	Nitrite-N (mg/L)	Nitrate-N (mg/L)	Total Kjeldahl-N (mg/L)	MBAS (mg/L)	BOD (mg/L)	Total Coliforms (mpn/100ml)	Fecal Coliforms (mpn/100ml)	E. Coli (mpn/100ml)	Enterococci (mpn/100ml)
P-1	ND ¹	0.014	3.1	ND	ND	ND	<2	<2	<2	<2
P-2	8.5	0.059	ND	9.5	1.2	1	<2	<2	<2	30
P-6	1.6	0.046	ND	2	0.1	5	23 ² (<2) ⁴	<2 (<2)	<2 (<2)	100 (220)
P-7	ND	0.018	ND	ND	0.1	ND	<2	<2	<2	23
P-9	2.2	ND	ND	3.4	0.4	1	4 (<2)	<2 (<2)	<2 (<2)	50 (23)
C-1	6.8	ND	ND	7	0.1	ND	<2 (<2)	<2 (<2)	<2 (<2)	13 (13)
C-2	0.3	ND	ND	0.6	ND	ND	<2 (<2)	<2 (<2)	<2 (<2)	23 (23)
SD-1	ND	ND	0.73	0.8	ND	ND	16,000	300	300	500
SD-2	27.6	ND	ND	50	0.1	536	16,000 (>16,000)	1,300 (>16,000)	,300 (>16,000)	>1,600 (>1,600)
SD-3	4.6	ND	ND	7	0.8	3	16,000	800	800	900
CS-1/CW-1	ND	0.013	1.4	ND	ND	ND	500	500	500	17
CS-2/CW-2	ND	0.01	1.6	ND	ND	ND	2,300	300	300	30
L-1	ND	0.021	0.98	0.8	ND	ND	110	110	110	>1,600
B-1	ND	ND	ND	ND	0.4	ND	<2	<2	<2	240
OS-1	ND	ND	ND	ND	ND	ND	110	110	110	2
B-2	ND	ND	ND	ND	0.2	ND	<2	<2	<2	<2
OS-2	ND	ND	ND	ND	ND	ND	170	20	20	20
B-3	ND	ND	ND	ND	ND	ND	800	140	140	23
OS-3	ND	ND	0.16	ND	ND	ND	2,300	2,300	2,300	70
B-4	ND	ND	ND	ND	ND	ND	<2	<2	<2	4
OS-4	ND	ND	ND	ND	ND	ND	2 (<2)	2 (<2)	2 (<2)	<2 (2)
B-5	-- ³	--	--	--	--	--	--	--	--	--
OS-5	--	--	--	--	--	--	--	--	--	--
B-6	--	--	--	--	--	--	--	--	--	--
OS-6	--	--	--	--	--	--	--	--	--	--
B-7	--	--	--	--	--	--	--	--	--	--
OS-7	--	--	--	--	--	--	--	--	--	--
B-8	--	--	--	--	--	--	--	--	--	--
OS-8	--	--	--	--	--	--	--	--	--	--
B-9	ND	ND	ND	ND	ND	ND	50	50	50	4
OS-9	ND	ND	ND	ND	ND	ND	<2	<2	<2	<2
B-10	ND	ND	0.8	ND	0.1	ND	<2	<2	<2	170
OS-10	ND	ND	ND	2.2	0.2	ND	<2	<2	<2	<2
B-11	ND	ND	ND	ND	0.1	ND	8,000 (2,300)	2,400 (800)	2,400 (800)	240 (80)
OS-11	ND	ND	ND	ND	ND	ND	<2 (<2)	<2 (<2)	<2 (<2)	30 (<2)

1. Not Detected. See Laboratory Report for detection limit.

2. P-6 Total Coliform result initially reported as 30, however correct result is 23. Laboratory to re-issue report (Silliker Laboratories pers. com.)

3. Not Sampled

4. CRWQCB split sample results shown in brackets

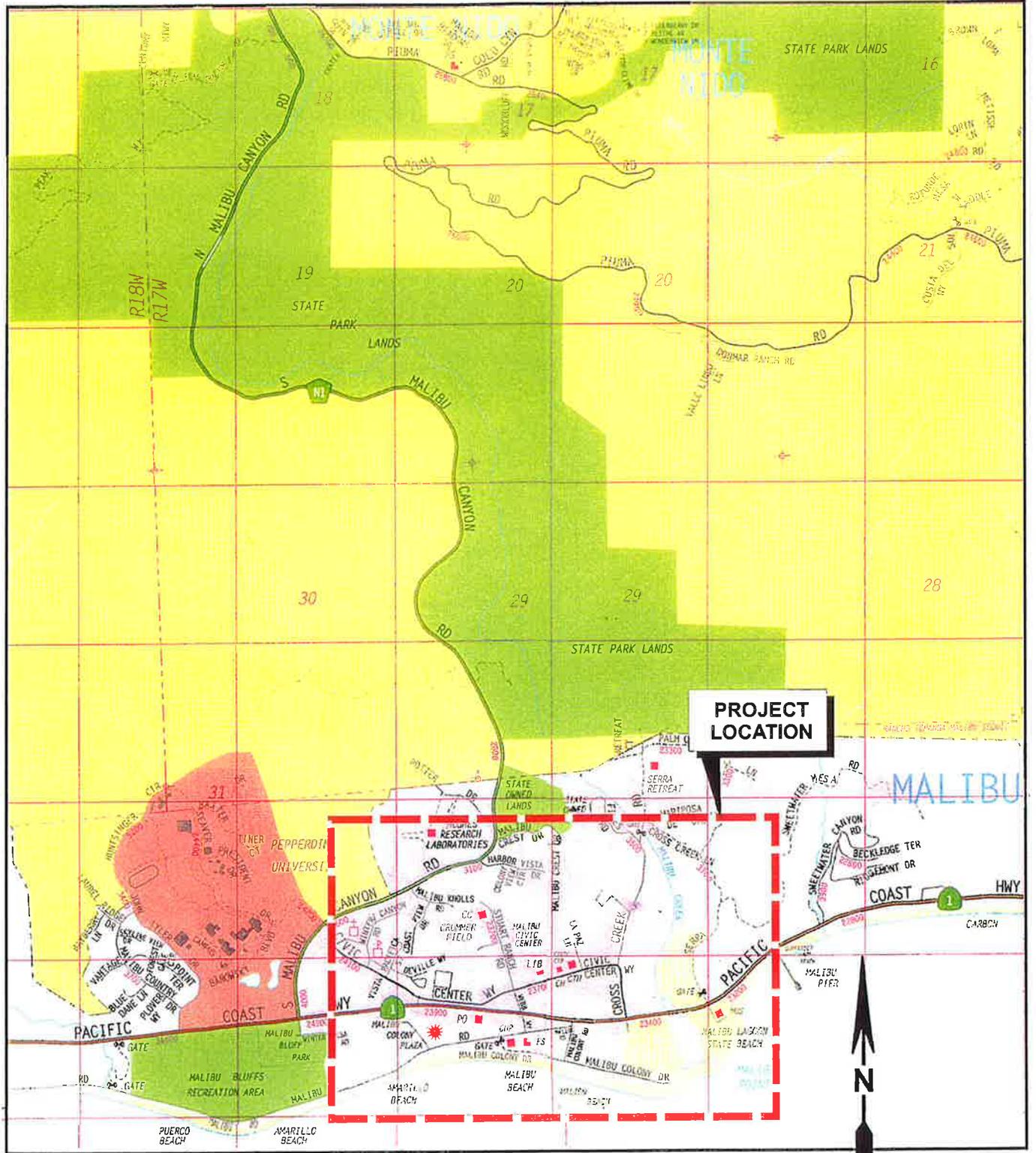
TABLE 7

**LABORATORY RESULTS OF SEDIMENT SAMPLES
COLLECTED SEPTEMBER 2, 1999**

	OF-1 ⁽¹⁾	OF-2	OF-3
Ammonia-N (mg/kg)	14	62	59
TKN (mg/kg)	154	784	504
Nitrate-N (mg/kg)	0.6	ND ⁽²⁾	ND
Nitrite-N (mg/kg)	0.66	ND	ND
BOD (mg/kg)	11	2020	1050
MBAS (mg/kg)	ND	1.9	1.4
Coliforms (MPN Coliforms/g)	<3	230	930
Fecal Coliforms (MPN Fecal Coliforms/g)	<3	23	15

Notes: (1) Sample sites OF-1, OF-2, & OF-3 are at the same location as SD-1, SD-2, & SD-3

(2) Not Detected. See laboratory report for detection limit



SITE LOCATION MAP

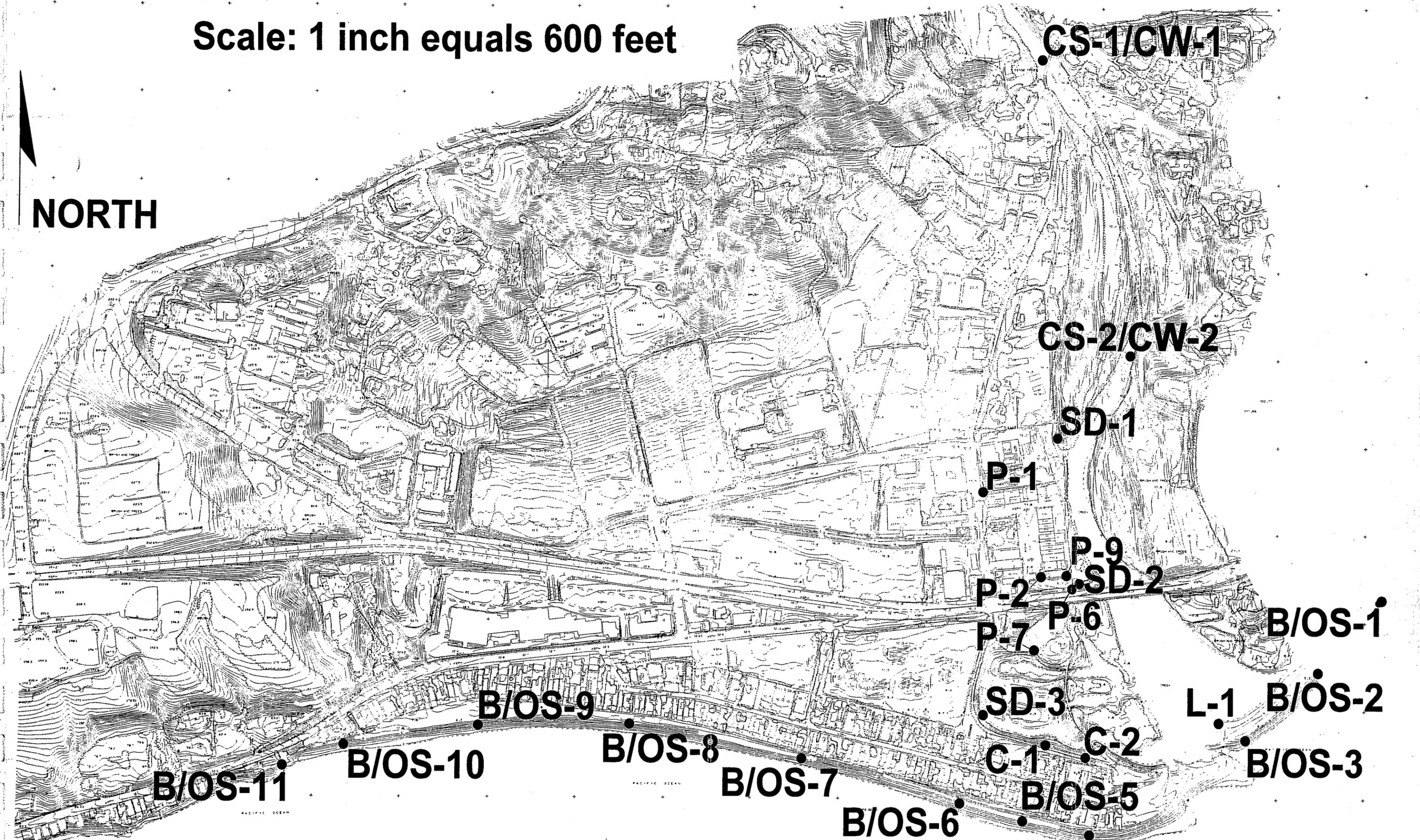
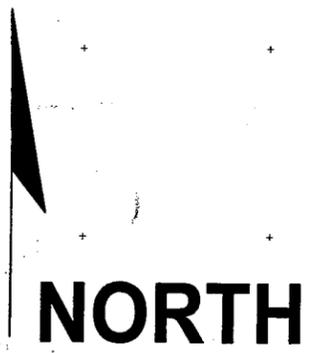
Project No.: 5709912032

Date: FEBRUARY 2000

Project: MALIBU WATER QUALITY STUDY

Fig. 1

Scale: 1 inch equals 600 feet



Malibu Water Quality Study Area

B/OS-4

FIGURE 2

FIGURE 3

Correlation of Indicator Bacteria Results

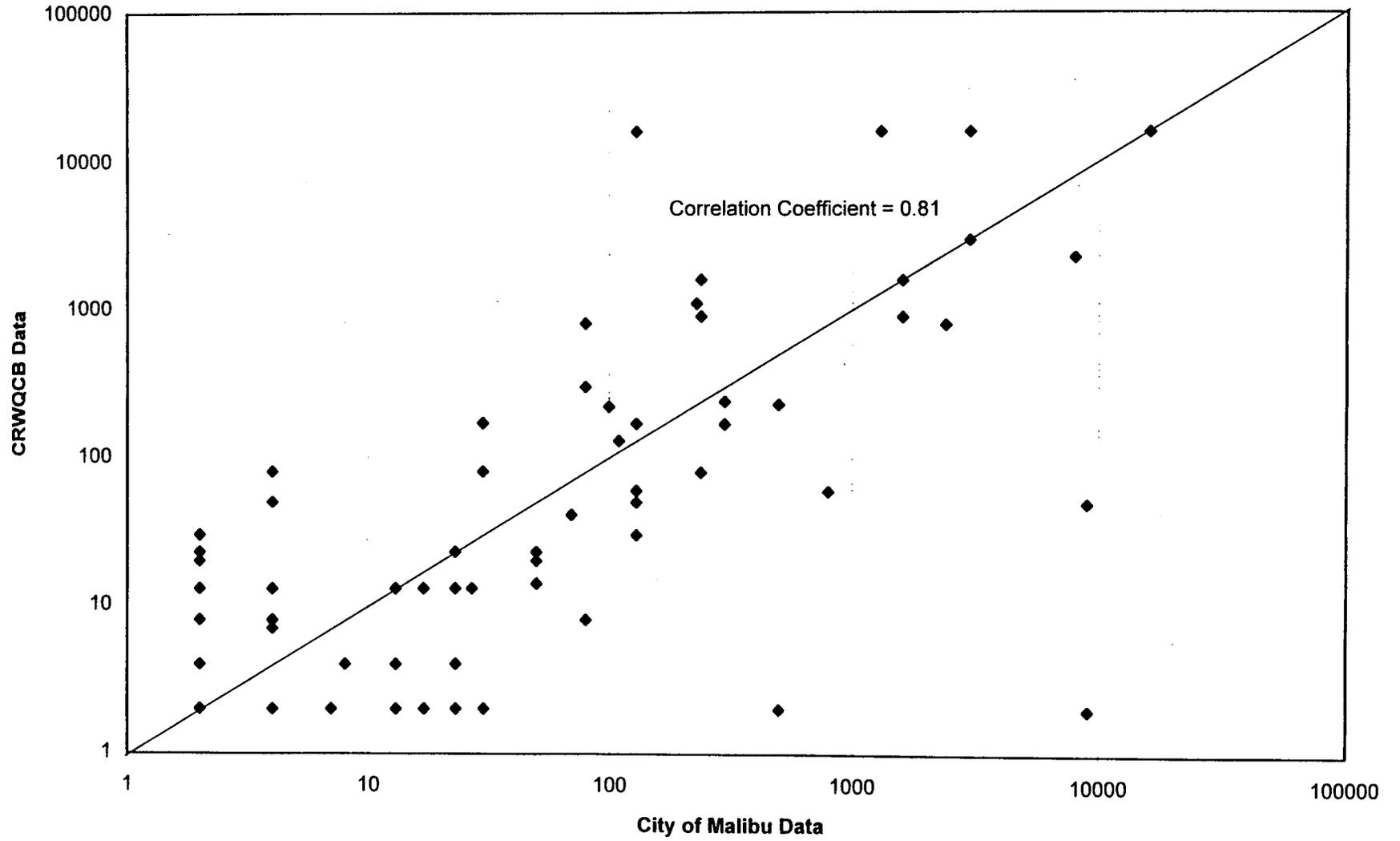
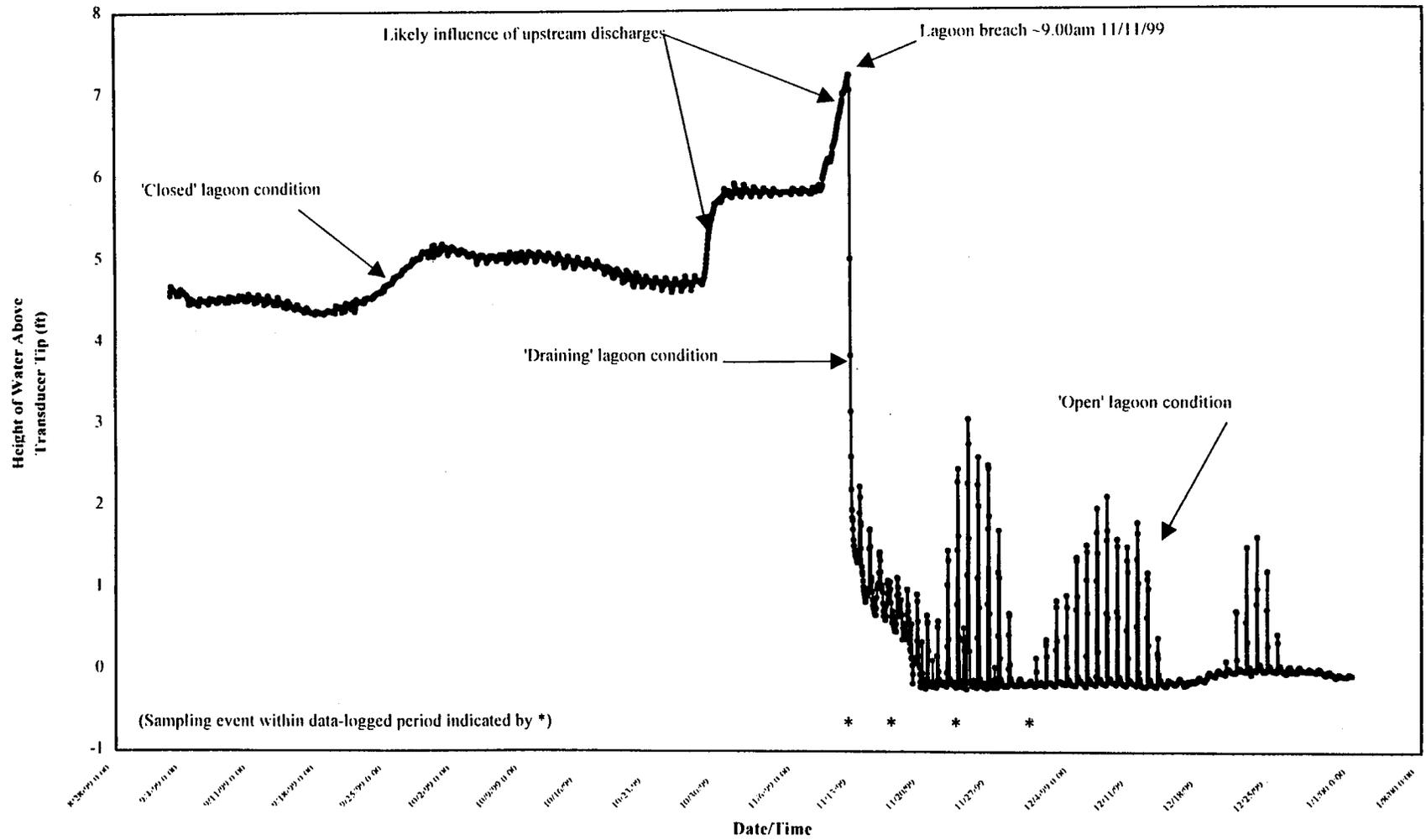


FIGURE 4

Malibu Lagoon Water Level at Malibu Bridge



Note Transducer tip approximately 1.6 ft above bottom of Lagoon
At readings less than zero water level is below transducer tip

FIGURE 6

Groundwater Level Monitoring at C-1

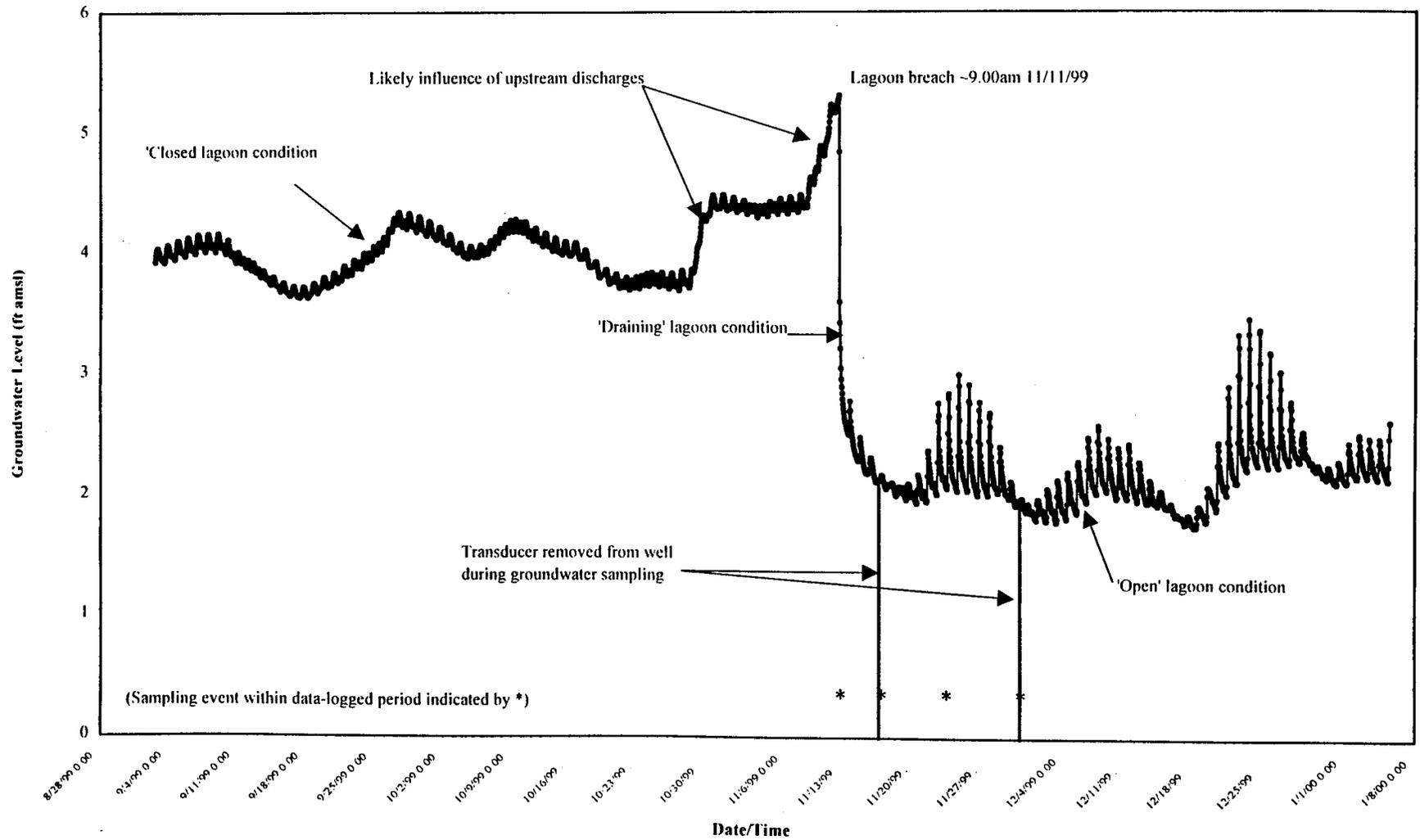


FIGURE 7

SAMPLE SITE WELL P-1

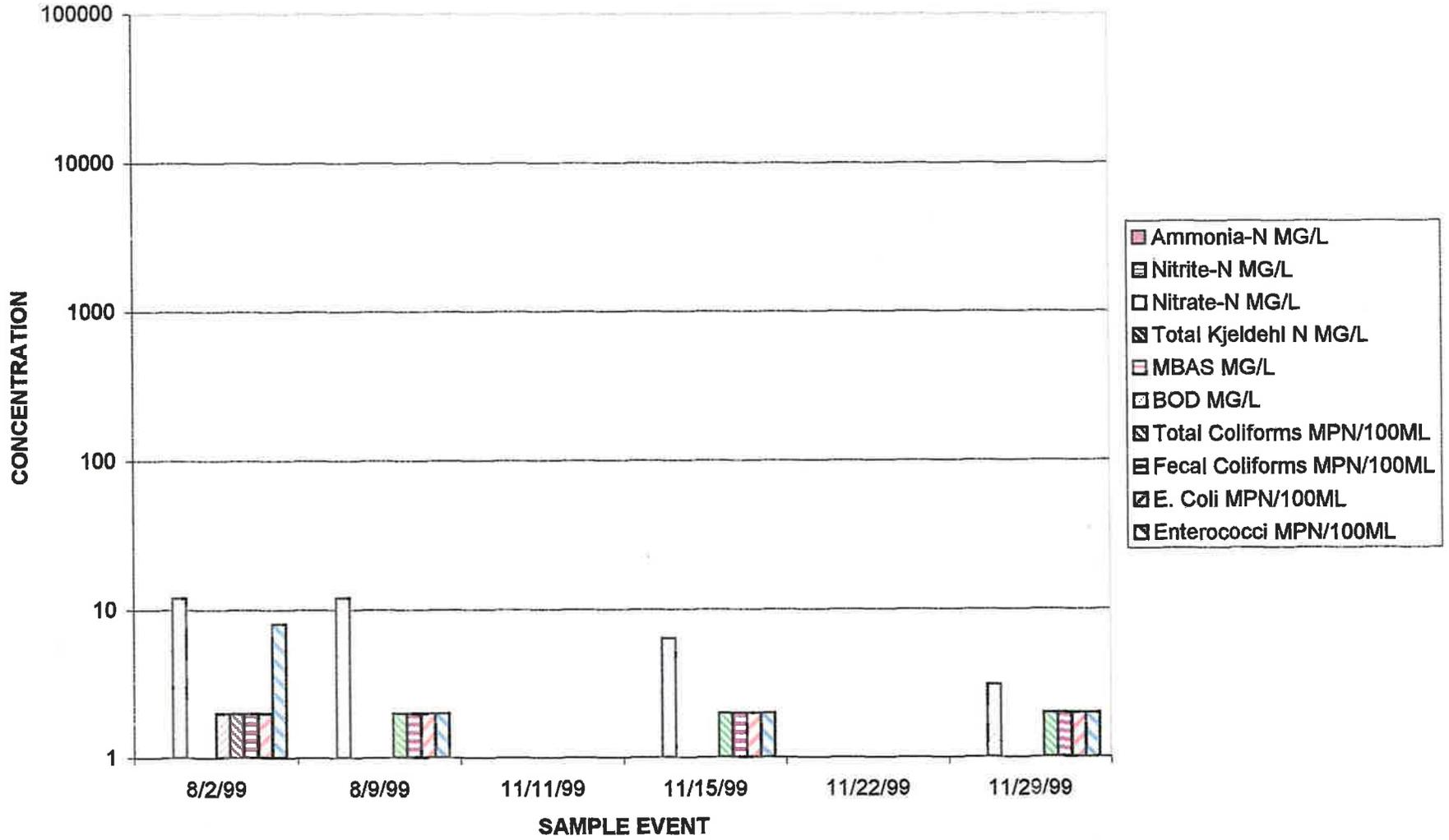


FIGURE 8

SAMPLE SITE WELL P-2

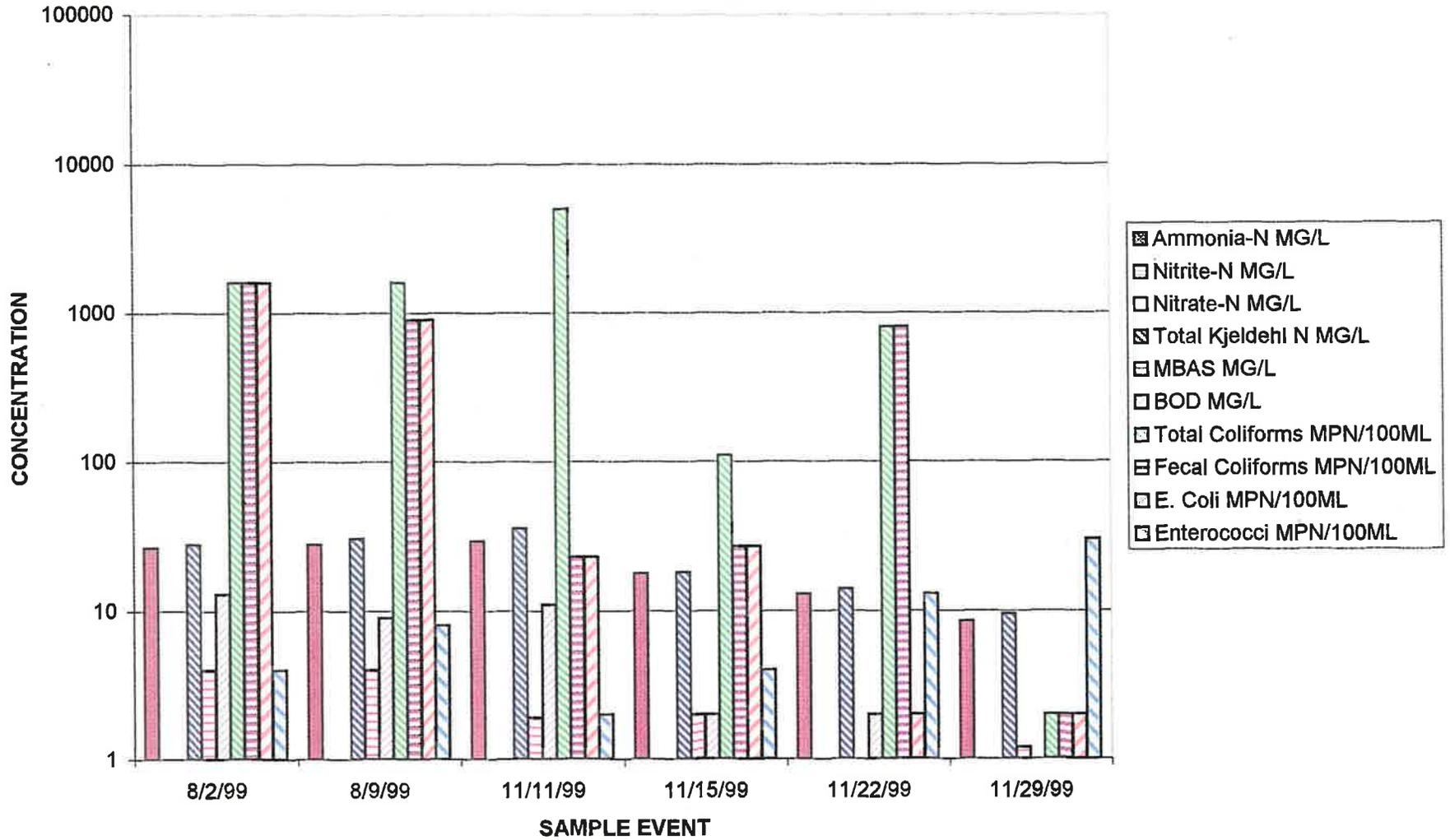


FIGURE 9

SAMPLE SITE WELL P-6

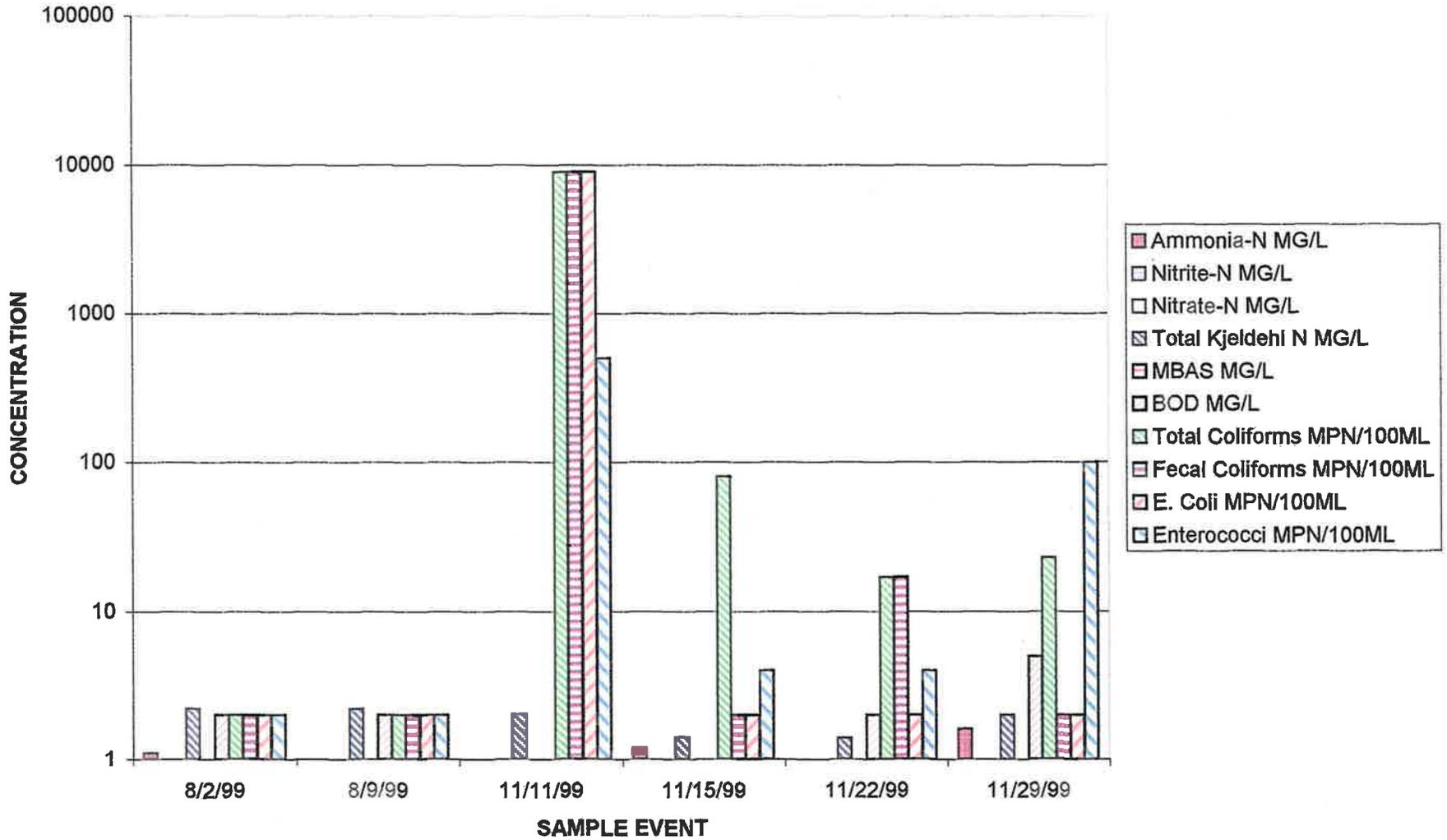


FIGURE 11

SAMPLE SITE WELL P-9

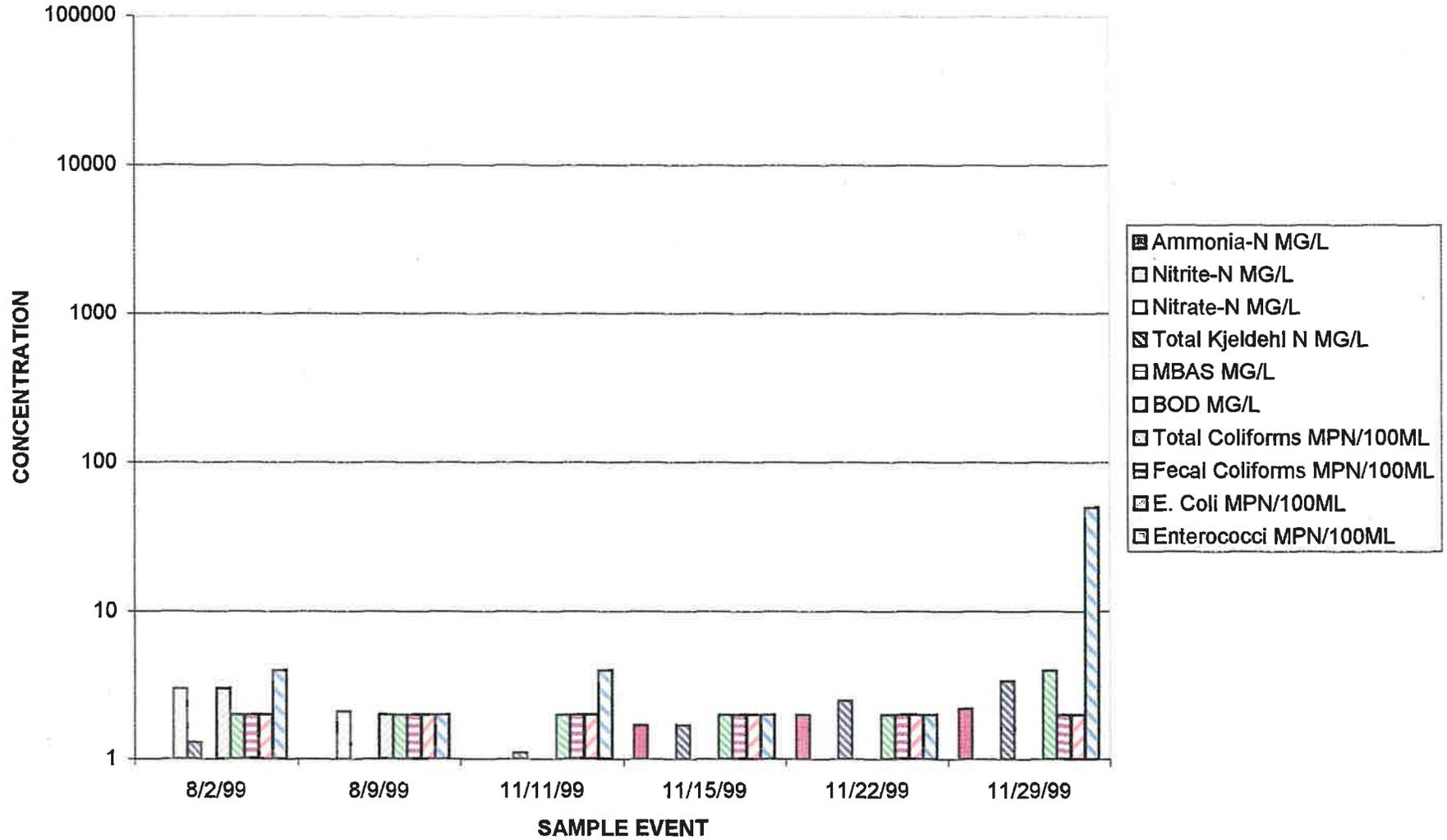


FIGURE 12

SAMPLE SITE WELL C-1

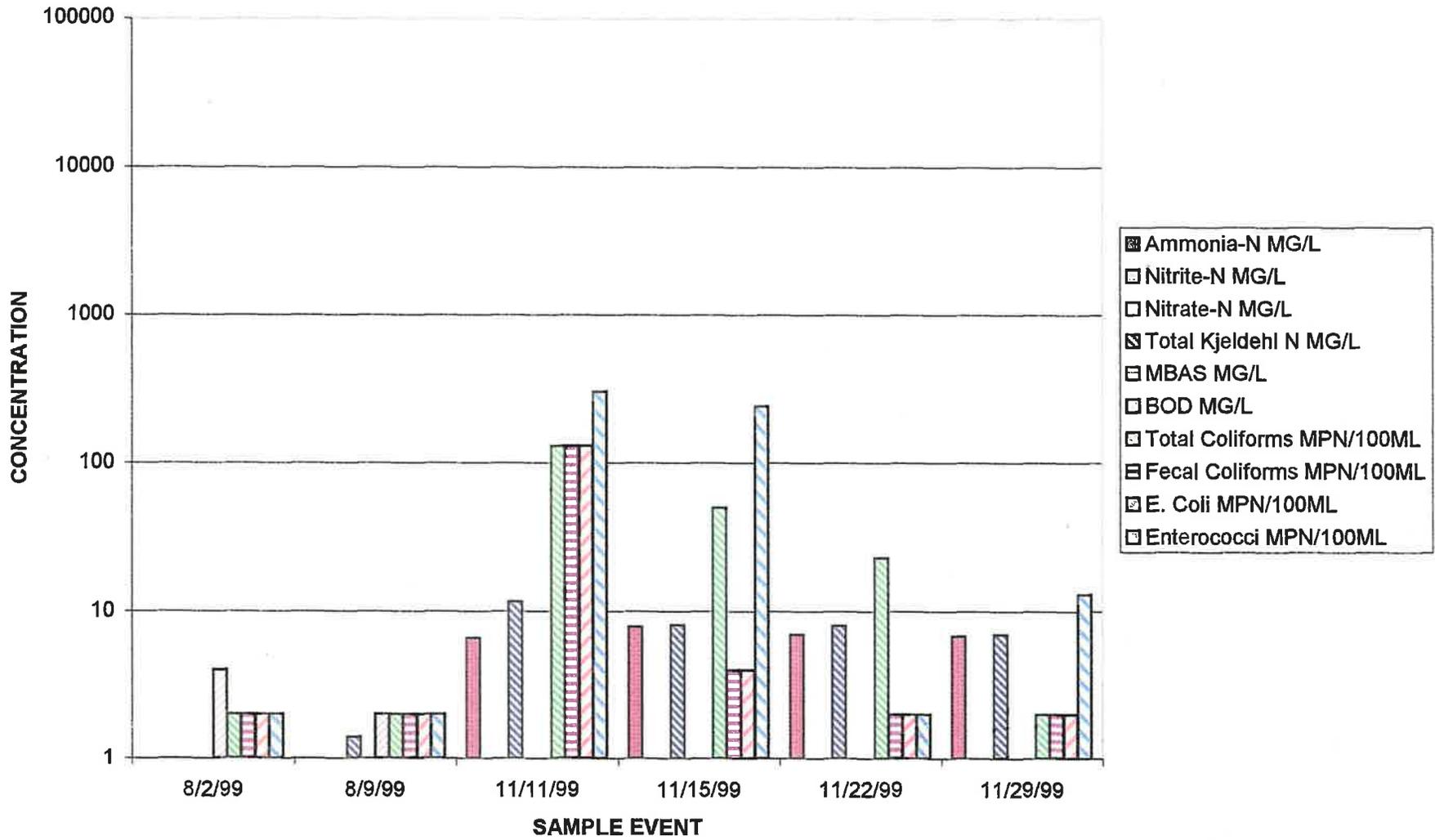


FIGURE 14

SAMPLE SITE B-1

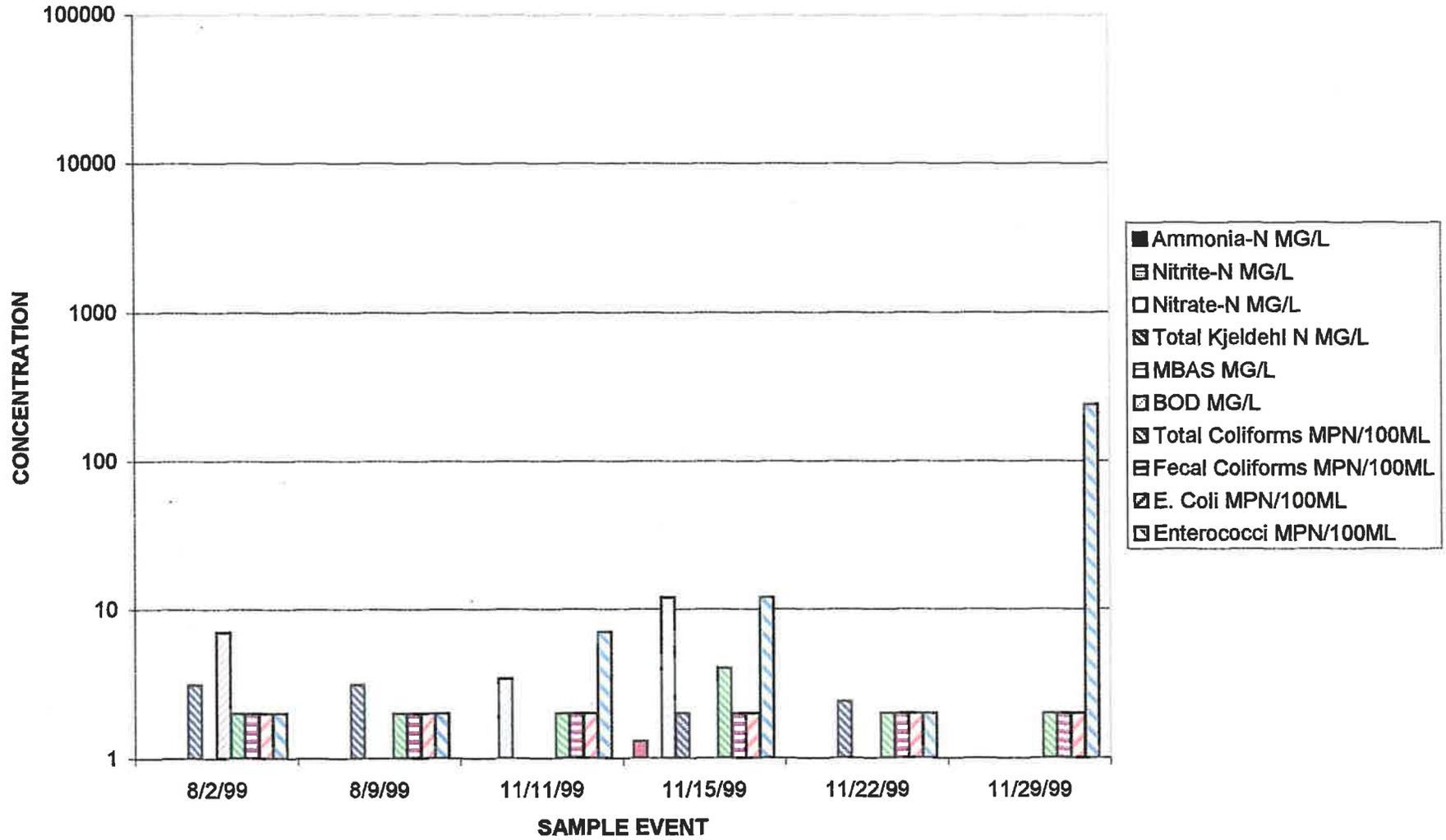


FIGURE 19

SAMPLE SITE B-6

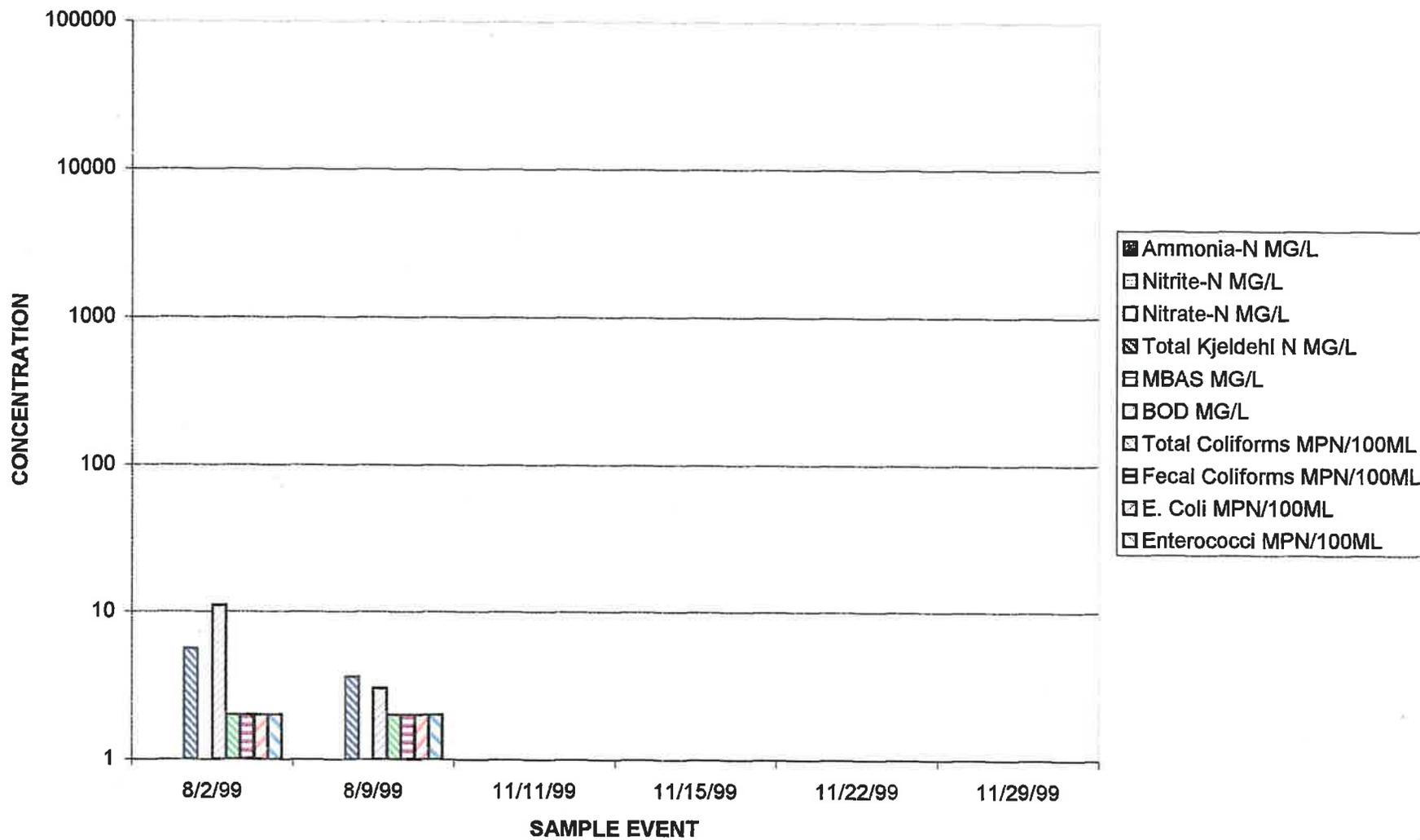


FIGURE 20

SAMPLE SITE B-7

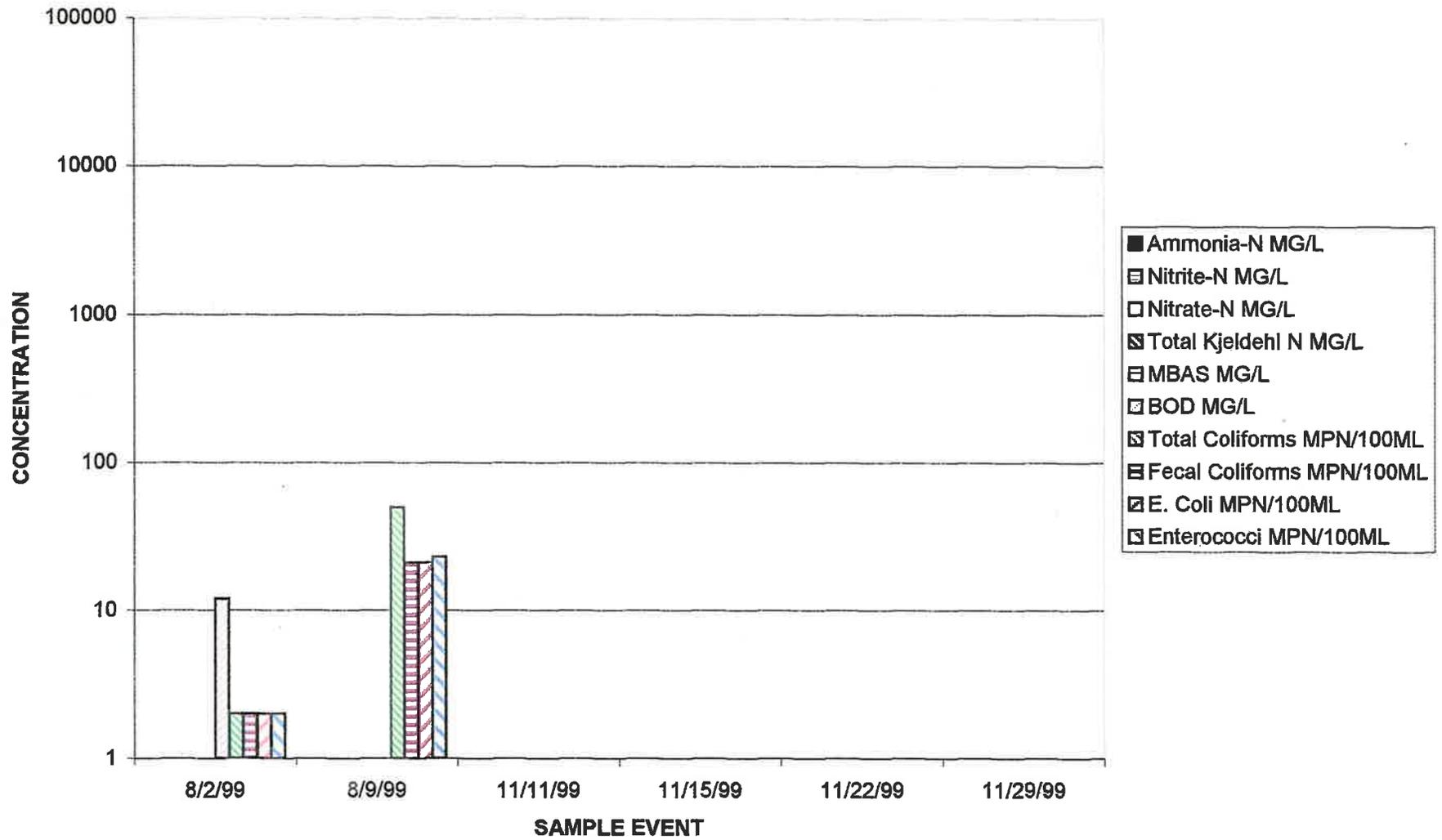


FIGURE 22

SAMPLE SITE B-9

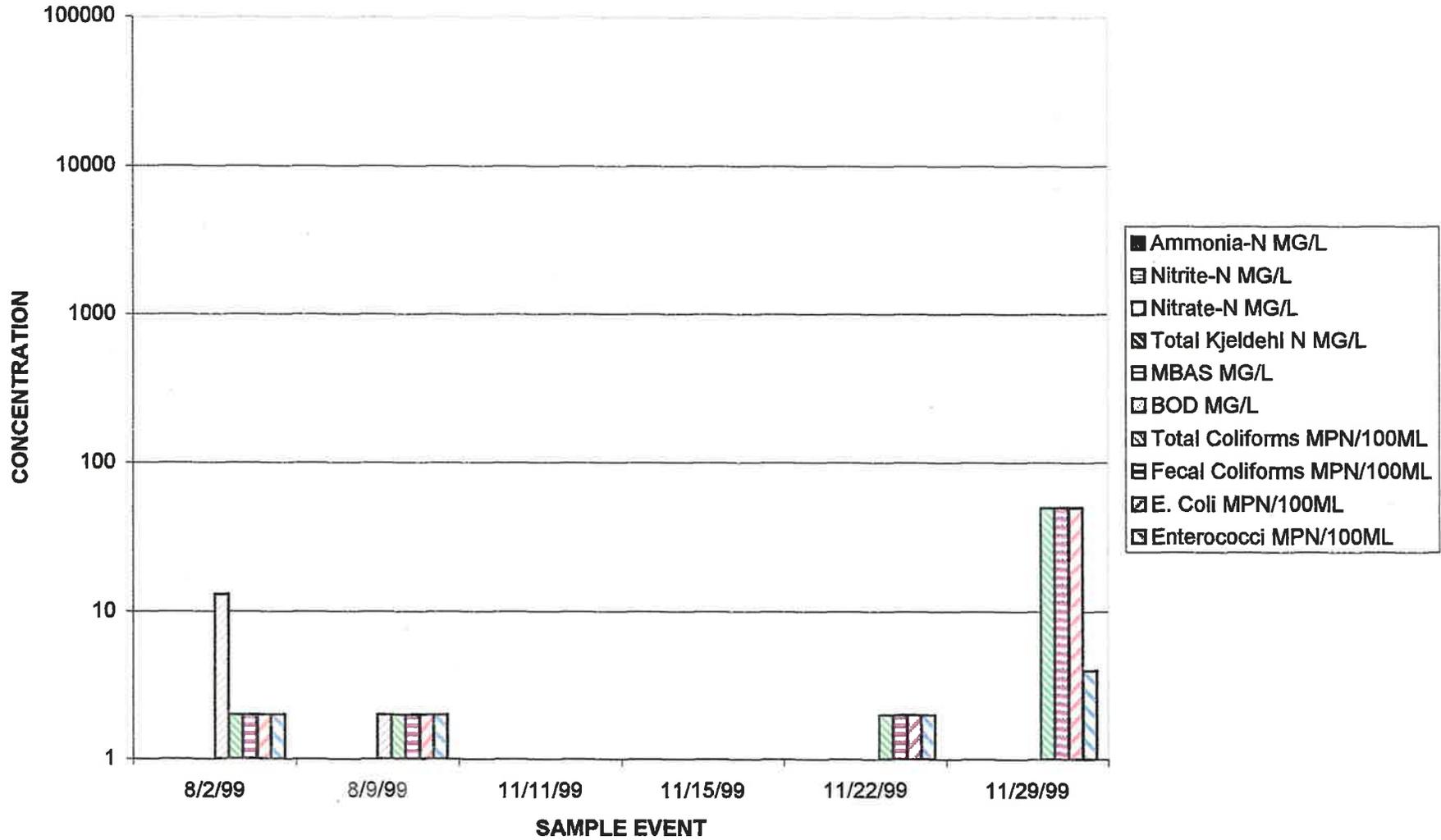


FIGURE 23

SAMPLE SITE B-10

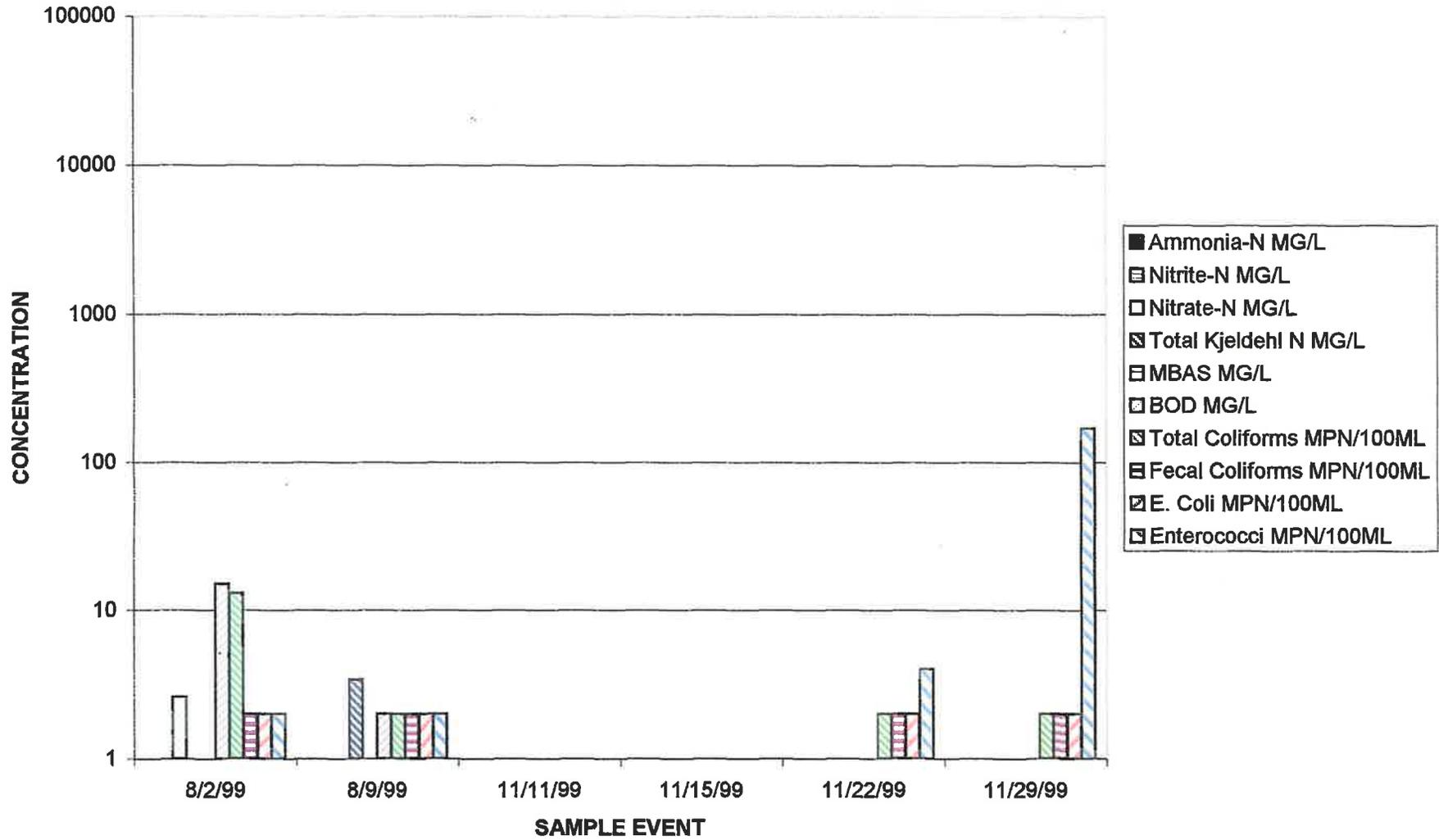


FIGURE 24

SAMPLE SITE B-11

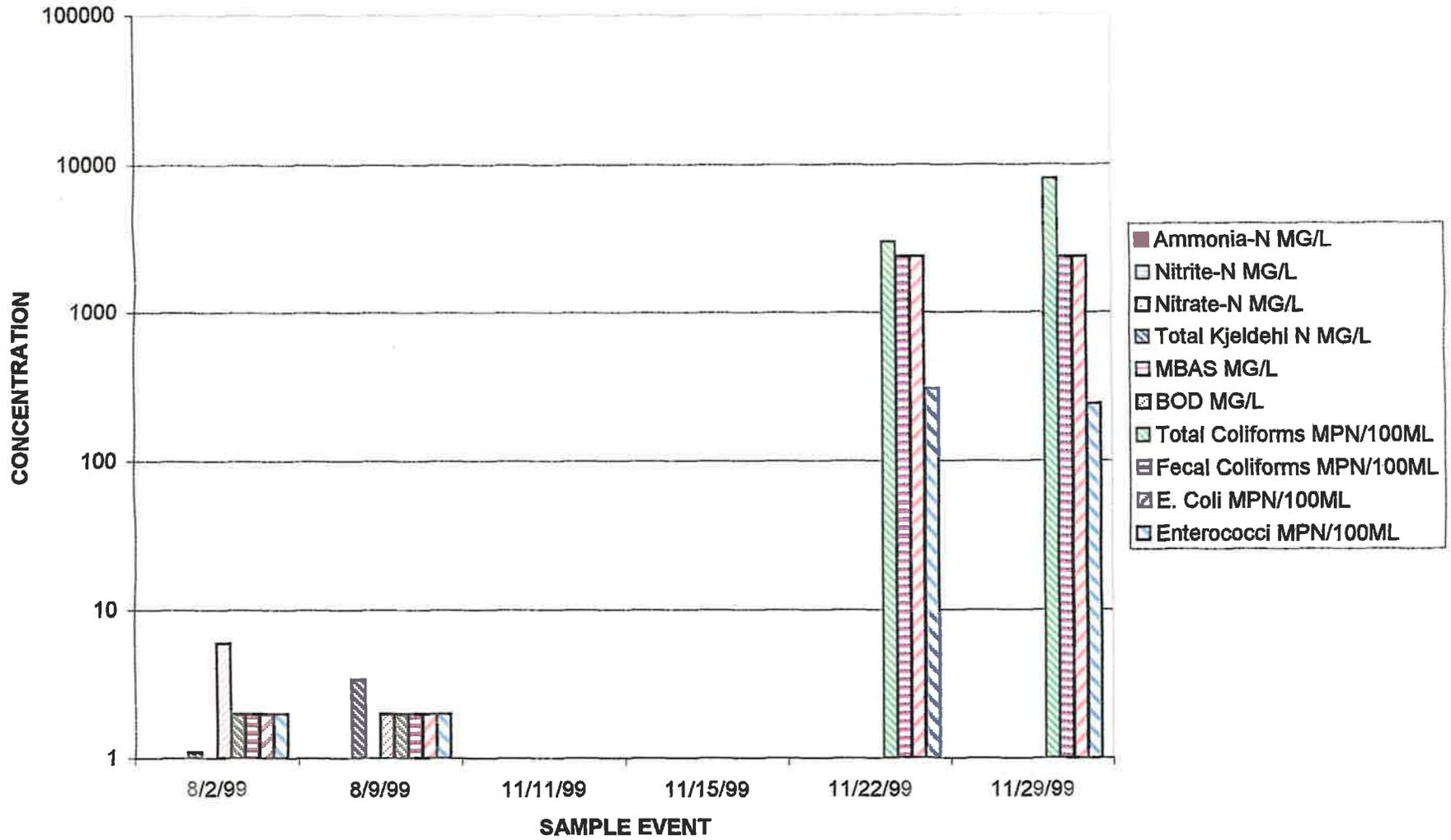


FIGURE 25

SAMPLE SITE CS-1/CW-1

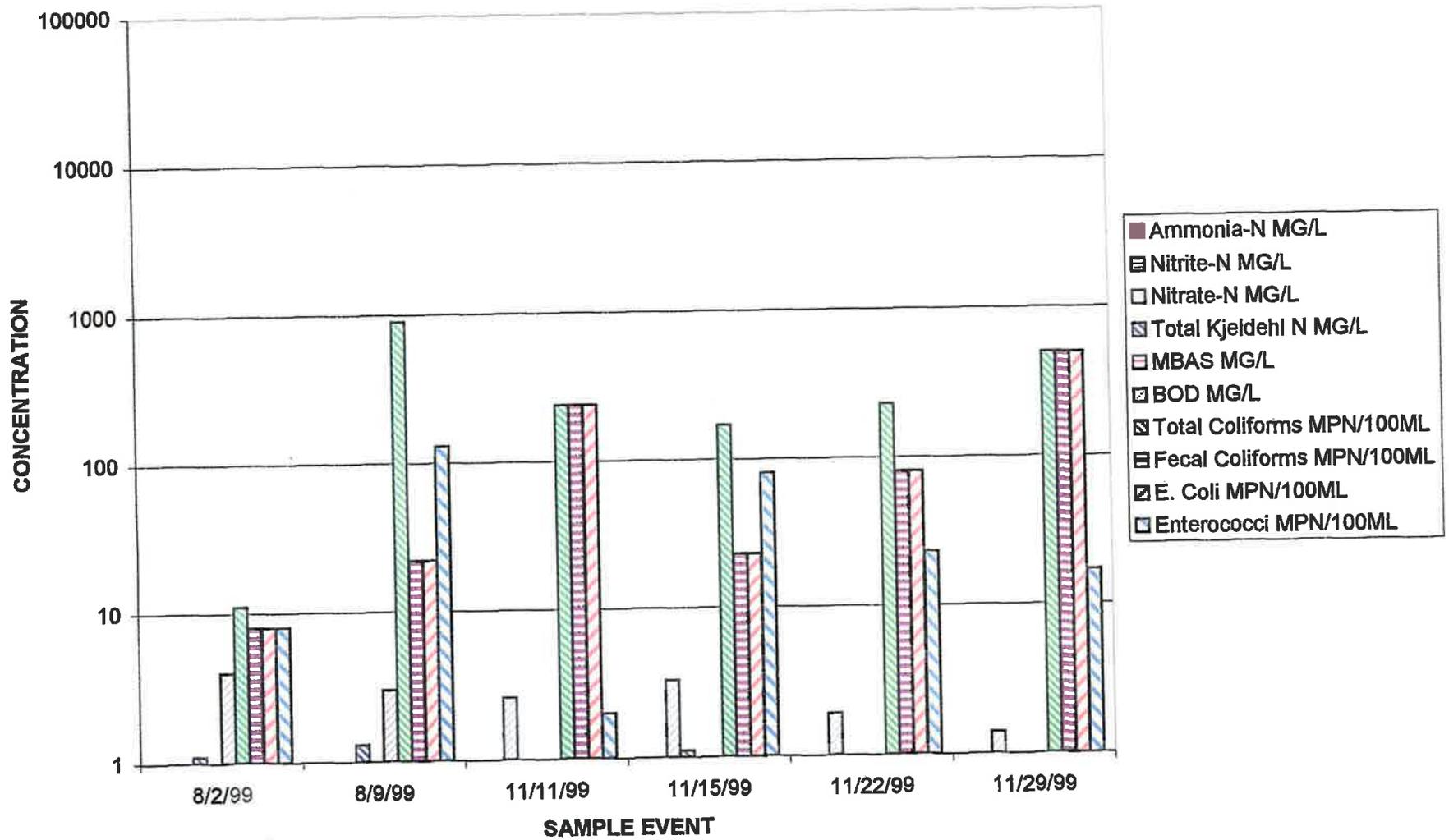


FIGURE 26

SAMPLE SITE CS-2/CW-2

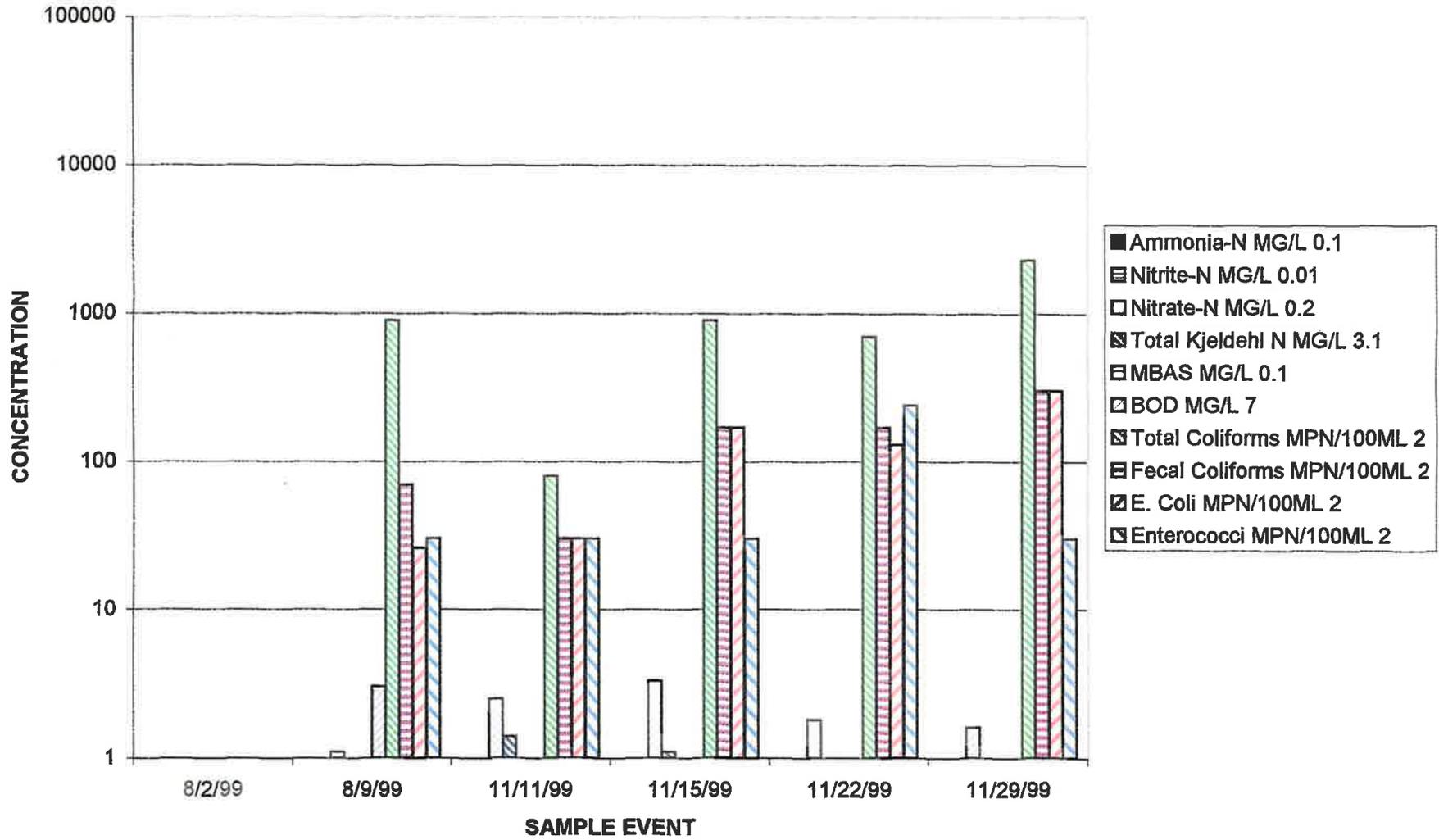


FIGURE 27

SAMPLE SITE SD-1

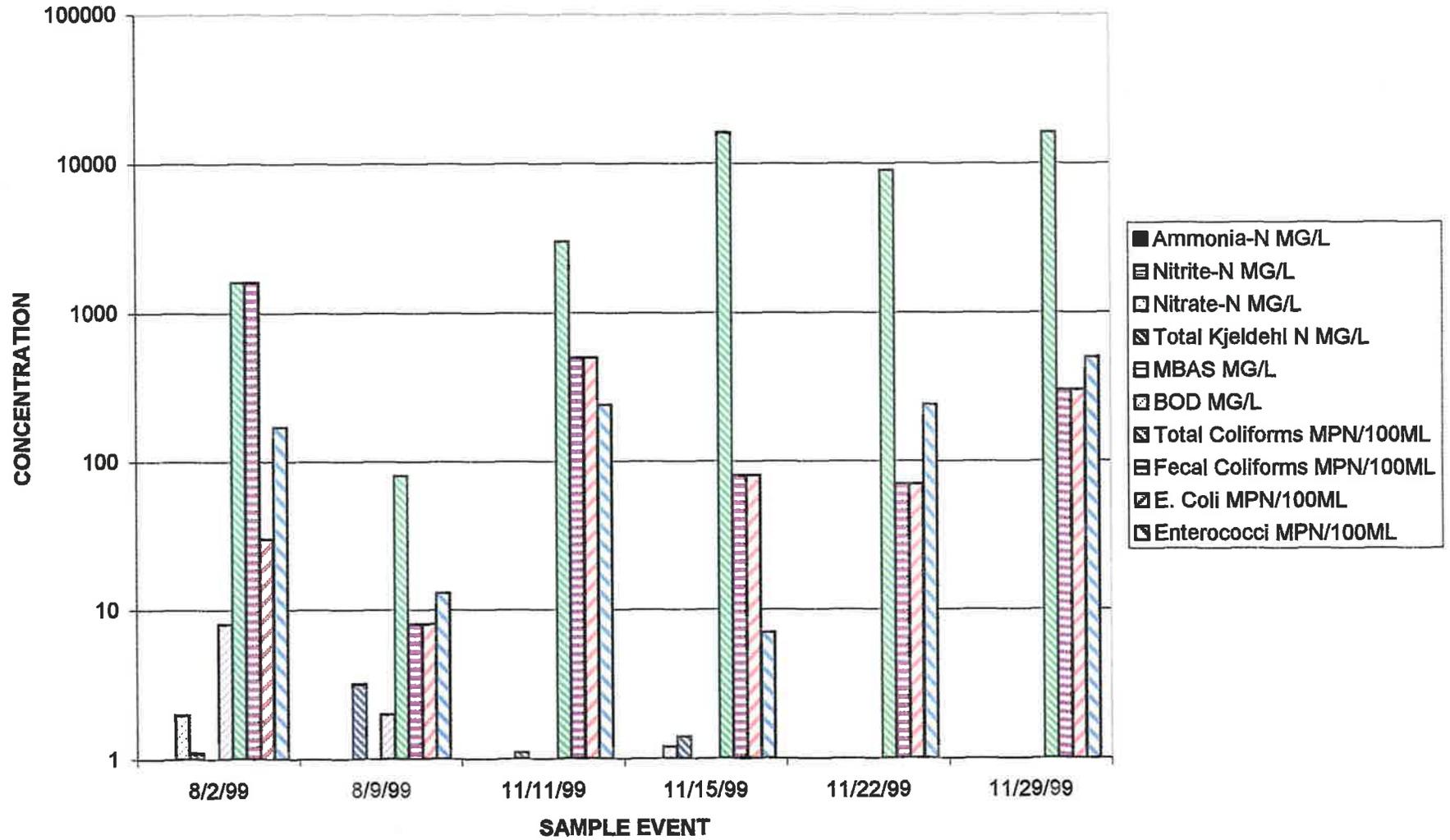


FIGURE 28

SAMPLE SITE SD-2

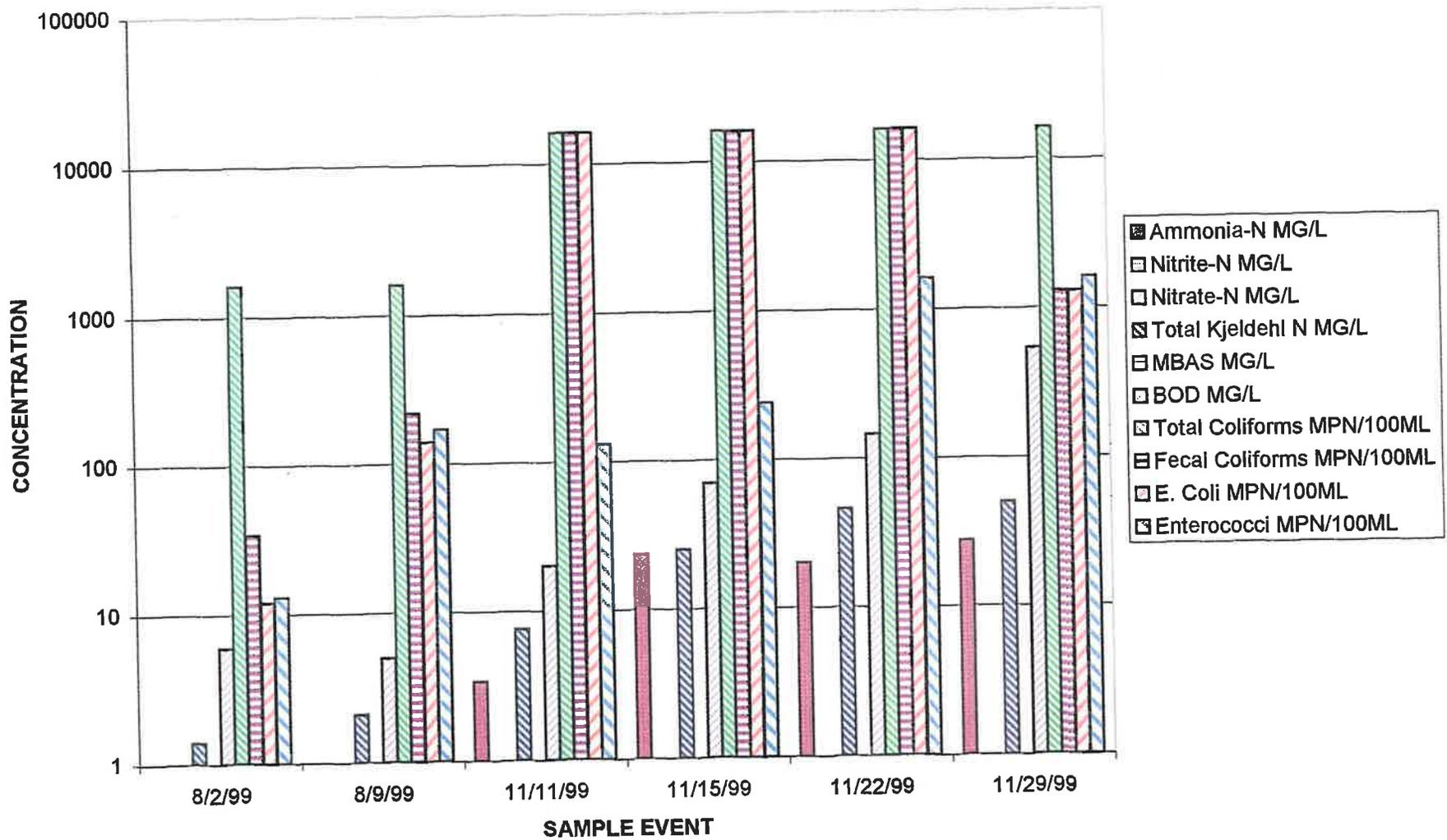


FIGURE 29

SAMPLE SITE SD-3

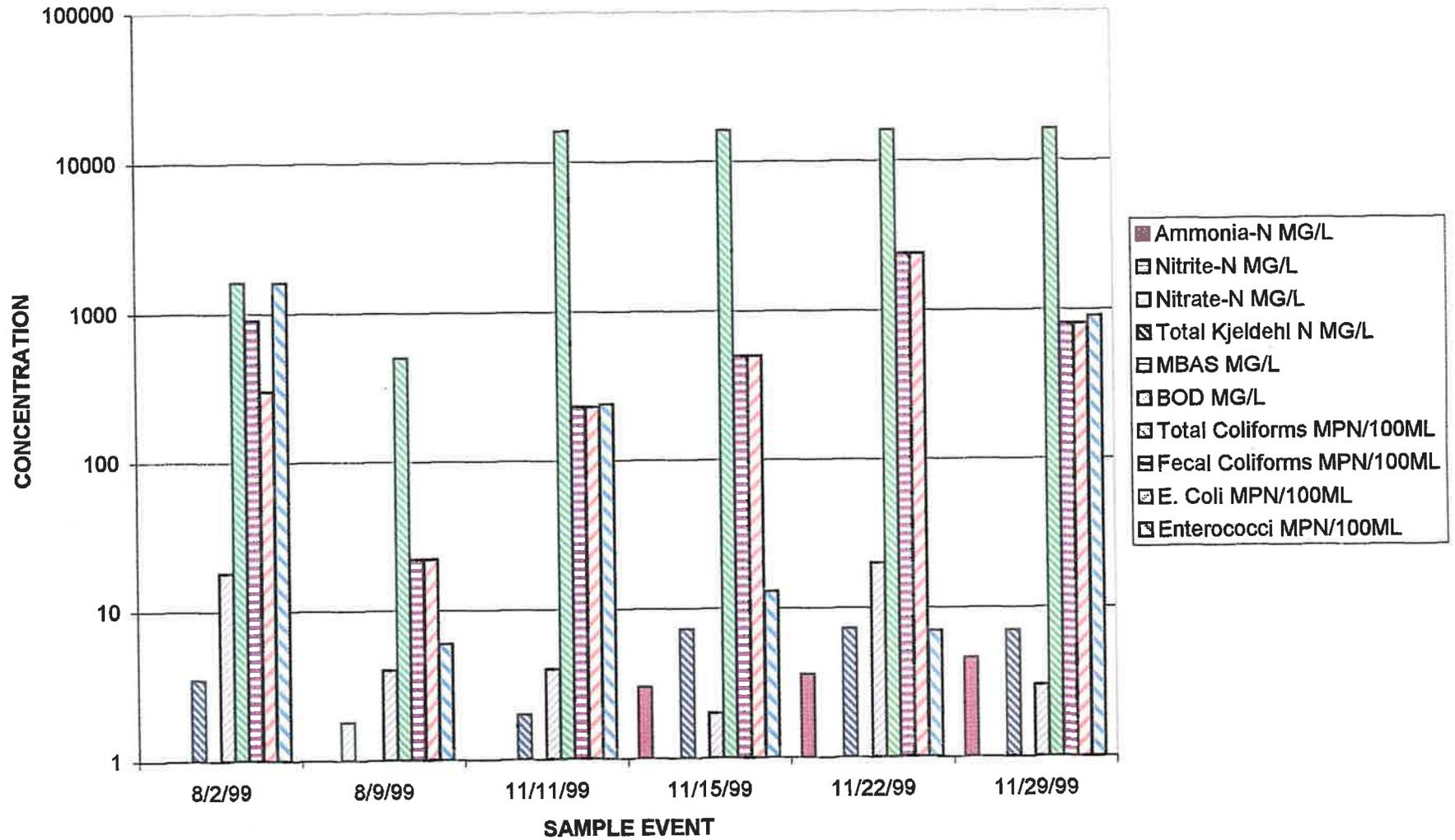


FIGURE 31

SAMPLE SITE OS-1

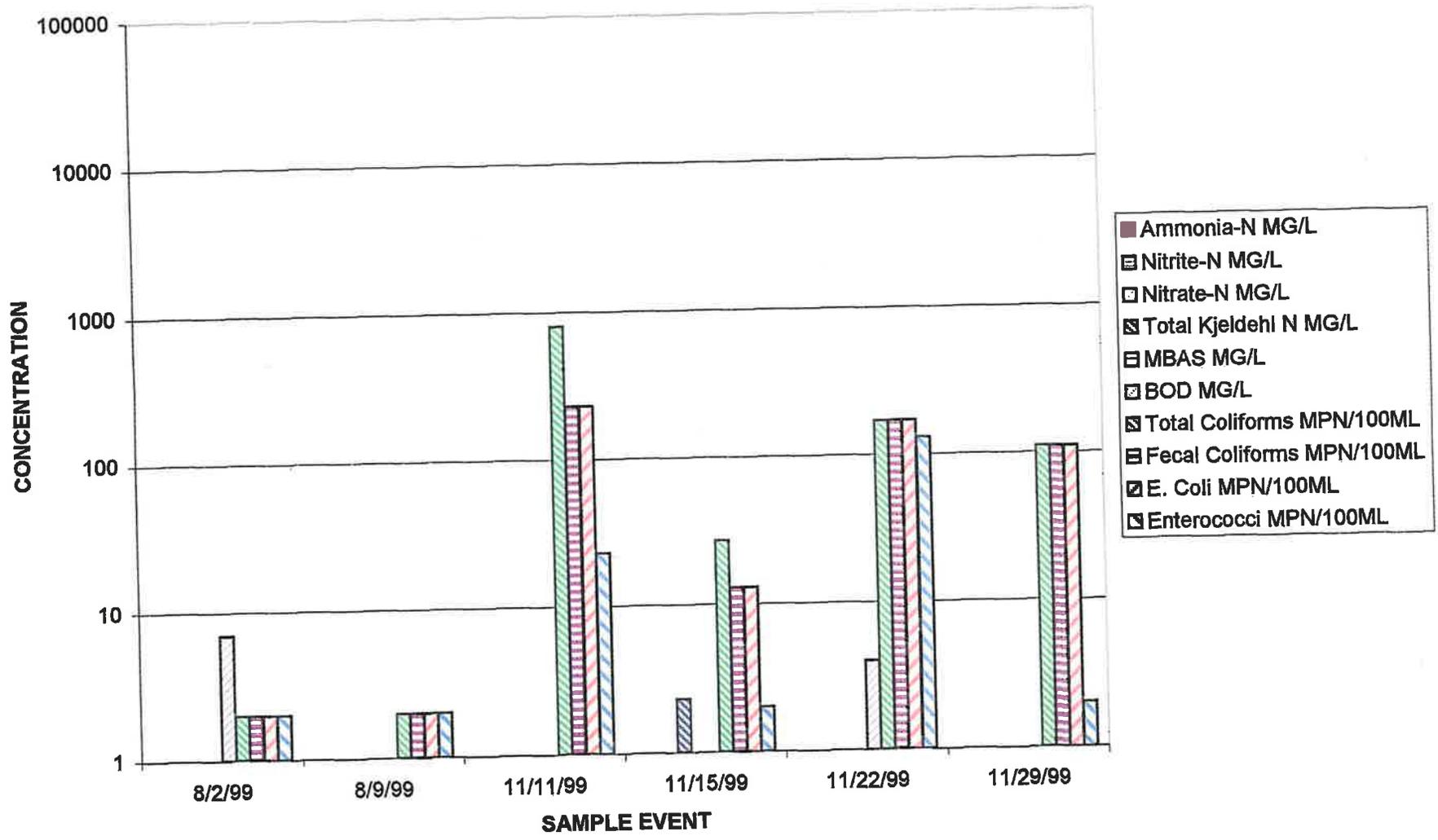


FIGURE 33

SAMPLE SITE OS-3

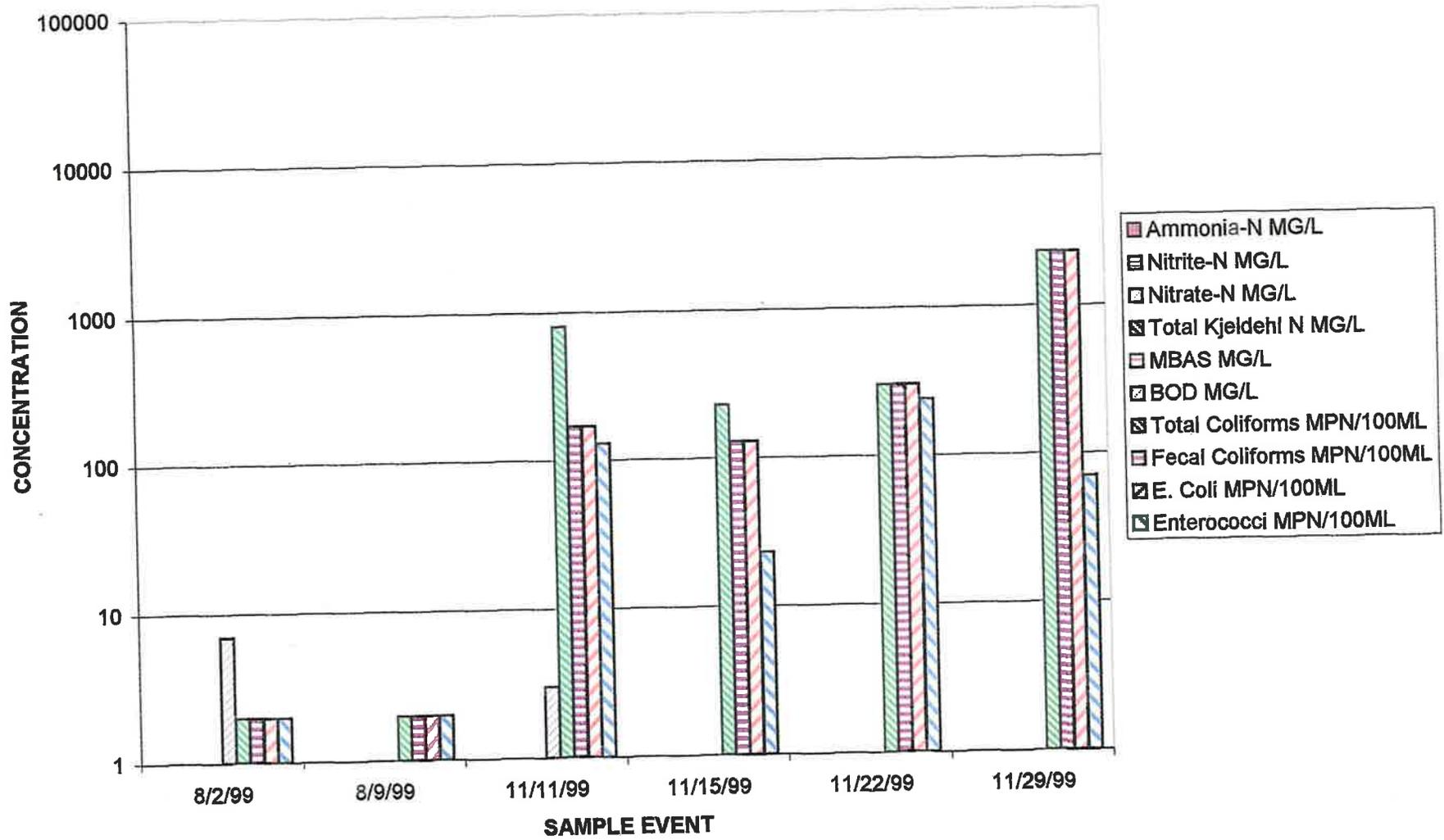


FIGURE 42

FECAL COLIFORMS

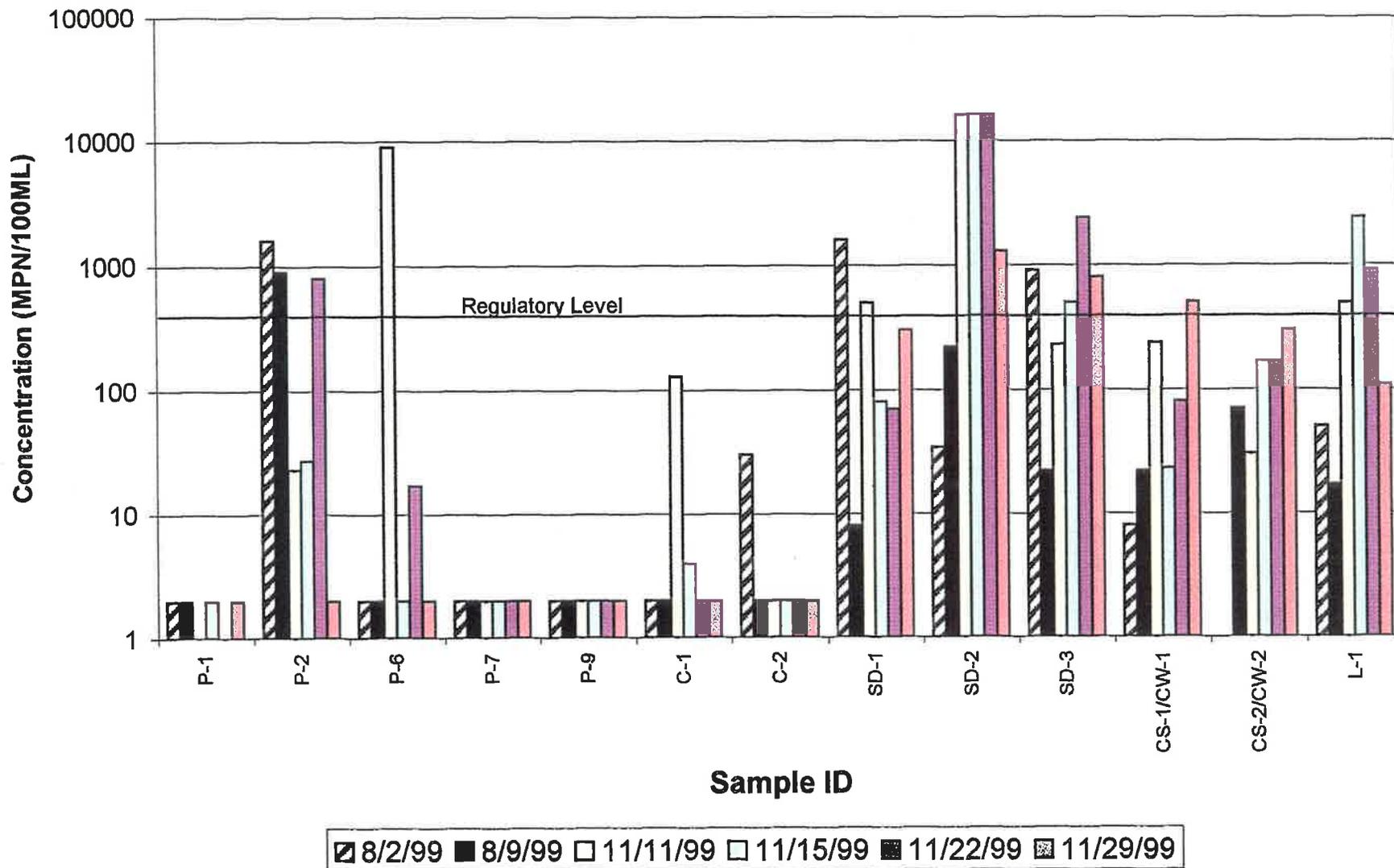


FIGURE 43

E. COLI

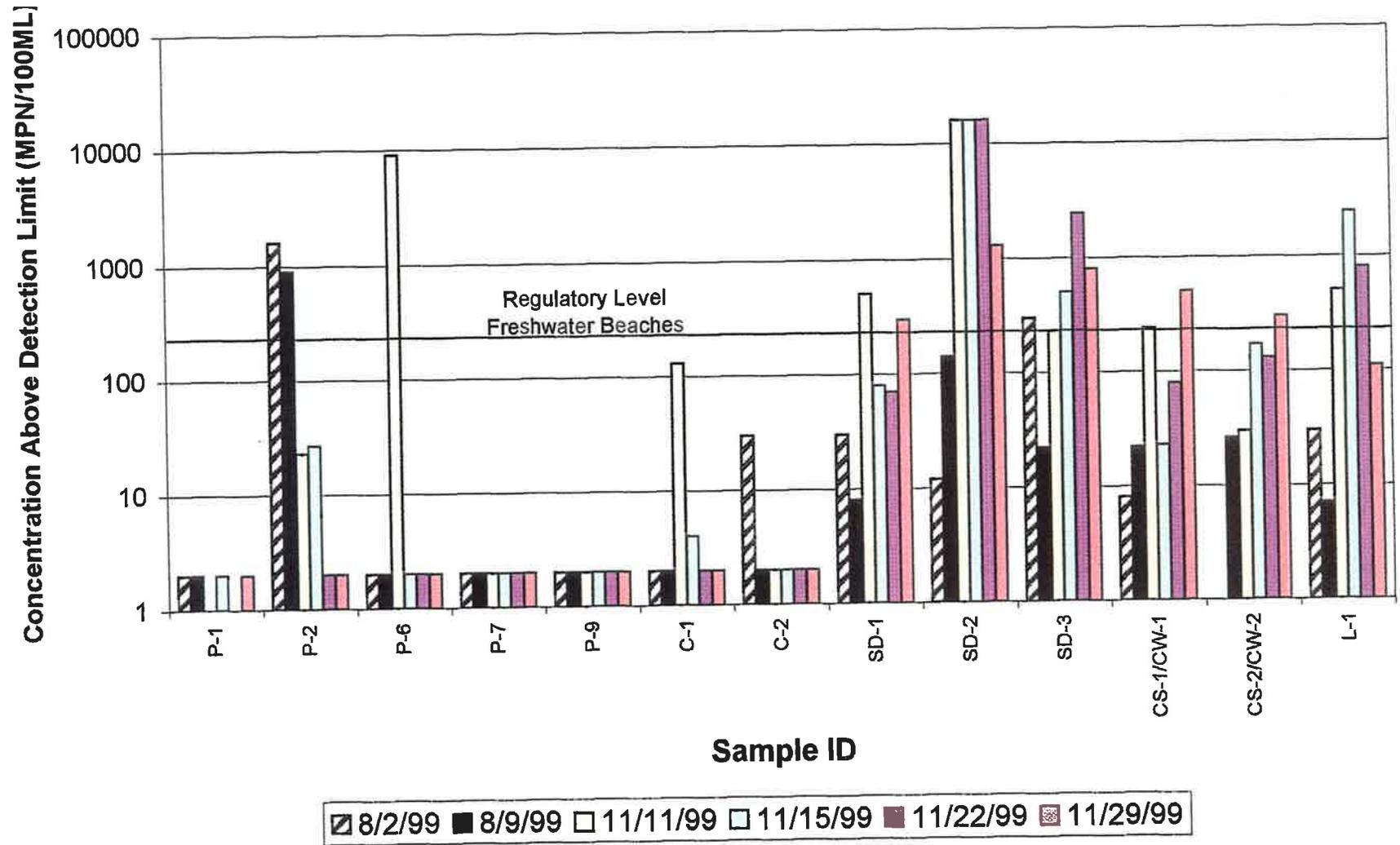


FIGURE 44

ENTEROCOCCI

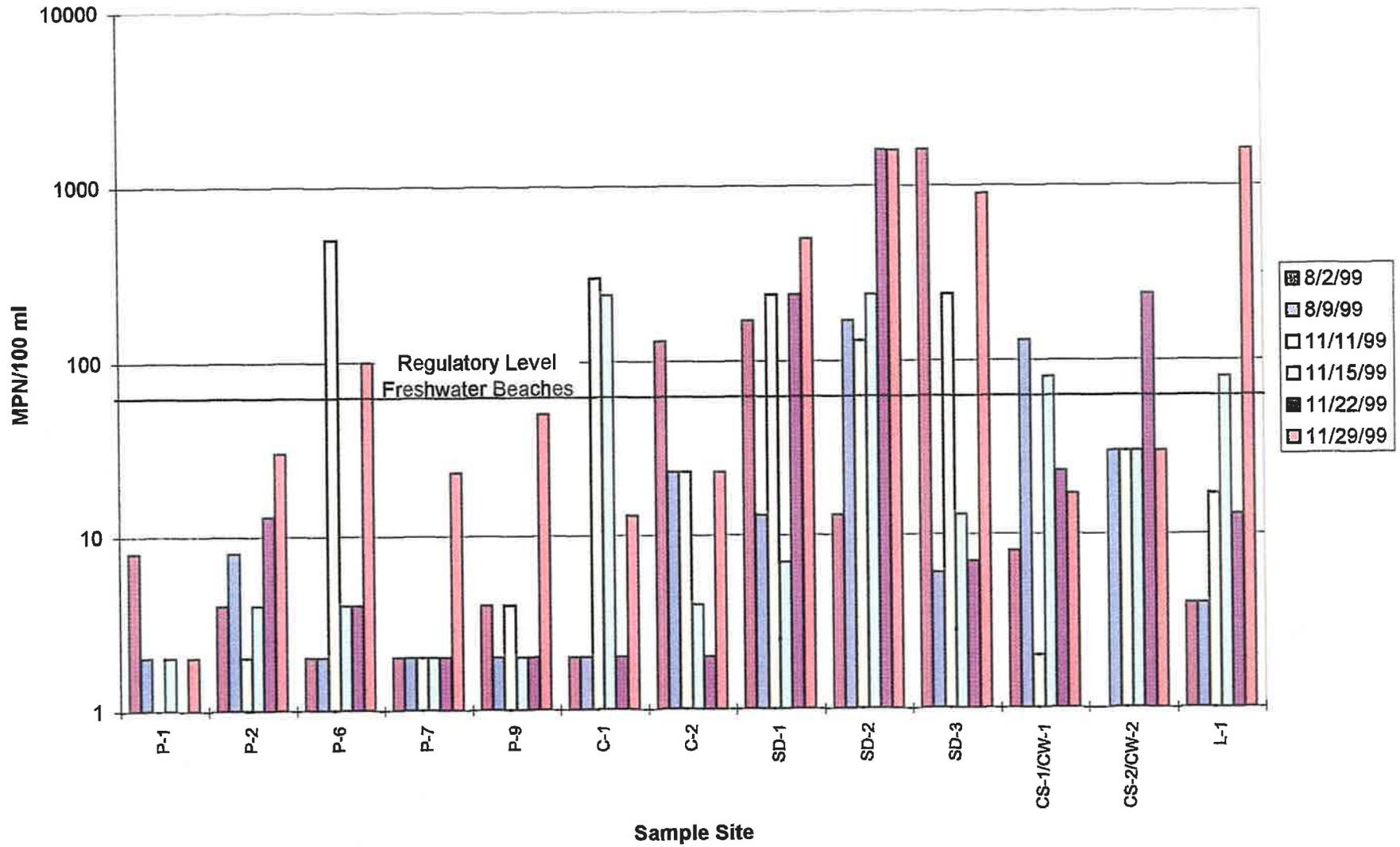


FIGURE 45

TOTAL COLIFORMS

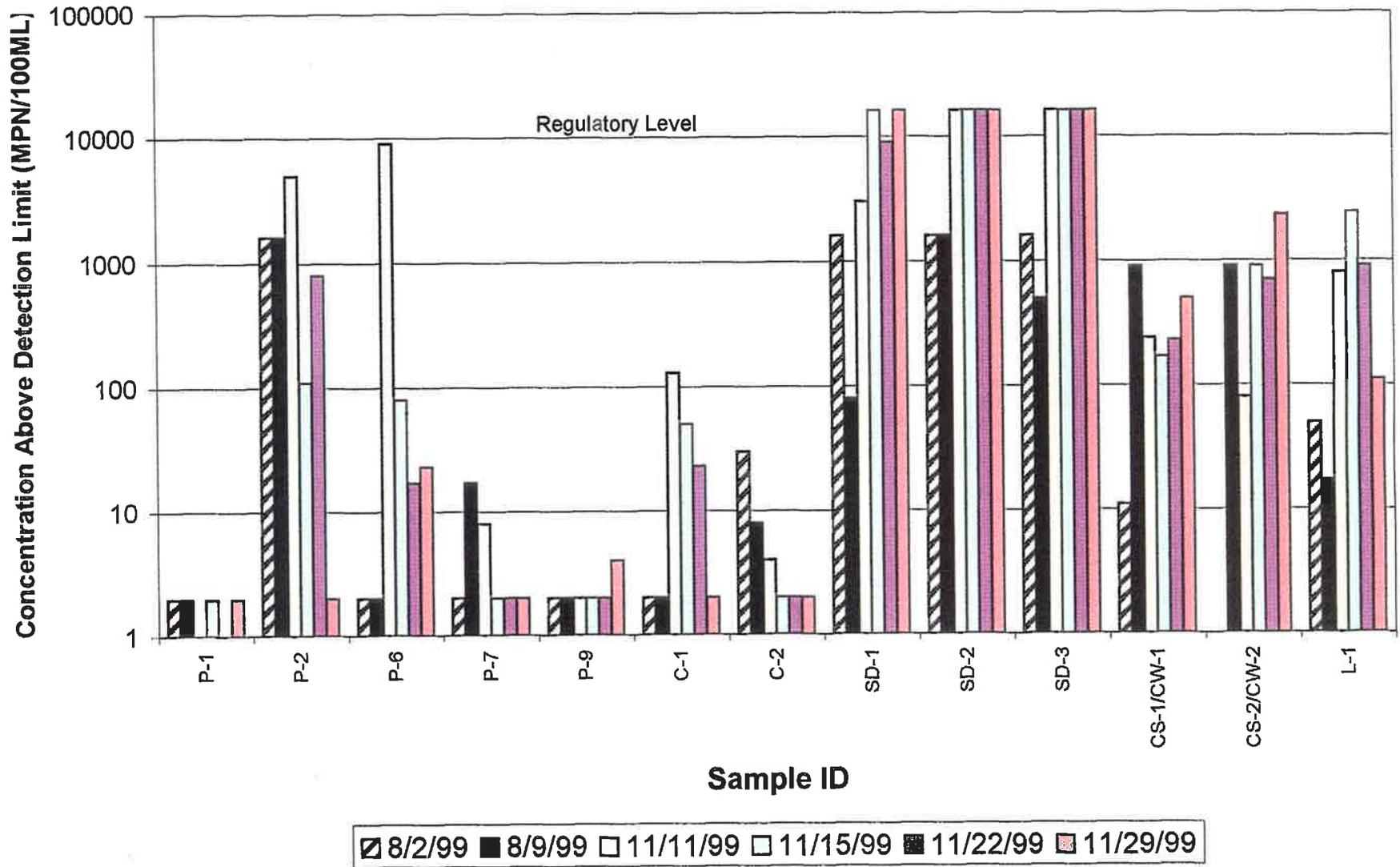


FIGURE 46

TOTAL COLIFORMS

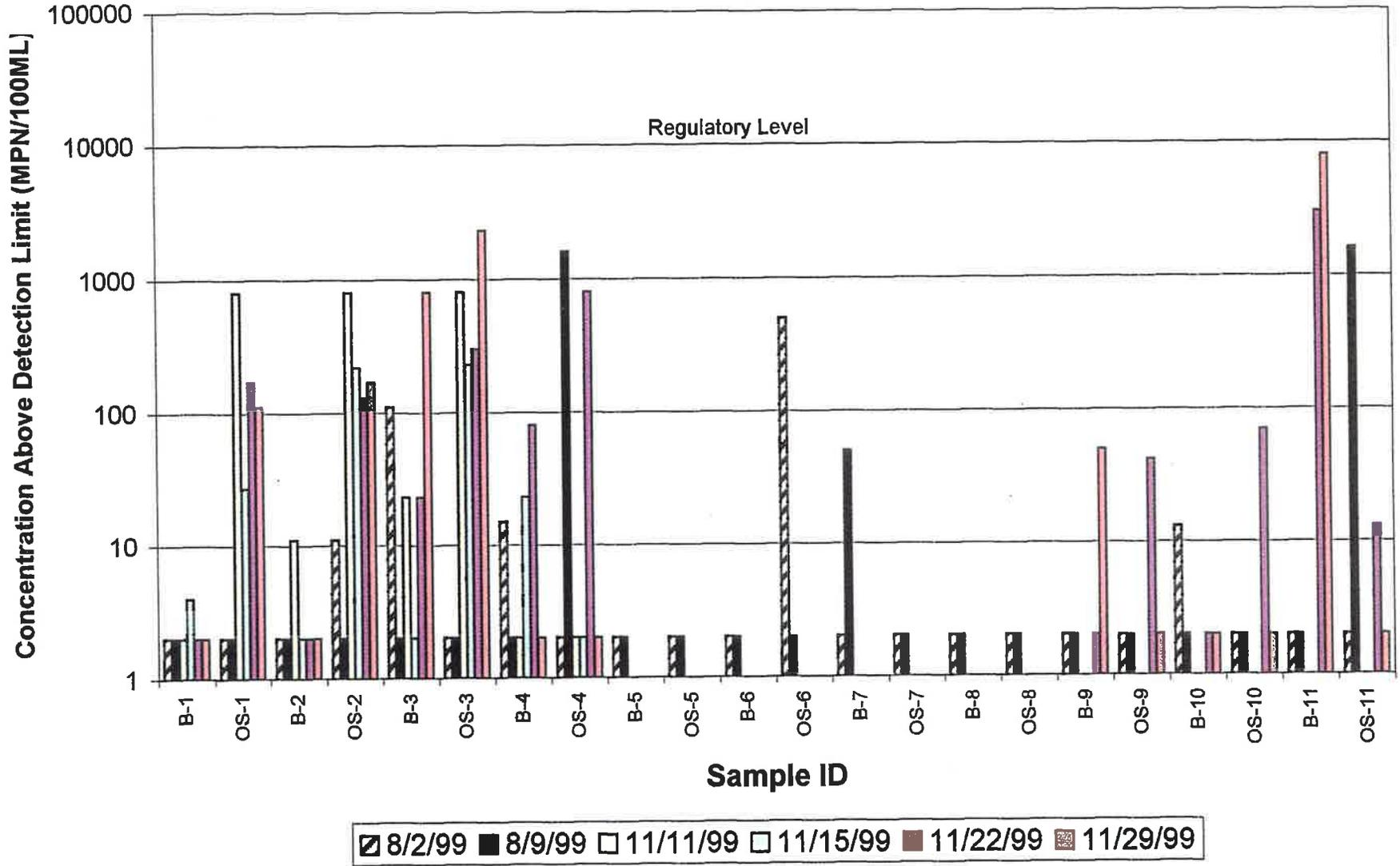


FIGURE 47

FECAL COLIFORMS

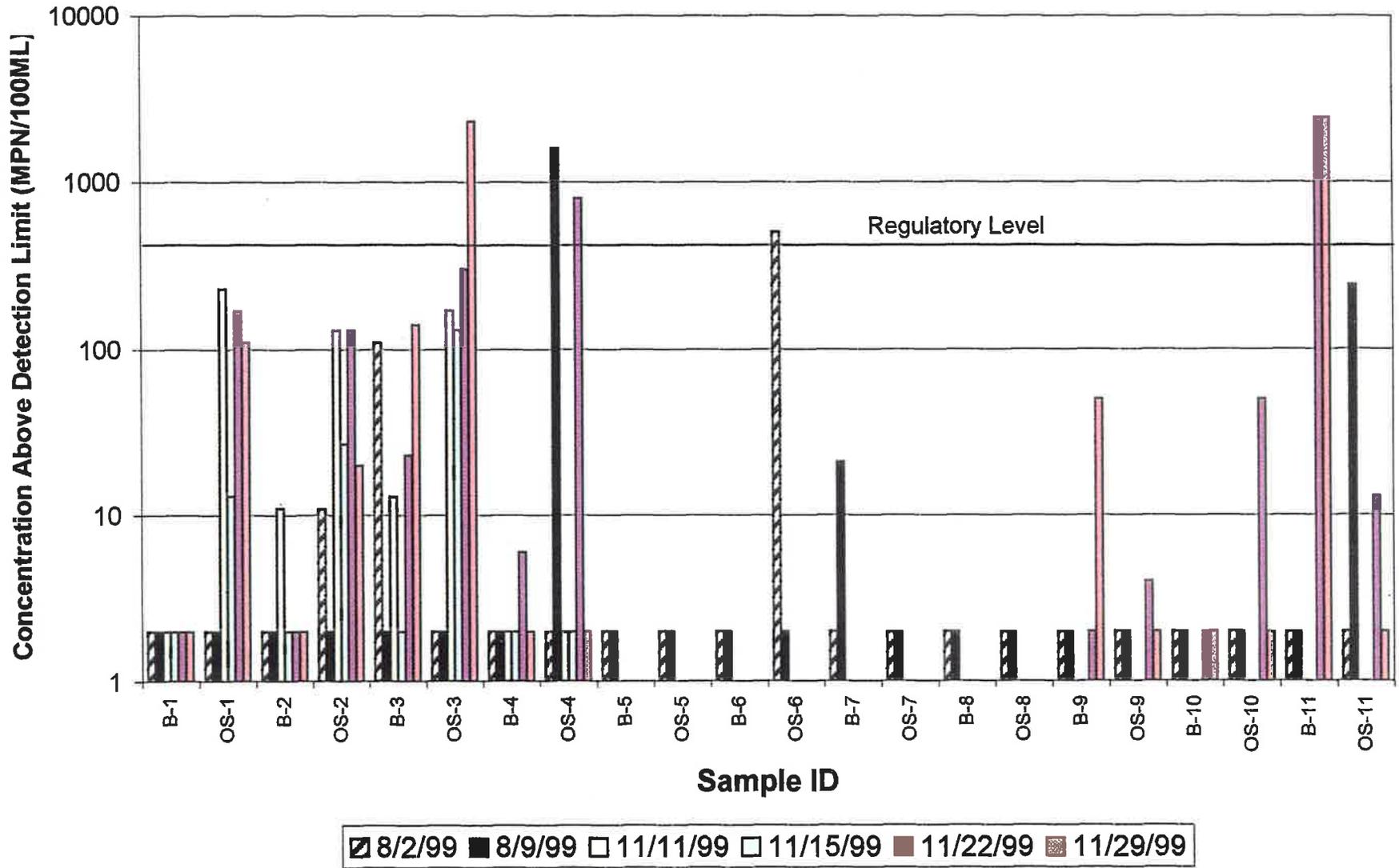


FIGURE 48

ENTEROCOCCI

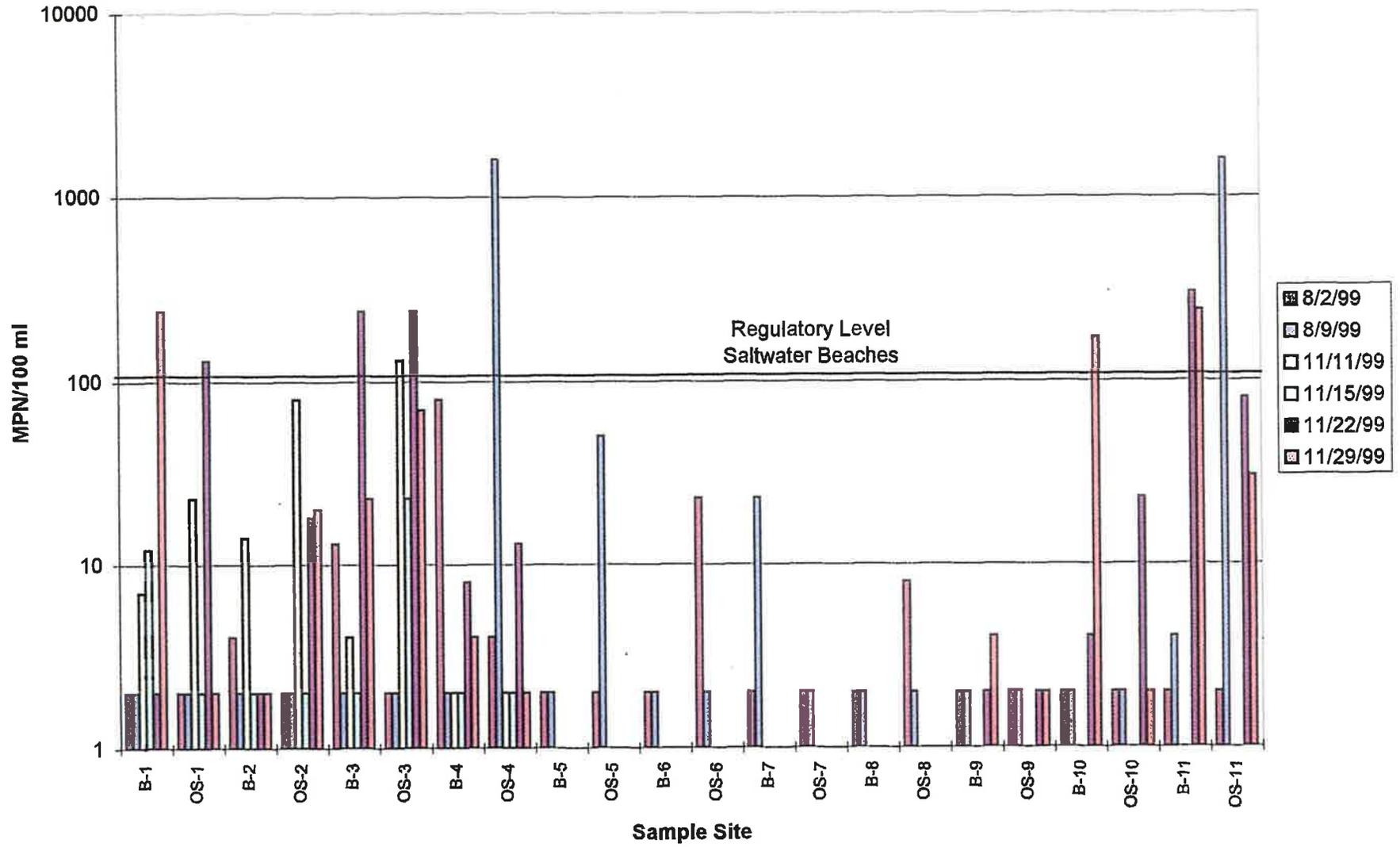


FIGURE 49

E. COLI

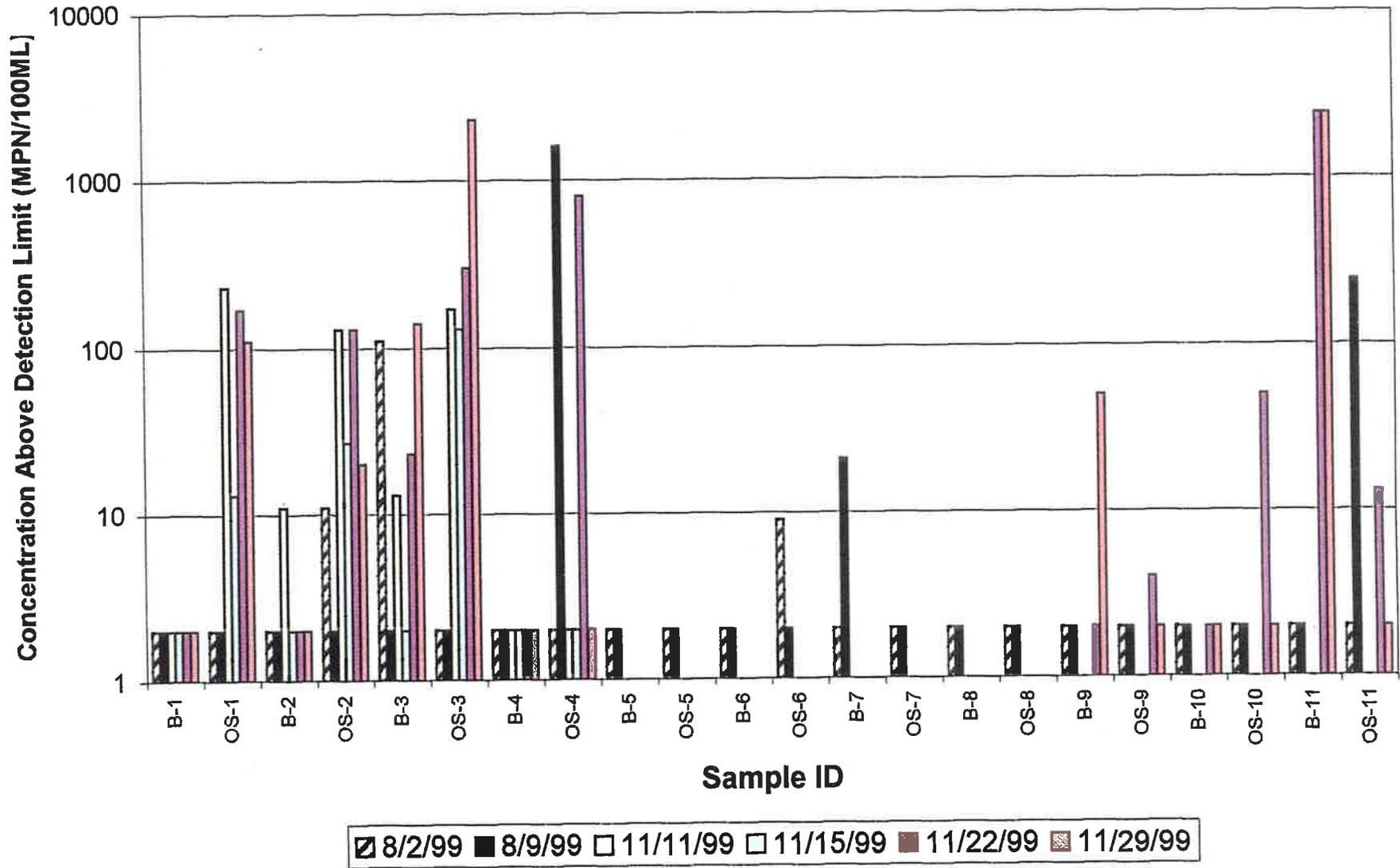
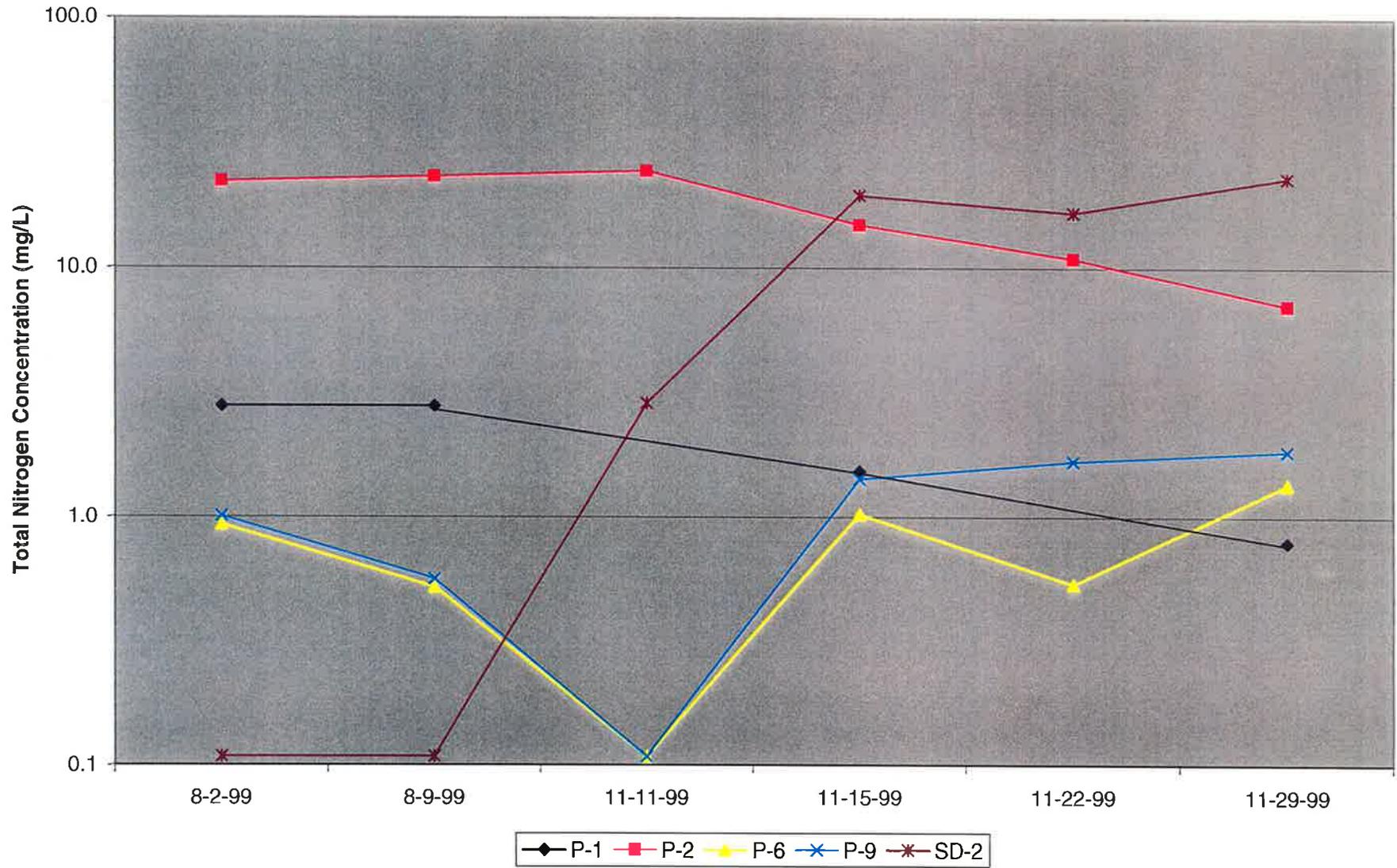


FIGURE 50

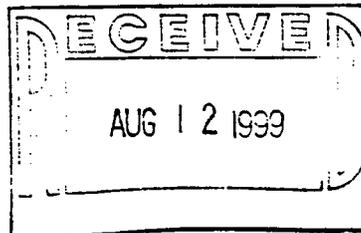
TOTAL NITROGEN IN THE CROSS CREEK PLAZA AREA



LABORATORY RESULTS FOR WATER QUALITY SAMPLING

2 AUGUST, 1999

Calscience
Environmental
Laboratories, Inc.



August 12, 1999

Eric Fordham
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: Calscience Work Order No.: 99-08-0008
Client Reference: Malibu Water Quality Study

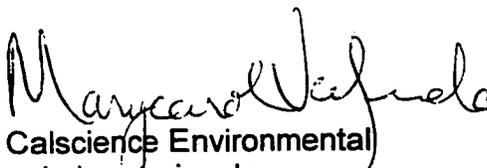
Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 08/02/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/02-07/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 405.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
OS-10	3	1
OS-11	4	1
C-1	4	1
C-2	9	1
L-1	6	1
SD-3	18	1
B-11	6	1
OS-1	7	1
OS-2	8	1
OS-3	7	1
OS-4	7	1
OS-5	6	1
OS-6	8	1
OS-7	9	1
OS-8	3	1
OS-9	3	1
B-1	7	1
B-2	11	1

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed:

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 405.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
B-3	14	1
B-4	11	1
Method Blank	ND	1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/02-07/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 405.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
B-5	8	1
B-6	11	1
B-7	12	1
B-8	13	1
B-9	13	1
B-10	15	1
Method Blank	ND	1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 350.2
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	0.1
OS-11	ND	0.1
C-1	ND	0.1
C-2	11.0	0.1
L-1	ND	0.1
SD-3	0.3	0.1
B-11	ND	0.1
OS-1	ND	0.1
OS-2	ND	0.1
OS-3	ND	0.1
OS-4	ND	0.1
OS-5	ND	0.1
OS-6	ND	0.1
OS-7	ND	0.1
OS-8	ND	0.1
OS-9	ND	0.1
B-1	ND	0.1
B-2	0.1	0.1
B-3	0.3	0.1

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 350.2
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-07-0872-5 (Duplicate)	89	90	1	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 350.2
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
B-4	ND	0.1
B-5	ND	0.1
B-6	ND	0.1
B-7	ND	0.1
B-8	ND	0.1
B-9	ND	0.1
B-10	ND	0.1
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-08-0032-7 (Duplicate)	98	99	1	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 351.3
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
OS-10	0.7	0.5
OS-11	0.7	0.5
C-1	0.8	0.5
C-2	11.9	0.5
L-1	2.2	0.5
SD-3	3.5	0.5
B-11	1.1	0.5
OS-1	1.0	0.5
OS-2	0.8	0.5
OS-3	0.6	0.5
OS-4	0.6	0.5
OS-5	0.7	0.5
OS-6	0.6	0.5
OS-7	ND	0.5
OS-8	0.6	0.5
OS-9	0.8	0.5
B-1	3.1	0.5
B-2	2.4	0.5
B-3	2.5	0.5

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 351.3
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
B-4	0.8	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
SD-3 (Duplicate)	3.5	3.4	3	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 08/02/99
Date Received: 08/02/99
Date Analyzed: 08/04/99

Attn: Eric Fordham
RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
Method: EPA 351.3
Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
B-5	ND	0.5
B-6	5.6	0.5
B-7	1.0	0.5
B-8	0.7	0.5
B-9	0.8	0.5
B-10	0.8	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-07-0234-1 (Duplicate)	2.2	2.4	9	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 354.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrite-N Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	0.01
OS-11	ND	0.01
C-1	ND	0.01
C-2	ND	0.01
L-1	ND	0.01
SD-3	0.02	0.01
B-11	ND	0.01
OS-1	ND	0.01
OS-2	ND	0.01
OS-3	ND	0.01
OS-4	ND	0.01
OS-5	ND	0.01
OS-6	ND	0.01
OS-7	ND	0.01
OS-8	ND	0.01
OS-9	ND	0.01
B-1	ND	0.01
B-2	ND	0.01
B-3	ND	0.01
B-4	ND	0.01
Method Blank	ND	0.01

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 354.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrite-N Concentration</u>	<u>Reporting Limit</u>
B-5	ND	0.01
B-6	ND	0.01
B-7	ND	0.01
B-8	ND	0.01
B-9	ND	0.01
B-10	ND	0.01
Method Blank	ND	0.01

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/02/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 353.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrate-N Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	0.1
OS-11	ND	0.1
C-1	ND	0.1
C-2	ND	0.1
L-1	ND	0.1
SD-3	ND	0.1
B-11	0.2	0.1
OS-1	ND	0.1
OS-2	ND	0.1
OS-3	ND	0.1
OS-4	ND	0.1
OS-5	ND	0.1
OS-6	ND	0.1
OS-7	ND	0.1
OS-8	ND	0.1
OS-9	ND	0.1
B-1	0.2	0.1
B-2	ND	0.1
B-3	ND	0.1
B-4	0.3	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/02/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 353.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrate-N Concentration</u>	<u>Reporting Limit</u>
B-5	ND	0.1
B-6	ND	0.1
B-7	0.1	0.1
B-8	0.6	0.2
B-9	0.5	0.2
B-10	2.6	0.5
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 08/02/99
Date Received: 08/02/99
Date Analyzed: 08/03/99

Attn: Eric Fordham
RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
Method: EPA 425.1
Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	0.1
OS-11	ND	0.1
C-1	0.1	0.1
C-2	0.3	0.1
L-1	ND	0.1
SD-3	0.3	0.1
B-11	ND	0.1
OS-1	ND	0.1
OS-2	ND	0.1
OS-3	ND	0.1
OS-4	ND	0.1
OS-5	ND	0.1
OS-6	ND	0.1
B-4	ND	0.1
B-5	ND	0.1
B-6	0.1	0.1
B-7	ND	0.1
B-8	ND	0.1
B-9	ND	0.1
B-10	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0008
 Method: EPA 425.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
OS-7	ND	0.1
OS-8	ND	0.1
OS-9	ND	0.1
B-1	0.1	0.1
B-2	ND	0.1
B-3	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

QUALITY ASSURANCE SUMMARY
Method EPA 354.1

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0008
Date Analyzed: 08/03/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OS-10

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	97	98	70 - 130	1	0 - 25

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: B-5

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	97	98	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY
Method EPA 353.3

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0008
Date Analyzed: 08/02/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OS-10

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	104	103	70 - 130	1	0 - 25

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: B-5

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	92	91	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY
 Method EPA 425.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-08-0008
 Date Analyzed: 08/03/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OS-11

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	104	98	70 - 130	6	0 - 25

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OS-7

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	96	89	70 - 130	8	0 - 25

**SILLIKER LABORATORIES
OF CALIFORNIA, INC.**

1139 East Dominguez, Suite I
Carson, CA • 90746
(310) 637-7121 • FAX (310) 637-2953

FOOD SAFETY • QUALITY • NUTRITION

LABORATORY REPORT

Report No.	Date	Page
488283	8/10/99	1

488283	8/10/99	1
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Purchase Order

PROJECT #:99-08-0008

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 8/02/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 8/10/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:0S-10 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:0S-11 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	2	<2	<2	<2
SAMPLE ID:C-1 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:C-2 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	30	30	30	130
SAMPLE ID:L-1 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	50	30	50	4
SAMPLE ID:SD-3 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	>1,600	300	900	1,600

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No.	Date	Page
------------	------	------

488283	8/10/99	2
--------	---------	---

Purchase Order

PROJECT #:99-08-0008

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-11 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:0S-1 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	2	2	2	2
SAMPLE ID:0S-2 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	11	11	11	<2
SAMPLE ID:0S-3 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	2	2	2	2
SAMPLE ID:0S-4 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	4
SAMPLE ID:0S-5 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	2	<2	<2	2

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No. Date Page

488283 8/10/99 3

Purchase Order

PROJECT #:99-08-0008

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:OS-6 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	500	9	500	23
SAMPLE ID:OS-7 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:OS-8 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	8
SAMPLE ID:OS-9 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:B-1 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	2
SAMPLE ID:B-2 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	4

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No. Date Page

488283 8/10/99 4

Purchase Order

PROJECT #:99-08-0008

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-3 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	110	110	110	13
SAMPLE ID:B-4 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	15	<2	<2	80
SAMPLE ID:B-5 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:B-6 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:B-7 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:B-8 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2

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* CONTINUED *

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LABORATORY REPORT

Report No. Date Page

488283 8/10/99 5

Purchase Order

PROJECT #:99-08-0008

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-9 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	<2	<2	<2	<2
SAMPLE ID:B-10 DATE:08/02/99 TIME:8:00 MATRIX:SEA WATER PROJ#:99-08-0008	13	<2	<2	<2

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, 9225A-C, 9230A-B, APHA, AWWA, WEF, 18TH EDITION, 1992.

MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

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**CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.**

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
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CHAIN OF CUSTODY RECORD

Date 8/2/99
Page 1 of 3

488283

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 99-08-0008			P.O. NO.:			
ADDRESS:			PROJECT CONTACT: Margarita Valenzuela			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___ / ___ / ___

SPECIAL INSTRUCTIONS

							REQUESTED ANALYSES																		
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	Fecal/Total Coliform	E. Coli	Enterococci	
			DATE	TIME																					
120	OS-10		8/2/99	8:00	W	3																	X	X	X
121	OS-11																						X	X	X
122	C-1																						X	X	X
123	C-2																						X	X	X
124	L-1																						X	X	X
125	SD-3																						X	X	X
126	B-11																						X	X	X
127	OS-1																						X	X	X
128	OS-2																						X	X	X
129	OS-3																						X	X	X

CSM

Relinquished by: (Signature) <i>M. Valenzuela</i>	Received by: (Signature) <i>Scott B. Boyer</i>	Date: 08-02-99	Time: 1415
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <i>Scott B. Boyer</i>	Received for Laboratory by: (Signature) <i>Duchelle Palomera</i>	Date: 08-02-99	Time: 1510

O&Q Graphic (714) 898-9702

7440 LINCOLN WAY
 GARDEN GROVE, CA 92841-1432
 TEL: (714) 895-5494 • FAX: (714) 894-7501

Date 8/2/99
 Page 2 of 3

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: <u>113005</u>			P.O. NO.:		
ADDRESS: <u>113005</u>			PROJECT CONTACT:			QUOTE NO.:		
CITY		STATE		ZIP		SAMPLER(S): (SIGNATURE)		
TEL:		FAX:		E-MAIL:		LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	Fecal Total Coliform	E. Coli	Enterococcus
			DATE	TIME																				
130	OS-4		8/2/99	8:00	W	3																X	X	X
131	OS-5																					X	X	X
132	OS-6																					X	X	X
133	OS-7																					X	X	X
134	OS-8																					X	X	X
135	OS-9																					X	X	X
136	B-1																					X	X	X
137	B-2																					X	X	X
138	B-3																					X	X	X
139	B-4																					X	X	X

Relinquished by: (Signature) <u>M. Valenzuela</u>	Received by: (Signature) <u>Bob Boy</u>	Date: <u>08-02-99</u>	Time: <u>1415</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>Bob Boy</u>	Received for Laboratory by: (Signature) <u>Michelle Valenzuela</u>	Date: <u>080299</u>	Time: <u>1510</u>

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.
 Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Yellow and Pink copies respectively.

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CHAIN OF CUSTODY RECORD

Date 8/2/99
Page 3 of 3

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 99-08-0008			P.O. NO.:		
ADDRESS:			PROJECT CONTACT:			QUOTE NO.:		
CITY		STATE		ZIP		LAB USE ONLY		
TEL:		FAX:		E-MAIL:		<input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
Sea water Samples

REQUESTED ANALYSES																								
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	Fecal/Total Coliform	E. Coli	ENTEROCOCCUS
			DATE	TIME																				
	140	B-5	8/2/99	800	W	3																X	X	X
	141	B-6																				X	X	X
	142	B-7																				X	X	X
	143	B-8																				X	X	X
	144	B-9																				X	X	X
	145	B-10																				X	X	X

Relinquished by: (Signature) <u>M. Valverde</u>	Received by: (Signature) <u>Bob Boye</u>	Date: <u>08-02-99</u>	Time: <u>1415</u>
Relinquished by: (Signature) <u>Bob Boye</u>	Received by: (Signature) <u>Michelle Polunyan</u>	Date: <u>08-02-99</u>	Time: <u>(210)</u>

Q&Q Graphic (714) 898-9702

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

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GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 8/2/99
Page 3 of 3

LABORATORY CLIENT: URS Greiner Woodward Clyde
ADDRESS: 2020 E. First St.
CITY: Santa Ana STATE: CA ZIP: 92705
TEL: 714-935-6846 FAX: 714-667-7447 E-MAIL: staff.hard@urscorp.com
TURNAROUND TIME: SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY):
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
SPECIAL INSTRUCTIONS

CLIENT PROJECT NAME / NUMBER: _____ P.O. NO.: _____
PROJECT CONTACT: _____ QUOTE NO.: _____
SAMPLER(S): (SIGNATURE) [Signature] LAB USE ONLY
 -

REQUESTED ANALYSES

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	PH ₂ O, Nitrate, Nitrite	MBAs	TKN, NH ₃	Fecal Coliform

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	B-1	Malibu Beach	8/2/99	0700	H ₂ O	6
	B-2					
	B-3					
	B-4					
	B-5					
	B-6					
	B-7					
	B-8					
	B-9					
	B-10					

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) _____	Date: <u>8/2/99</u>	Time: <u>1248</u>
Relinquished by: (Signature) _____	Received by: (Signature) _____	Date: _____	Time: _____
Relinquished by: (Signature) _____	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>8/2/99</u>	Time: <u>1248</u>

C&O Graphics (714) 898-9702

**Calscience
Environmental
Laboratories, Inc.**

August 12, 1999

Eric Fordham
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: Calscience Work Order No.: 99-08-0030
Client Reference: Malibu Water Quality Study

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 08/02/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03-08/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0030
 Method: EPA 405.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
P1	2	1
P2	13	1
P6	2	1
P7	1	1
P9	3	1
SD-2	6	1
SD-1	8	1
CW-1	4	1
Method Blank	ND	1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0030
 Method: EPA 350.2
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
P1	ND	0.1
P2	26.6	0.1
P6	1.1	0.1
P7	ND	0.1
P9	0.4	0.1
SD-2	ND	0.1
SD-1	0.2	0.1
CW-1	ND	0.1
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-08-0032-7 (Duplicate)	98	99	1	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/04/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0030
 Method: EPA 351.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
P1	ND	0.5
P2	28.0	0.5
P6	2.2	0.5
P7	1.0	0.5
P9	1.3	0.5
SD-2	1.4	0.5
SD-1	1.1	0.5
CW-1	1.1	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-07-0234-1 (Duplicate)	2.2	2.4	9	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 08/02/99
Date Received: 08/02/99
Date Analyzed: 08/02/99

Attn: Eric Fordham
RE: Malibu Water Quality Study

Work Order No.: 99-08-0030
Method: EPA 353.3
Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrate-N Concentration</u>	<u>Reporting Limit</u>
P1	12	2
P2	ND	0.1
P6	ND	0.1
P7	ND	0.1
P9	3	1
SD-2	ND	0.1
SD-1	2	1
CW-1	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/02/99
 Date Received: 08/02/99
 Date Analyzed: 08/03/99

Attn: Eric Fordham
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0030
 Method: EPA 354.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrite-N Concentration</u>	<u>Reporting Limit</u>
P1	ND	0.01
P2	ND	0.01
P6	ND	0.01
P7	ND	0.01
P9	ND	0.01
SD-2	ND	0.01
SD-1	0.02	0.01
CW-1	ND	0.01
Method Blank	ND	0.01

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 08/02/99
Date Received: 08/02/99
Date Analyzed: 08/04/99

Attn: Eric Fordham
RE: Malibu Water Quality Study

Work Order No.: 99-08-0030
Method: EPA 425.1
Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
P1	ND	0.1
P2	4.0	0.2
P6	ND	0.1
P7	ND	0.1
P9	ND	0.1
SD-2	ND	0.1
SD-1	ND	0.1
CW-1	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

QUALITY ASSURANCE SUMMARY
Method EPA 353.3

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0030
Date Analyzed: 08/02/99

Matrix Spike/Matrix Spike Duplicate
Sample Spiked: 99-08-0008-21

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	92	91	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY
Method EPA 354.1

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0030
Date Analyzed: 08/03/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: 99-08-0008-21

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	97	98	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY
Method EPA 425.1

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0030
Date Analyzed: 08/04/99

Matrix Spike/Matrix Spike Duplicate
Sample Spiked: CW-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	88	86	70 - 130	2	0 - 25

**SILLIKER LABORATORIES
OF CALIFORNIA, INC.**

1139 East Dominguez, Suite I
Carson, CA • 90746
(310) 637-7121 • FAX (310) 637-2953

FOOD SAFETY • QUALITY • NUTRITION

LABORATORY REPORT

Report No.	Date	Page
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488286	8/10/99	1
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Purchase Order

PROJECT #:99-08-0030

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 8/02/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 8/10/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:P1 DATE:08/02/99 TIME:12:55 MATRIX:SEA WATER PROJ#:99-08-0030	<2	<2	<2	8
SAMPLE ID:P2 DATE:08/02/99 TIME:11:30 MATRIX:SEA WATER PROJ#:99-08-0030	>1,600	1,600	>1,600	4
SAMPLE ID:P6 DATE:08/02/99 TIME:11:30 MATRIX:SEA WATER PROJ#:99-08-0030	<2	<2	<2	<2
SAMPLE ID:P7 DATE:08/02/99 TIME:11:05 MATRIX:SEA WATER PROJ#:99-08-0030	<2	<2	<2	<2
SAMPLE ID:P9 DATE:08/02/99 TIME:11:30 MATRIX:SEA WATER PROJ#:99-08-0030	<2	<2	<2	4
SAMPLE ID:SD-2 DATE:08/02/99 TIME:12:15 MATRIX:SEA WATER PROJ#:99-08-0030	>1,600	12	34	13

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No. Date Page

488286 8/10/99 2

Purchase Order

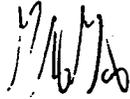
PROJECT #:99-08-0030

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:SD-1 DATE:08/02/99 TIME:12:30 MATRIX:SEA WATER PROJ#:99-08-0030	>1,600	30	>1,600	170
SAMPLE ID:CW-1 DATE:08/02/99 TIME:13:15 MATRIX:SEA WATER PROJ#:99-08-0030	11	8	8	8

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, 9225A-C, 9230A-B, APHA, AWWA, WEF, 18TH EDITION,
1992.


MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

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CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

488286

CHAIN OF CUSTODY RECORD

Date 8/2/99
Page 1 of 1

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: <u>99-08-0030</u>			P.O. NO.:			
ADDRESS:			PROJECT CONTACT: <u>Marycarol Valenzuela</u>			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES																							
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	<i>Fecal/Total Coliform</i>	<i>E. coli, Enterococcus</i>
			DATE	TIME																			
	146	P1	8/2/99	1255	W	3																X	X
	147	P2		1130																		X	X
	148	PG		1130																		X	X
	149	P7		1105																		X	X
	150	P9		1130																		X	X
	151	SD-2		1215																		X	X
	152	SD-1		1230																		X	X
	153	CW-1		1315																		X	X

Relinquished by: (Signature) <i>M. Valenzuela</i>	Received by: (Signature) <i>Mark C. Adney</i>	Date: <u>8/2/99</u>	Time: <u>1725</u>
Relinquished by: (Signature) <i>Mark C. Adney</i>	Received by: (Signature) <i>Dorothy McKeon</i>	Date: <u>8.2.99</u>	Time: <u>17.45</u>
Relinquished by: (Signature)	Received for Laboratory/by: (Signature)	Date:	Time:

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

Please indicate that 1 of 2 of 3 of 4 of 5 of 6 of 7 of 8 of 9 of 10 of 11 of 12 of 13 of 14 of 15 of 16 of 17 of 18 of 19 of 20 of 21 of 22 of 23 of 24 of 25 of 26 of 27 of 28 of 29 of 30 of 31 of 32 of 33 of 34 of 35 of 36 of 37 of 38 of 39 of 40 of 41 of 42 of 43 of 44 of 45 of 46 of 47 of 48 of 49 of 50 of 51 of 52 of 53 of 54 of 55 of 56 of 57 of 58 of 59 of 60 of 61 of 62 of 63 of 64 of 65 of 66 of 67 of 68 of 69 of 70 of 71 of 72 of 73 of 74 of 75 of 76 of 77 of 78 of 79 of 80 of 81 of 82 of 83 of 84 of 85 of 86 of 87 of 88 of 89 of 90 of 91 of 92 of 93 of 94 of 95 of 96 of 97 of 98 of 99 of 100 of 101 of 102 of 103 of 104 of 105 of 106 of 107 of 108 of 109 of 110 of 111 of 112 of 113 of 114 of 115 of 116 of 117 of 118 of 119 of 120 of 121 of 122 of 123 of 124 of 125 of 126 of 127 of 128 of 129 of 130 of 131 of 132 of 133 of 134 of 135 of 136 of 137 of 138 of 139 of 140 of 141 of 142 of 143 of 144 of 145 of 146 of 147 of 148 of 149 of 150 of 151 of 152 of 153 of 154 of 155 of 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LABORATORY RESULTS FOR WATER QUALITY SAMPLING

9 AUGUST, 1999

Calscience
Environmental
Laboratories, Inc.

August 17, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: Calscience Work Order No.: 99-08-0271
Client Reference: Malibu Water Test Sampling

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 08/09/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-11/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 350.2
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
B-1	ND	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-4	ND	0.1
OS-4	ND	0.1
LS-1	ND	0.1
B-5	ND	0.1
OS-5	ND	0.1
B-6	ND	0.1
OS-6	ND	0.1
B-7	ND	0.1
OS-7	ND	0.1
B-8	ND	0.1
OS-8	ND	0.1
B-9	ND	0.1
OS-9	ND	0.1
B-10	ND	0.1
OS-10	ND	0.1
B-11	ND	0.1
OS-11	ND	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-11/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 350.2
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-08-0310-4 (Duplicate)	80	81	1	0 - 25
99-08-0269-7 (Duplicate)	73	73	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-11/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 351.3
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
B-1	3.1	0.5
OS-1	0.6	0.5
B-2	1.3	0.5
OS-2	ND	0.5
B-3	1.8	0.5
OS-3	ND	0.5
B-4	0.8	0.5
OS-4	ND	0.5
LS-1	2.0	0.5
B-5	0.6	0.5
OS-5	0.7	0.5
B-6	3.6	0.5
OS-6	1.0	0.5
B-7	0.6	0.5
OS-7	0.6	0.5
B-8	0.6	0.5
OS-8	1.4	0.5
B-9	0.8	0.5
OS-9	ND	0.5
B-10	3.4	0.5
OS-10	0.6	0.5
B-11	2.1	0.5
OS-11	0.6	0.5
Method Blank	ND	0.5
Method Blank	ND	0.5

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-11/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 351.3
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-08-0248-7 (Duplicate)	10.6	10.4	2	0 - 25
B-6 (Duplicate)	3.6	3.4	6	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 353.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrate-N Concentration</u>	<u>Reporting Limit</u>
B-1	ND	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-4	0.3	0.1
OS-4	ND	0.1
LS-1	ND	0.1
B-5	ND	0.1
OS-5	ND	0.1
B-6	ND	0.1
OS-6	ND	0.1
B-7	ND	0.1
OS-7	ND	0.1
B-8	0.1	0.1
OS-8	ND	0.1
B-9	0.3	0.1
OS-9	ND	0.1
B-10	0.6	0.1
OS-10	ND	0.1
B-11	0.7	0.1
OS-11	ND	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 354.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrite-N Concentration</u>	<u>Reporting Limit</u>
B-1	ND	0.01
OS-1	ND	0.01
B-2	ND	0.01
OS-2	ND	0.01
B-3	ND	0.01
OS-3	ND	0.01
B-4	ND	0.01
OS-4	ND	0.01
LS-1	ND	0.01
B-5	ND	0.01
OS-5	ND	0.01
B-6	ND	0.01
OS-6	ND	0.01
B-7	ND	0.01
OS-7	ND	0.01
B-8	ND	0.01
OS-8	ND	0.01
B-9	ND	0.01
OS-9	ND	0.01
B-10	0.01	0.01
OS-10	ND	0.01
B-11	ND	0.01
OS-11	ND	0.01
Method Blank	ND	0.01
Method Blank	ND	0.01

ND denotes not detected at indicated reportable limit.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

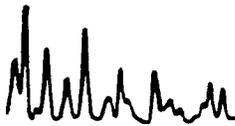
Date Sampled: 08/09/99
Date Received: 08/09/99
Date Analyzed: 08/10-15/99

Attn: Paul Salter
RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
Method: EPA 405.1
Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
B-1	1	1
OS-1	1	1
B-2	2	1
OS-2	ND	1
B-3	3	1
OS-3	ND	1
B-4	1	1
OS-4	ND	1
LS-1	1	1
B-5	ND	1
OS-5	1	1
B-6	3	1
OS-6	1	1
B-7	1	1
OS-7	1	1
B-8	ND	1
OS-8	1	1
B-9	2	1
OS-9	1	1
B-10	2	1
OS-10	1	1
B-11	3	1
OS-11	ND	1
Method Blank	ND	1
Method Blank	ND	1



URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-15/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 405.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
B-1 (Duplicate)	1	1	0	0 - 25
OS-11 (Duplicate)	ND	ND	NA	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-11/99

Attn: Paul Salter
 RE: Malibu Water Test Sampling

Work Order No.: 99-08-0271
 Method: EPA 425.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
B-1	ND	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-4	ND	0.1
OS-4	ND	0.1
LS-1	ND	0.1
B-5	ND	0.1
OS-5	ND	0.1
B-6	ND	0.1
OS-6	ND	0.1
B-7	ND	0.1
OS-7	ND	0.1
B-8	ND	0.1
OS-8	ND	0.1
B-9	ND	0.1
OS-9	ND	0.1
B-10	ND	0.1
OS-10	ND	0.1
B-11	ND	0.1
OS-11	ND	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

QUALITY ASSURANCE SUMMARY
 Method EPA 353.3

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-08-0271
 Date Analyzed: 08/10/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: B-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	90	100	70 - 130	11	0 - 25

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OS-10

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	98	97	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY

Method EPA 354.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-08-0271
 Date Analyzed: 08/10/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: B-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	110	110	70 - 130	0	0 - 25

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OS-10

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	110	110	70 - 130	0	0 - 25

QUALITY ASSURANCE SUMMARY
 Method EPA 425.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-08-0271
 Date Analyzed: 08/10-11/99

Matrix Spike/Matrix Spike Duplicate (08/10/99)

Sample Spiked: 99-08-0248-11

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	96	90	70 - 130	6	0 - 25

Matrix Spike/Matrix Spike Duplicate (08/11/99)

Sample Spiked: OS-9

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	104	98	70 - 130	6	0 - 25

**SILLIKER LABORATORIES
OF CALIFORNIA, INC.**

1139 East Dominguez, Suite I
Carson, CA • 90746
(310) 637-7121 • FAX (310) 637-2953

FOOD SAFETY • QUALITY • NUTRITION

LABORATORY REPORT

Report No.	Date	Page
------------	------	------

489754	8/16/99	1
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Purchase Order

PROJECT #:99-08-0271

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 8/10/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 8/16/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-1 DATE:08/09/99 TIME:1400 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:OS-1 DATE:08/09/99 TIME:1349 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	2
SAMPLE ID:B-2 DATE:08/09/99 TIME:1420 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:OS-2 DATE:08/09/99 TIME:1419 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:B-3 DATE:08/09/99 TIME:1500 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:OS-3 DATE:08/09/99 TIME:1455 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No. Date Page

489754 8/16/99 2

Purchase Order

PROJECT #:99-08-0271

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-4 DATE:08/09/99 TIME:1535 MATRIX:SEA WATER PROJ#:99-08-0271	2	2	2	<2
SAMPLE ID:OS-4 DATE:08/09/99 TIME:1535 MATRIX:SEA WATER PROJ#:99-08-0271	1,600	1,600	1,600	>1,600
SAMPLE ID:LS-1 DATE:08/09/99 TIME:1600 MATRIX:SEA WATER PROJ#:99-08-0271	17	7	17	4
SAMPLE ID:B-5 DATE:08/09/99 TIME:1515 MATRIX:SEA WATER PROJ#:99-08-0271	2	<2	<2	<2
SAMPLE ID:OS-5 DATE:08/09/99 TIME:1515 MATRIX:SEA WATER PROJ#:99-08-0271	2	2	2	50
SAMPLE ID:B-6 DATE:08/09/99 TIME:1445 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	2

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No. Date Page

489754 8/16/99 3

Purchase Order

PROJECT #:99-08-0271

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:OS-6 DATE:08/09/99 TIME:1445 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:B-7 DATE:08/09/99 TIME:1415 MATRIX:SEA WATER PROJ#:99-08-0271	50	21	21	23
SAMPLE ID:OS-7 DATE:08/09/99 TIME:1415 MATRIX:SEA WATER PROJ#:99-08-0271	2	2	2	<2
SAMPLE ID:B-8 DATE:08/09/99 TIME:1350 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:OS-8 DATE:08/09/99 TIME:1350 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:B-9 DATE:08/09/99 TIME:1500 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	2

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* CONTINUED *

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LABORATORY REPORT

Report No.	Date	Page
489754	8/16/99	4

Purchase Order

PROJECT #:99-08-0271

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:OS-9 DATE:08/09/99 TIME:1500 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:B-10 DATE:08/09/99 TIME:1421 MATRIX:SEA WATER PROJ#:99-08-0271	2	2	2	<2
SAMPLE ID:OS-10 DATE:08/09/99 TIME:1421 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	<2
SAMPLE ID:B-11 DATE:08/09/99 TIME:1356 MATRIX:SEA WATER PROJ#:99-08-0271	<2	<2	<2	4
SAMPLE ID:OS-11 DATE:08/09/99 TIME:1356 MATRIX:SEA WATER PROJ#:99-08-0271	>1,600	240	240	>1,600

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* CONTINUED *

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LABORATORY REPORT

Report No.	Date	Page
------------	------	------

489754	8/16/99	5
--------	---------	---

Purchase Order

PROJECT #:99-08-0271

CONTINUED:

ANALYTICAL RESULTS

Test Method: Standard Methods for the Examination of Water and Wastewater,
Section 9221A-E, 9230A-B, APHA, AWWA, WEF, 18th edition, 1992.

Melissa Calicchia
MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

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CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

48412-1

CHAIN OF CUSTODY RECORD

Date 8/10/99

Page 1 of 3

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: <u>99-08-0271</u>			P.O. NO.:			
ADDRESS:			PROJECT CONTACT: <u>Marycarol Valenzuela</u>			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S) (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___.

SPECIAL INSTRUCTIONS
Sea Water

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	T & F. Coliform	E. Coli / Enterococcus
			DATE	TIME																			
166	B-1		8/9/99	1400	W																	X	X
167	OS-1			1349																		X	X
168	B-2			1420																		X	X
169	OS-2			1419																		X	X
170	B-3			1500																		X	X
171	OS-3			1455																		X	X
172	B-4			1535																		X	X
173	OS-4			1535																		X	X
174	LS-1			1600																		X	X
175	B-5			1515																		X	X

Relinquished by: (Signature) <u>M. Valenzuela</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>8/10/99</u>	Time: <u>0900</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>Sandy McKeon</u>	Date: <u>8-10-99</u>	Time: <u>10:20</u>

Q&C Graphic (714) 898-9702

7440 LINCOLN WAY
 GARDEN GROVE, CA 92841-1432
 TEL: (714) 895-5494 • FAX: (714) 894-7501

Date 8/10/99
 Page 2 of 3

LABORATORY CLIENT:
 ADDRESS:
 CITY STATE ZIP
 TEL: FAX: E-MAIL:

CLIENT PROJECT NAME / NUMBER:
99-08-0271
 PROJECT CONTACT:
Marycarol Valenzuela
 SAMPLER(S): (SIGNATURE)
 P.O. NO.:
 QUOTE NO.:
 LAB USE ONLY
 -

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
 SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
 SPECIAL INSTRUCTIONS
Sea Water

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
176	OS-5		8/9/99	1515	W	
177	B-6			1445		
178	OS-6			1445		
179	B-7			1415		
180	OS-7			1415		
181	B-8			1350		
182	OS-8			1350		
183	B-9			1500		
184	OS-9			1500		
185	B-10			1421		

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	T & F. Coliforms	E. Coli / Enterococcus
															X	X
															X	X
															X	X
															X	X
															X	X
															X	X
															X	X
															X	X
															X	X

Relinquished by: (Signature)
M Valenzuela
 Relinquished by: (Signature)
[Signature]
 Relinquished by: (Signature)
[Signature]

Received by: (Signature)
[Signature]
 Received by: (Signature)
[Signature]
 Received for Laboratory by: (Signature)
Sandy McKeen
 Date: 8/10/99 Time: 0900
 Date: 8/10/99 Time: 1020

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 8/10/99
Page 3 of 3

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 99-08-0271			P.O. NO.:			
ADDRESS:			PROJECT CONTACT: Marycarol Valenzuela			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
Sea Water

REQUESTED ANALYSES																							
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TD-14A) or (TD-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	F&T Coliforms	E.Coli / Enterococcus
186	OS-10		8/9/99	1424	W																	X	X
187	D-11			1356																		X	X
188	OS-11			1356																		X	X
189	SP1																					X	
190	SP2																					X	

Relinquished by: (Signature) <i>M. Valenzuela</i>	Received by: (Signature) <i>[Signature]</i>	Date: 8/10/99	Time: 0900
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <i>[Signature]</i>	Received for Laboratory by: (Signature) <i>Dandy McRae</i>	Date: 8-10-99	Time: 10:20

Q&O Graphic (714) 894-9702

**SILLIKER LABORATORIES
OF CALIFORNIA, INC.**

1139 East Dominguez, Suite I
Carson, CA • 90746
(310) 637-7121 • FAX (310) 637-2953

FOOD SAFETY • QUALITY • NUTRITION

LABORATORY REPORT

Report No. Date Page

489755 8/16/99 1

Purchase Order

PROJECT #:99-08-0271

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 8/10/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 8/16/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	FECAL COLIFORMS MPN/100ML
SAMPLE ID:SP1 DATE:08/09/99 TIME:N/A MATRIX:SEA WATER PROJ#:99-08-0271	2	2
SAMPLE ID:SP2 DATE:08/09/99 TIME:N/A MATRIX:SEA WATER PROJ#:99-08-0271	>1,600	23

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

Report No.	Date	Page
489755	8/16/99	2

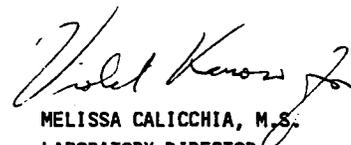
Purchase Order

PROJECT #:99-08-0271

CONTINUED:

ANALYTICAL RESULTS

Test Method: Standard Methods for the Examination of Water and Wastewater,
Section 9221A-E, APHA, AWWA, WEF, 18th edition, 1992.


MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

LABORATORY CLIENT: ADDRESS: CITY STATE ZIP TEL: FAX: E-MAIL:				CLIENT PROJECT NAME / NUMBER: 99-08-0271 PROJECT CONTACT: MargCarol Valenzuela SAMPLER(S): (SIGNATURE)				P.O. NO.: QUOTE NO.: LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>															
TURNAROUND TIME <input type="checkbox"/> SAME DAY <input type="checkbox"/> 24 HR <input type="checkbox"/> 48 HR <input type="checkbox"/> 72 HR <input type="checkbox"/> 5 DAYS <input type="checkbox"/> 10 DAYS SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY) <input type="checkbox"/> RWQCB REPORTING <input type="checkbox"/> ARCHIVE SAMPLES UNTIL ___/___/___ SPECIAL INSTRUCTIONS Sea Water				REQUESTED ANALYSES																			
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	FAT Coliforms	E.Coli / Enterococcus
			DATE	TIME																			
186	OS-10		8/9/99	1424	W																	X	X
187	B-11			1356																		X	X
188	OS-11			1356																		X	X
189	SP1																					X	
190	SP2																					X	
Relinquished by: (Signature) M. Valenzuela						Received by: (Signature) [Signature]						Date: 8/10/99		Time: 0900									
Relinquished by: (Signature)						Received by: (Signature)						Date:		Time:									
Relinquished by: (Signature) [Signature]						Received for Laboratory by: (Signature) Dandy McNoce						Date: 8-10-99		Time: 10:20									

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

Please note that pages 1 and 2 of 2 of our T/ICs are printed on the reverse side of the Yellow and Pink copies respectively.

LABORATORY CLIENT:
URS GREINER WOODWARD CLYDE

ADDRESS:
2020 E. FIRST ST.

CITY: **SANTA ANA** STATE: **CA** ZIP: **92705**

TEL: **714-835-6886** FAX: **714-667-7147** E-MAIL:

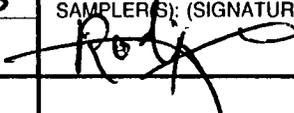
TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

CLIENT PROJECT NAME / NUMBER:
MALIBU WATER TEST SAMPLING

PROJECT CONTACT:
ERIC FORDHAM

SAMPLER(S): (SIGNATURE)


P.O. NO.:
 QUOTE NO.:
 LAB USE ONLY
 -

REQUESTED ANALYSES																		
TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	BOD, NO ₂ , NO ₃ , NH ₃	TRN, NH ₃	Total Fecal Coliform	S. Coli

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	B-1	Beach Site 1	8/9/99	1400	H ₂ O	4
	OS-1	OCEAN SITE 1	8/9/99	1349H	H ₂ O	4
	B-2	Beach Site 2	"	1420H	"	4
	OS-2	OCEAN SITE 2	"	1419H	"	4
	B-3	BEACH SITE 3	"	1500	"	4
	OS-3	OCEAN SITE 3	"	1455	"	4
	B-4	BEACH SITE 4	"	1535	"	4
	OS-4	OCEAN SITE 4	"	1535	"	4
	LS-1	Lagoon	"	1600	"	4

Relinquished by: (Signature) 	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature) 	Date: <u>8/09/99</u>	Time: <u>1830</u>

Q&O Graphic (714) 898-9702

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 8.9.99
Page 2 of 3

LABORATORY CLIENT: **URS GREINER WOODWARD CLYDE**
ADDRESS: **2020 E. FIRST ST**
CITY: **SANTA ANA** STATE: **CA** ZIP: **92705**
TEL: **714-835-6886** FAX: **(714) 667-7147** E-MAIL:
TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
SPECIAL INSTRUCTIONS

CLIENT PROJECT NAME / NUMBER: **MALIBU WATER TEST SAMPLING** P.O. NO.:
PROJECT CONTACT: **ERIC FORDHAM** QUOTE NO.:
SAMPLER(S): (SIGNATURE) LAB USE ONLY
 -

REQUESTED ANALYSES

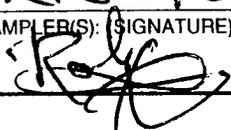
TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	BOD, NO ₂ , NO ₃ , MBAS	TKN, NH ₃	Total Fecal Coliform	S. Coli

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	B-5	Beach	8/9/99	1515	H ₂ O	4
	OS-5	Ocean		1515		4
	B-6	Beach		1445		4
	OS-6	Ocean		1445		4
	B-7	Beach		1415		4
	OS-7	Ocean		1415		4
	B-8	Beach		1350		4
	OS-8	Ocean		1350		4
	B-9	Beach		1500		4
	OS-9	Ocean		1500		4

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date: <u>8/09/99</u>	Time: <u>1830</u>

Q&Q Graphic (714) 898-9702

LABORATORY CLIENT:
URS GREINER WOODWARD CLYDE
 ADDRESS:
2020 E. FIRST ST.
 CITY **SANTA ANA** STATE **CA** ZIP **92705**
 TEL: **714 835 6886** FAX: **714 667 7147** E-MAIL:

CLIENT PROJECT NAME / NUMBER:
MALIBU WATER TEST SAMPLING
 PROJECT CONTACT:
ERIC FORDHAM
 SAMPLER(S) (SIGNATURE):


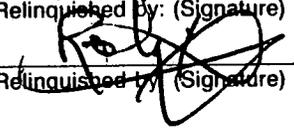
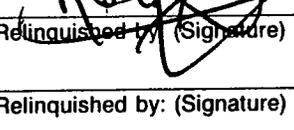
P.O. NO.:
 QUOTE NO.:
 LAB USE ONLY
 8 - 0271

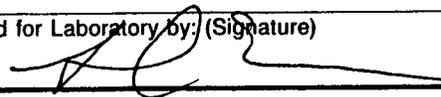
TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
 SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
 SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	B-10	Beach	8/9/99	1421	H ₂ O	4
	07-10	Ocean		1421	H ₂ O	4
	B-11	Beach		1356	H ₂ O	4
	07-11	Ocean		1356	H ₂ O	4
	SP1	Storm Drain	8/9/99		H ₂ O	1
	SP2	Storm Drain	8/9/99		H ₂ O	1

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNA's (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	PH	PO ₄ , NO ₃ , NO ₂ , NH ₃ , NH ₄	Total / Fecal Coliform	E. Coli

Relinquished by: (Signature)

 Relinquished by: (Signature)

 Relinquished by: (Signature)

Received by: (Signature)
 Received by: (Signature)
 Received for Laboratory by: (Signature)


Date: _____ Time: _____
 Date: _____ Time: _____
 Date: 8-9-99 Time: 1838

Calscience
Environmental
Laboratories, Inc.

August 16, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-08-0248**
Client Reference: **Malibu Water Quality**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 08/09/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/11/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0248
 Method: EPA 350.2
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
P-1	ND	0.1
P-2	27.9	0.1
P-6	0.6	0.1
P-7	ND	0.1
P-9	ND	0.1
C-1	ND	0.1
C-2	9.6	0.1
SD-1	ND	0.1
SD-2	ND	0.1
SD-3	ND	0.1
CS-1	ND	0.1
CS-2	ND	0.1
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-08-0269-7 (Duplicate)	73	73	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0248
 Method: EPA 351.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
P-1	ND	0.5
P-2	30.7	0.5
P-6	2.2	0.5
P-7	1.1	0.5
P-9	0.8	0.5
C-1	1.4	0.5
C-2	10.6	0.5
SD-1	3.2	0.5
SD-2	2.1	0.5
SD-3	0.7	0.5
CS-1	1.3	0.5
CS-2	1.0	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
C-2 (Duplicate)	10.6	10.4	2	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0248
 Method: EPA 353.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrate-N Concentration</u>	<u>Reporting Limit</u>
P-1	12	1
P-2	ND	0.1
P-6	ND	0.1
P-7	ND	0.1
P-9	2.1	0.2
C-1	ND	0.1
C-2	ND	0.1
SD-1	ND	0.1
SD-2	ND	0.1
SD-3	1.8	0.2
CS-1	ND	0.1
CS-2	1.1	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0248
 Method: EPA 354.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrite-N Concentration</u>	<u>Reporting Limit</u>
P-1	ND	0.01
P-2	ND	0.01
P-6	ND	0.01
P-7	ND	0.01
P-9	ND	0.01
C-1	ND	0.01
C-2	ND	0.01
SD-1	0.04	0.01
SD-2	ND	0.01
SD-3	0.02	0.01
CS-1	ND	0.01
CS-2	0.06	0.01
Method Blank	ND	0.01

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10-15/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0248
 Method: EPA 405.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
P-1	ND	1
P-2	9	1
P-6	2	1
P-7	2	1
P-9	2	1
C-1	2	1
C-2	7	1
SD-1	2	1
SD-2	5	1
SD-3	4	1
CS-1	3	1
CS-2	3	1
Method Blank	ND	1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
B-1 (Duplicate)	1	1	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 08/09/99
 Date Received: 08/09/99
 Date Analyzed: 08/10/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-08-0248
 Method: EPA 425.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
P-1	ND	0.1
P-2	4.0	0.2
P-6	ND	0.1
P-7	ND	0.1
P-9	ND	0.1
C-1	ND	0.1
C-2	0.2	0.1
SD-1	0.2	0.1
SD-2	ND	0.1
SD-3	ND	0.1
CS-1	ND	0.1
CS-2	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

QUALITY ASSURANCE SUMMARY
Method EPA 353.3

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0248
Date Analyzed: 08/10/99

Matrix Spike/Matrix Spike Duplicate
Sample Spiked: 99-08-0271-21

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	98	97	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY
Method EPA 354.1

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0248
Date Analyzed: 08/10/99

Matrix Spike/Matrix Spike Duplicate
Sample Spiked: 99-08-0271-21

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	110	110	70 - 130	1	0 - 25

QUALITY ASSURANCE SUMMARY
Method EPA 425.1

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-08-0248
Date Analyzed: 08/10/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: CS-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	96	90	70 - 130	6	0 - 25

**SILLIKER LABORATORIES
OF CALIFORNIA, INC.**

1139 East Dominguez, Suite I
Carson, CA • 90746
(310) 637-7121 • FAX (310) 637-2953

FOOD SAFETY • QUALITY • NUTRITION

LABORATORY REPORT

Report No. Date Page

489695 8/16/99 1

Purchase Order

PROJECT #:99-08-0248

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 8/09/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 8/16/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:P-1 DATE:8/09/99 TIME:1120 MATRIX:W PROJ#:99-08-0248	<2	<2	<2	<2
SAMPLE ID:P-2 DATE:8/09/99 TIME:1020 MATRIX:W PROJ#:99-08-0248	1,600	900	900	8
SAMPLE ID:P-6 DATE:8/09/99 TIME:1000 MATRIX:W PROJ#:99-08-0248	<2	<2	<2	<2
SAMPLE ID:P-7 DATE:8/09/99 TIME:1150 MATRIX:W PROJ#:99-08-0248	17	<2	<2	<2
SAMPLE ID:P-9 DATE:8/09/99 TIME:1015 MATRIX:W PROJ#:99-08-0248	2	<2	<2	<2
SAMPLE ID:C-1 DATE:8/09/99 TIME:1230 MATRIX:W PROJ#:99-08-0248	<2	<2	<2	<2

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

**SILLIKER LABORATORIES
OF CALIFORNIA, INC.**

1139 East Dominguez, Suite 1
Carson, CA • 90748
(310) 637-7121 • FAX (310) 637-2953

FOOD SAFETY • QUALITY • NUTRITION

LABORATORY REPORT

Report No. Date Page

489695 8/16/99 2

Purchase Order

PROJECT #:99-08-0248

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:C-2 DATE:8/09/99 TIME:1240 MATRIX:W PROJ#:99-08-0248	8	<2	<2	23
SAMPLE ID:SD-1 DATE:8/09/99 TIME:1220 MATRIX:W PROJ#:99-08-0248	80	8	8	13
SAMPLE ID:SD-2 DATE:8/09/99 TIME:1000 MATRIX:W PROJ#:99-08-0248	1,600	140	220	170
SAMPLE ID:SD-3 DATE:8/09/99 TIME:1015 MATRIX:W PROJ#:99-08-0248	500	22	22	6
SAMPLE ID:CS-1 DATE:8/09/99 TIME:1120 MATRIX:W PROJ#:99-08-0248	900	22	22	130
SAMPLE ID:CS-2 DATE:8/09/99 TIME:1150 MATRIX:W PROJ#:99-08-0248	900	26	70	30

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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1139 East Dominguez, Suite I
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LABORATORY REPORT

Report No.	Date	Page
489695	8/16/99	3
Purchase Order		
PROJECT #:99-08-0248		

CONTINUED:

ANALYTICAL RESULTS

Test Method: Standard Methods for the Examination of Water and Wastewater,
Section 9221-E, 9230A-B, APHA, AWWA, WEF, 18th edition, 1992.

Melissa Calicchia
MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 8/9/99
Page 1 of 2

17 11:28:45

LABORATORY CLIENT:
ADDRESS:
CITY STATE ZIP
TEL: FAX: E-MAIL:

CLIENT PROJECT NAME / NUMBER:
99-08-0248
PROJECT CONTACT:
Margaret Valenzuela
SAMPLER(S) (SIGNATURE)
P.O. NO.:
QUOTE NO.:
LAB USE ONLY
 -

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
SPECIAL INSTRUCTIONS
#489195

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T & F Coliform	E. coli & Enterococcus
			DATE	TIME																			
154	P-1		8-9-99	1120	W																		
155	P-2			1020																			
156	P-6			1000																			
157	P-7			1150																			
158	P-9			1015																			
159	C-1			1230																			
160	C-2			1240																			
161	SD-1			1220																			
162	SD-2			1000																			
163	SD-3			1015																			

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>8-9-99</u>	Time: <u>1430</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date:	Time:

Q&C Graphic (714) 898-9702

7440 LINCOLN WAY
 GARDEN GROVE, CA 92841-1432
 TEL: (714) 895-5494 • FAX: (714) 894-7501

Date 8/9/99
 Page 2 of 2

LABORATORY CLIENT:
 ADDRESS:
 CITY STATE ZIP
 TEL: FAX: E-MAIL:

CLIENT PROJECT NAME / NUMBER:
99-08-0248
 PROJECT CONTACT:
MaryCarol Valenzuela
 SAMPLER(S) (SIGNATURE)
 P.O. NO.:
 QUOTE NO.:
 LAB USE ONLY
 -

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
 # 489295

REQUESTED ANALYSES

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T & F Coliform	E. coli / Enterococcus
															←	←

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
<u>164</u>	<u>CS-1</u>		<u>8-9-99</u>	<u>1120</u>	<u>W</u>	
<u>165</u>	<u>CS-2</u>		<u>↓</u>	<u>1150</u>	<u>↓</u>	

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>8-9-99</u>	Time: <u>1430</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date:	Time:

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Yellow and Pink copies respectively.

ALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date Aug. 7, 1999
Page 2 of 2

LABORATORY CLIENT: URS GWL
ADDRESS: 2020 E. First St. #400
CITY: Santa Ana STATE: CA ZIP: 92705
TEL: 714-835-6986 FAX: 714-667-7147 E-MAIL:

CLIENT PROJECT NAME / NUMBER: Malibu Water Quality
PROJECT CONTACT: Paul Satter / Eric Tordheim
SAMPLER(S): (SIGNATURE) [Signature]
P.O. NO.:
QUOTE NO.:
LAB USE ONLY: 08-0248

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504:1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	NO ₂ , NO ₃ , TKN, NH ₄	BOD, MBAS	Total Coliform	E. Coli, Enterococci		
			DATE	TIME																							
	CS-1	Serra Villa/Creek	8-9-99	1120	W	4																					
	CS-2	Serra Villa/Creek	8-9-99	1150	W	4																					
END OF RECORD																											

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>8-7-99</u>	Time: <u>1305</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>8-9-99</u>	Time: <u>1920</u>

LABORATORY RESULTS FOR WATER QUALITY SAMPLING

11 NOVEMBER, 1999

Calscience
Environmental
Laboratories, Inc.

November 18, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-11-0466**
Client Reference: **Malibu Water Quality**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 11/11/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 11/11/99
Date Received: 11/11/99
Date Analyzed: 11/17/99

Attn: Paul Salter
RE: Malibu Water Quality

Work Order No.: 99-11-0466
Method: EPA 350.2
Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
B1	ND	0.1
OS-1	ND	0.1
B2	ND	0.1
OS-2	ND	0.1
B3	ND	0.1
OS-3	ND	0.1
B4	ND	0.1
OS-4	ND	0.1
SD-1	ND	0.1
SD-2	3.4	0.1
CW-1	ND	0.1
CS-2	ND	0.1
P-2	29.4	0.1
P-6	ND	0.1
P-7	ND	0.1
P-9	ND	0.1
C-1	6.6	0.1
C-2	ND	0.1
L-1	ND	0.1
SD-3	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/11/99
 Date Received: 11/11/99
 Date Analyzed: 11/15/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0466
 Method: EPA 351.3
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
B1	0.8	0.5
OS-1	0.6	0.5
B2	0.8	0.5
OS-2	0.6	0.5
B3	1.1	0.5
OS-3	0.8	0.5
B4	ND	0.5
OS-4	ND	0.5
SD-1	1.1	0.5
SD-2	7.6	0.5
CW-1	0.9	0.5
CW-2	1.4	0.5
P-2	35.6	0.5
P-6	2.0	0.5
P-7	0.6	0.5
P-9	1.1	0.5
C-1	11.6	0.5
C-2	0.6	0.5
L-1	1.4	0.5

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/11/99
 Date Received: 11/11/99
 Date Analyzed: 11/15/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0466
 Method: EPA 351.3
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
SD-3	2.0	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
B1 (Duplicate)	0.8	0.8	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/11/99
 Date Received: 11/11/99
 Date Analyzed: 11/12-17/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0466
 Method: EPA 405.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
B1	ND	1
OS-1	1	1
B2	1	1
OS-2	1	1
B3	1	1
OS-3	3	1
B4	ND	1
OS-4	ND	1
SD-1	ND	1
SD-2	20	1
CW-1	ND	1
CW-2	ND	1
P-2	11	1
P-6	ND	1
P-7	ND	1
P-9	ND	1
C-1	ND	1
C-2	ND	1
L-1	6	1

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/11/99
 Date Received: 11/11/99
 Date Analyzed: 11/12-17/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0466
 Method: EPA 405.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
SD-3	4	1
Method Blank	ND	1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-11-0419-1 (Duplicate)	400	394	2	0 - 25
99-11-0472-1 (Duplicate)	372	366	2	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/11/99
 Date Received: 11/11/99
 Date Analyzed: 11/12/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0466
 Method: EPA 425.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
B1	0.1	0.1
OS-1	ND	0.1
B2	ND	0.1
OS-2	ND	0.1
B3	ND	0.1
OS-3	0.1	0.1
B4	ND	0.1
OS-4	ND	0.1
SD-1	ND	0.1
SD-2	0.4	0.1
CW-1	ND	0.1
CW-2	ND	0.1
P-2	1.9	0.1
P-6	ND	0.1
P-7	ND	0.1
P-9	ND	0.1
C-1	ND	0.1
C-2	ND	0.1
L-1	0.1	0.1
SD-3	0.1	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Page 1 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B1	99-11-0466-1	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-1	99-11-0466-2	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B2	99-11-0466-3	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-2	99-11-0466-4	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B3	99-11-0466-5	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.026	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-3	99-11-0466-6	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.012	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B4	99-11-0466-7	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/11/99
Work Order No: 99-11-0466
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-0466-8	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

SD-1	99-11-0466-9	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.014	0.010	1		mg/l

SD-2	99-11-0466-10	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.092	0.010	1		mg/l

CW-1	99-11-0466-11	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.019	0.010	1		mg/l

CW-2	99-11-0466-12	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.021	0.010	1		mg/l

P-2	99-11-0466-13	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

P-6	99-11-0466-14	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Page 3 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-7	99-11-0466-15	Aqueous	11/11/99	N/A	11/12/99	991112NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

P-9	99-11-0466-16	Aqueous	11/11/99	N/A	11/12/99	991112NO2
-----	---------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

C-1	99-11-0466-17	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

C-2	99-11-0466-18	Aqueous	11/11/99	N/A	11/12/99	991112NO2
-----	---------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

L-1	99-11-0466-19	Aqueous	11/11/99	N/A	11/12/99	991112NO2
-----	---------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

SD-3	99-11-0466-20	Aqueous	11/11/99	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.030	0.010	1		mg/l

Method Blank	099-05-001-62	Aqueous	N/A	N/A	11/12/99	991112NO2
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Page 1 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B1	99-11-0466-1	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	3.4	0.5	5		mg/l

OS-1	99-11-0466-2	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

B2	99-11-0466-3	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.35	0.10	1		mg/l

OS-2	99-11-0466-4	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

B3	99-11-0466-5	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	1.1	0.1	1		mg/l

OS-3	99-11-0466-6	Aqueous	11/11/99	N/A	11/12/99	NO3991112
------	--------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

B4	99-11-0466-7	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Page 2 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-0466-8	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-1	99-11-0466-9	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.82	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-0466-10	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.19	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-1	99-11-0466-11	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	2.6	0.5	5		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-2	99-11-0466-12	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	2.5	0.5	5		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-2	99-11-0466-13	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-6	99-11-0466-14	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Page 3 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-7	99-11-0466-15	Aqueous	11/11/99	N/A	11/12/99	NO3991112

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

P-9	99-11-0466-16	Aqueous	11/11/99	N/A	11/12/99	NO3991112
-----	---------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

C-1	99-11-0466-17	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

C-2	99-11-0466-18	Aqueous	11/11/99	N/A	11/12/99	NO3991112
-----	---------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

L-1	99-11-0466-19	Aqueous	11/11/99	N/A	11/12/99	NO3991112
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

SD-3	99-11-0466-20	Aqueous	11/11/99	N/A	11/12/99	NO3991112
------	---------------	---------	----------	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Method Blank	099-05-001-65	Aqueous	N/A	N/A	11/12/99	NO3991112
--------------	---------------	---------	-----	-----	----------	-----------

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

QUALITY ASSURANCE SUMMARY
 Method EPA 425.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-11-0466
 Date Analyzed: 11/12/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: SD-3

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants (MBAS)	108	109	70 - 130	1	0 - 25

Laboratory Control Sample

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants (MBAS)	1.00	0.94	94	80 - 120

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
SD-2	Aqueous	8452A	N/A	11/12/99	991112NO2

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrite-N	96	99	70-130	1	0-25	

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/11/99
 Work Order No: 99-11-0466
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
114	Aqueous	8452A	N/A	11/12/99	NO3991112

<u>Parameter</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Nitrate-N	110	114	70-130	2	0-25	



Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/11/99
Work Order No: 99-11-0466
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-62	Aqueous	8452A	11/12/99		991112NO2

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0247	99	80-120	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received:
Work Order No:
Preparation:
Method:

11/11/99
99-11-0466
N/A
EPA 353.3

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-65	Aqueous	8452A	11/12/99		NO3991112

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.562	112	80-120	

Work Order Number: 99-11-0466

<u>Qualifier</u>	<u>Definition</u>
ND	Not detected at indicated reporting limit.

SILLIKER

Assuring Quality Worldwide

SILLIKER LABORATORIES OF CALIFORNIA
1139 EAST DOMINGUEZ ST., SUITE 1 • CARSON, CA 90746
TEL: 310/ 637 7121 • FAX: 310/ 637 2953

LABORATORY REPORT

REPORT NO. DATE PAGE

508010 11/19/99 1

PURCHASE ORDER

PROJECT #:99-11-0466

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 11/11/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 11/19/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-1 DATE:11/11/99 TIME:1550 MATRIX:W PROJ#:99-11-0466	<2	<2	<2	7
SAMPLE ID:OS-1 DATE:11/11/99 TIME:1550 MATRIX:W PROJ#:99-11-0466	800	230	230	23
SAMPLE ID:B-2 DATE:11/11/99 TIME:1625 MATRIX:W PROJ#:99-11-0466	11	11	11	14
SAMPLE ID:OS-2 DATE:11/11/99 TIME:1625 MATRIX:W PROJ#:99-11-0466	800	130	130	80
SAMPLE ID:B-3 DATE:11/11/99 TIME:1630 MATRIX:W PROJ#:99-11-0466	23	13	13	4
SAMPLE ID:OS-3 DATE:11/11/99 TIME:1630 MATRIX:W PROJ#:99-11-0466	800	170	170	130

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-4 DATE:11/11/99 TIME:1730 MATRIX:W PROJ#:99-11-0466	2	2	2	<2
SAMPLE ID:OS-4 DATE:11/11/99 TIME:1730 MATRIX:W PROJ#:99-11-0466	2	2	2	<2
SAMPLE ID:SD-1 DATE:11/11/99 TIME:1355 MATRIX:W PROJ#:99-11-0466	3,000	500	500	240
SAMPLE ID:SD-2 DATE:11/11/99 TIME:1320 MATRIX:W PROJ#:99-11-0466	>16,000	>16,000	>16,000	130
SAMPLE ID:CW-1 DATE:11/11/99 TIME:1345 MATRIX:W PROJ#:99-11-0466	240	240	240	<2
SAMPLE ID:CW-2 DATE:11/11/99 TIME:1325 MATRIX:W PROJ#:99-11-0466	80	30	30	30

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* CONTINUED *

LABORATORY REPORT		
REPORT NO.	DATE	PAGE
508010	11/19/99	3
PURCHASE ORDER		
PROJECT #:99-11-0466		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:P-2 DATE:11/11/99 TIME:1415 MATRIX:W PROJ#:99-11-0466	5,000	23	23	<2
SAMPLE ID:P-6 DATE:11/11/99 TIME:1438 MATRIX:W PROJ#:99-11-0466	9,000	9,000	9,000	500
SAMPLE ID:P-7 DATE:11/11/99 TIME:1435 MATRIX:W PROJ#:99-11-0466	8	<2	<2	<2
SAMPLE ID:P-9 DATE:11/11/99 TIME:1520 MATRIX:W PROJ#:99-11-0466	<2	<2	<2	4
SAMPLE ID:C-1 DATE:11/11/99 TIME:1650 MATRIX:W PROJ#:99-11-0466	130	130	130	300
SAMPLE ID:C-2 DATE:11/11/99 TIME:1700 MATRIX:W PROJ#:99-11-0466	4	<2	<2	23

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* CONTINUED *

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REPORT NO.	DATE	PAGE
508010	11/19/99	4
PURCHASE ORDER		
PROJECT #:99-11-0466		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:L-1 DATE:11/11/99 TIME:1330 MATRIX:W PROJ#:99-11-0466	800	500	500	17
SAMPLE ID:SD-3 DATE:11/11/99 TIME:1600 MATRIX:W PROJ#:99-11-0466	>16,000	230	230	240

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, 9225A-C, 9230A-B, APHA, AWWA, WEF, 18TH EDITION, 1992.


MELISSA CALTECHIA, M.S.
LABORATORY DIRECTOR

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LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

DATE RECEIVED

Date 11/11/99

Page 3 of

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 99-11-0466		P.O. NO.:
ADDRESS:			PROJECT CONTACT: MARYCAROL VALENZUELA		QUOTE NO.:
CITY:	STATE:	ZIP:	SAMPLER(S): (SIGNATURE)		LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
TEL:	FAX:	E-MAIL:			

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___ / ___ / ___

SPECIAL INSTRUCTIONS
CSMV

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T & F COLIFORM	E. COLI : ENTEROCOCCUS	
			DATE	TIME																				
312	B-1			1550	W	2																		
313	OS-1			"																				
314	B-2			1625																				
315	OS-2			"																				
316	B3			1630																				
317	OS-3			"																				
318	B4			1730																				
319	OS4			"																				
320	SD1			1355																				
321	SD2			1320																				

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CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
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CHAIN OF CUSTODY RECORD

Date 11/11/99
Page 4 of

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 99-11-0466			P.O. NO.:		
ADDRESS:			PROJECT CONTACT: MARYCAROL VALENZUELA			QUOTE NO.:		
CITY: _____ STATE: _____ ZIP: _____			SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		
TEL: _____		FAX: _____		E-MAIL: _____				

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (D)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T: F coliform	E. COLI / ENTEROCOCCUS
			DATE	TIME																			
322	CW 1		11/11/99	1345	W	2																	
323	CW 2			1325																			
324	P-2			1415																			
325	P-6			1438																			
326	P-7			1435																			
327	P-9			1520																			
328	C-1			1650																			
329	C-2			1700																			
330	L-1			1330																			
331	SD-3			1600																			

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature) <i>Marycarol Valenzuela</i>	Date: <u>11/11/99</u>	Time: <u>1:20 PM</u>

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02/01/99 Revision

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CHAIN OF CUSTODY RECORD

Date Nov. 11-1999

Page 1 of

LABORATORY CLIENT: <u>URS Greiner Woodward Clyde</u>			CLIENT PROJECT NAME / NUMBER: <u>Malibu Water Quality</u>			P.O. NO.:		
ADDRESS: <u>2020 E. First St. #400</u>			PROJECT CONTACT: <u>Paul Satter</u>			QUOTE NO.:		
CITY: <u>Santa Ana</u> STATE: <u>CA</u> ZIP: <u>92705</u>			SAMPLER(S) (SIGNATURE): <u>[Signature]</u>			LAB USE ONLY		
TEL: <u>714-835-6886</u>		FAX: <u>714-667-7147</u>		E-MAIL:		<input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>		

REQUESTED ANALYSES

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL / /

SPECIAL INSTRUCTIONS

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	MBAS, BOD, NO ₂ NO ₃	TKN, NH ₄	E. Coli, Enterococci	Fecal & Total Coliform	
			DATE	TIME																						
	CW-1	Malibu Creek	11/11/99	1345	W	4																				
	CW-2	" "		1325	W	4																				
	P-2	Well P-2		1415	W	4																				
	P-6	Well P-6		1438	W	4																				
	P-7	Well P-7		1435	W	4																				
	P-9	Well P-9		1520	W	4																				
	C-1	Well C-1		1650	W	4																				
	C-2	Well C-2		1700	W	4																				
X	L-1	Breach/Lagoon #1		1330	W	4																				
	SD-3	Storm Drain #3		1600	W	4																				

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>11/11/99</u>	Time: <u>1745</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>11/11/99</u>	Time: <u>1850</u>

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LABORATORY RESULTS FOR WATER QUALITY SAMPLING

15 NOVEMBER, 1999

Calscience
Environmental
Laboratories, Inc.

November 22, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-11-0562**
Client Reference: **Malibu Water Quality**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 11/15/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/19/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 350.2
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
B-1	1.3	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-4	ND	0.1
OS-4	ND	0.1
CW-1	ND	0.1
CW-2	ND	0.1
P-1	ND	0.1
P-2	17.9	0.5
P-6	1.2	0.1
P-7	ND	0.1
C-1	7.9	0.1
C-2	0.1	0.1
P-9	1.7	0.1
SD-1	0.1	0.1
SD-2	23.4	0.1

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/19/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 350.2
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
SD-3	3.0	0.1
L-1	0.4	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
P-2 (Duplicate)	17.9	17.6	2	0 - 25
99-11-0706-2 (Duplicate)	100	100	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/18/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 351.3
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
B-1	2.0	0.5
OS-1	2.3	0.5
B-2	1.4	0.5
OS-2	0.8	0.5
B-3	ND	0.5
OS-3	0.8	0.5
B-4	1.1	0.5
OS-4	0.6	0.5
CW-1	1.1	0.5
CW-2	1.1	0.5
P-1	0.8	0.5
P-2	18.2	0.5
P-6	1.4	0.5
P-7	2.5	0.5
C-1	8.1	0.5
C-2	2.0	0.5
P-9	1.7	0.5
SD-1	1.4	0.5
SD-2	25.2	0.5

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/18/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 351.3
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
SD-3	7.3	0.5
L-1	1.4	0.5
Method Blank	ND	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
B-1 (Duplicate)	2.0	2.0	0	0 - 25
99-11-0528-4 (Duplicate)	ND	ND	NA	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/15/99
Work Order No: 99-11-0562
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 1 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-1	99-11-0562-1	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	12	2	25		mg/l

OS-1	99-11-0562-2	Aqueous	11/15/99	N/A	11/16/99	991116NO3
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

B-2	99-11-0562-3	Aqueous	11/15/99	N/A	11/16/99	991116NO3
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

OS-2	99-11-0562-4	Aqueous	11/15/99	N/A	11/16/99	991116NO3
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

B-3	99-11-0562-5	Aqueous	11/15/99	N/A	11/16/99	991116NO3
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

OS-3	99-11-0562-6	Aqueous	11/15/99	N/A	11/16/99	991116NO3
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

B-4	99-11-0562-7	Aqueous	11/15/99	N/A	11/16/99	991116NO3
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.12	0.10	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/15/99
Work Order No: 99-11-0562
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 2 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-0562-8	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-1	99-11-0562-9	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	3.3	0.5	5		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-2	99-11-0562-10	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	3.3	0.5	5		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-1	99-11-0562-11	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	6.4	1.0	10		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-2	99-11-0562-12	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-6	99-11-0562-13	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.14	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-7	99-11-0562-14	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/15/99
Work Order No: 99-11-0562
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 3 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-1	99-11-0562-15	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-2	99-11-0562-16	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-9	99-11-0562-17	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-1	99-11-0562-18	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	1.2	0.2	2		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-0562-19	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-3	99-11-0562-20	Aqueous	11/15/99	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
L-1	99-11-0562-21	Aqueous	11/15/99	N/A	11/16/99	NO3991116

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	1.1	0.2	2		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Page 4 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
	099-05-001-75	Aqueous	N/A	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Method Blank	099-05-001-76	Aqueous	N/A	N/A	11/16/99	NO3991116
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Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/15/99
Work Order No: 99-11-0562
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 4 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-75	Aqueous	N/A	N/A	11/16/99	991116NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-76	Aqueous	N/A	N/A	11/16/99	NO3991116

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Page 1 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-1	99-11-0562-1	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-1	99-11-0562-2	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-2	99-11-0562-3	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-2	99-11-0562-4	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-3	99-11-0562-5	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-3	99-11-0562-6	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-4	99-11-0562-7	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Page 2 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-0562-8	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-1	99-11-0562-9	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.024	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-2	99-11-0562-10	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.028	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-1	99-11-0562-11	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.014	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-2	99-11-0562-12	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-6	99-11-0562-13	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.027	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-7	99-11-0562-14	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/15/99
Work Order No: 99-11-0562
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

Page 3 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-1	99-11-0562-15	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.012	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-2	99-11-0562-16	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-9	99-11-0562-17	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-1	99-11-0562-18	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.010	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-0562-19	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-3	99-11-0562-20	Aqueous	11/15/99	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.028	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
L-1	99-11-0562-21	Aqueous	11/15/99	N/A	11/16/99	NO2991116

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.052	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Page 4 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
	099-05-001-73	Aqueous	N/A	N/A	11/16/99	991116NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
	099-05-001-74	Aqueous	N/A	N/A	11/16/99	NO2991116

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/17-22/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 405.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
B-1	ND	1
OS-1	ND	1
B-2	ND	1
OS-2	ND	1
B-3	1	1
OS-3	ND	1
B-4	ND	1
OS-4	ND	1
CW-1	ND	1
CW-2	ND	1
P-1	ND	1
P-2	2	1
P-6	1	1
P-7	ND	1
C-1	1	1
C-2	ND	1
P-9	ND	1
SD-1	ND	1
SD-2	70	1

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/17-22/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 405.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
SD-3	2	1
L-1	2	1
Method Blank	ND	1
Method Blank	ND	1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-11-0560-1 (Duplicate)	229	232	1	0 - 25
99-11-0628-1 (Duplicate)	292	294	1	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/15/99
 Date Received: 11/15/99
 Date Analyzed: 11/17/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-0562
 Method: EPA 425.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
B-1	ND	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	0.1	0.1
B-3	0.2	0.1
OS-3	ND	0.1
B-4	ND	0.1
OS-4	ND	0.1
CW-1	ND	0.1
CW-2	ND	0.1
P-1	ND	0.1
P-2	2.0	0.1
P-6	ND	0.1
P-7	ND	0.1
C-1	ND	0.1
C-2	ND	0.1
P-9	0.2	0.1
SD-1	ND	0.1
SD-2	0.1	0.1

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 11/15/99
Date Received: 11/15/99
Date Analyzed: 11/17/99

Attn: Paul Salter
RE: Malibu Water Quality

Work Order No.: 99-11-0562
Method: EPA 425.1
Page 2 of 2

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
SD-3	0.2	0.1
L-1	ND	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
B-1	Aqueous	8452A	N/A	11/16/99	991116NO3

<u>Parameter</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Nitrate-N	96	97	70-130	1	0-25	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received:
Work Order No:
Preparation:
Method:

11/15/99
99-11-0562
N/A
EPA 353.3

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-75	Aqueous	8452A	11/16/99		991116NO3

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.436	87	80-120	

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
L-1	Aqueous	8452A	N/A	11/16/99	NO3991116

<u>Parameter</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Nitrate-N	98	98	70-130	0	0-25	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received:
Work Order No:
Preparation:
Method:

11/15/99
99-11-0562
N/A
EPA 353.3

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-76	Aqueous	8452A	11/16/99		NO3991116

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.478	96	80-120	

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CW-2	Aqueous	8452A	N/A	11/16/99	991116NO2

<u>Parameter</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Nitrite-N	107	102	70-130	4	0-25	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received:
Work Order No:
Preparation:
Method:

11/15/99
99-11-0562
N/A
EPA 354.1

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-73	Aqueous	8452A	11/16/99		991116NO2

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0251	100	80-120	

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/15/99
 Work Order No: 99-11-0562
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
L-1	Aqueous	8452A	N/A	11/16/99	NO2991116

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrite-N	110	110	70-130	0	0-25	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received:
Work Order No:
Preparation:
Method:

11/15/99
99-11-0562
N/A
EPA 354.1

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-74	Aqueous	8452A	11/16/99		NO2991116

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0253	101	80-120	

QUALITY ASSURANCE SUMMARY
 Method EPA 425.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-11-0562
 Date Analyzed: 11/17/99

Matrix Spike/Matrix Spike Duplicate #1

Sample Spiked: B-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	98	97	70 - 130	1	0 - 25

Matrix Spike/Matrix Spike Duplicate #2

Sample Spiked: 99-11-0585-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	99	100	70 - 130	1	0 - 25

Laboratory Control Sample #1

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	1.00	0.94	94	80 - 120

Laboratory Control Sample #2

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	1.00	0.94	94	80 - 120

Work Order Number: 99-11-0562

<u>Qualifier</u>	<u>Definition</u>
ND	Not detected at indicated reporting limit.

SILLIKER LABORATORIES OF CALIFORNIA
 1139 EAST DOMINGUEZ ST., SUITE 1 • CARSON, CA 90746
 TEL: 310/ 637 7121 • FAX: 310/ 637 2953

LABORATORY REPORT		
REPORT NO.	DATE	PAGE
508456	11/22/99	1
PURCHASE ORDER		
PROJECT #:99-11-0562		

MS. MARYCAROL VALENZUELA
 PROJECT MANAGER
 CALSCIENCE ENVIRONMENTAL
 LABORATORIES, INC.
 7440 LINCOLN WAY
 GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 11/15/99
 RECEIVED FROM: GARDEN GROVE, CA
 REPORT FAXED: 11/22/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: P-1 DATE:11/15/99 TIME:1113 MATRIX:SEAWATER PROJ#:99-11-0562	<2	<2	<2	<2
SAMPLE ID: P-2 DATE:11/15/99 TIME:1145 MATRIX:SEAWATER PROJ#:99-11-0562	110	27	27	4
SAMPLE ID: P-6 DATE:11/15/99 TIME:1300 MATRIX:SEAWATER PROJ#:99-11-0562	80	<2	<2	4
SAMPLE ID: P-7 DATE:11/15/99 TIME:0820 MATRIX:SEAWATER PROJ#:99-11-0562	2	<2	<2	<2
SAMPLE ID: C-1 DATE:11/15/99 TIME:0915 MATRIX:SEAWATER PROJ#:99-11-0562	50	4	4	240
SAMPLE ID: C-2 DATE:11/15/99 TIME:0925 MATRIX:SEAWATER PROJ#:99-11-0562	<2	<2	<2	4

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT		
REPORT NO.	DATE	PAGE
508456	11/22/99	2
PURCHASE ORDER		
PROJECT #:99-11-0562		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: P-9 DATE:11/15/99 TIME:1217 MATRIX:SEAWATER PROJ#:99-11-0562	<2	<2	<2	<2
SAMPLE ID: SD-1 DATE:11/15/99 TIME:1015 MATRIX:SEAWATER PROJ#:99-11-0562	>16,000	80	80	7
SAMPLE ID: SD-2 DATE:11/15/99 TIME:1245 MATRIX:SEAWATER PROJ#:99-11-0562	>16,000	>16,000	>16,000	240
SAMPLE ID: SD-3 DATE:11/15/99 TIME:1015 MATRIX:SEAWATER PROJ#:99-11-0562	>16,000	500	500	13

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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Assuring Quality Worldwide

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LABORATORY REPORT

REPORT NO.	DATE	PAGE
508456	11/22/99	3

PURCHASE ORDER

PROJECT #:99-11-0562

CONTINUED:

ANALYTICAL RESULTS

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, 9225A-C, 9230A-B, APHA, AWWA, WEF, 18TH EDITION, 1992.



MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

CAESCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date: 11/15/99
Page: 4 of 4

S. J. A. S. O.

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: <u>99-11-0565</u>		P.O. NO.:
ADDRESS:			PROJECT CONTACT: <u>M. VALENZUELA</u>		QUOTE NO.:
CITY:	STATE:	ZIP:	SAMPLER(S): (SIGNATURE)		LAB USE ONLY / <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
TEL:	FAX:	E-MAIL:			

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
Seawater Samples.

REQUESTED ANALYSES																
TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (10-14A) or (10-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	F. Coli / Enterococcus	F & T Coliform
															X	

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	BB-62	377	11/15/99	1225		
	BB-63	378		1205		
	BB-64	379		1145		
	BB-65	380		837		
X	BB-66	381		810		
	C-25	382		925		
	P-25	383		1151		
	SD-25	384		1245		
	P-65	385		1257		
	E-2	386		1310		

Relinquished by: (Signature) <i>M. Valenzuela</i>	Received by: (Signature) <i>[Signature]</i>	Date: <u>11/15/99</u>	Time: <u>6:14 PM</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date:	Time:

Q&Q Graphic (714) 895 9702

SILLIKER

Assuring Quality Worldwide

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LABORATORY REPORT

REPORT NO.	DATE	PAGE
508457	11/22/99	1

PURCHASE ORDER

PROJECT #:99-11-0562

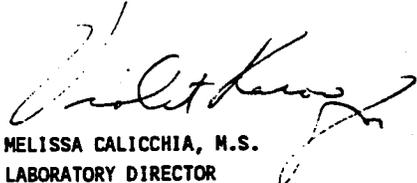
MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 11/15/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 11/22/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: L-1 DATE: 11/15/99 TIME: 0950 MATRIX: SEAWATER PROJ#: 99-11-0562	2,400	2,400	2,400	80

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, 9225A-C, 9230A-B, APHA, AWWA, WEF, 18TH EDITION, 1992.


MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

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LABORATORY REPORT

REPORT NO. DATE PAGE

508455

11/23/99

1

PURCHASE ORDER

PROJECT #:99-11-0562

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 11/15/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 11/23/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: B-1 DATE:11/15/99 TIME:1025 MATRIX:SEAWATER PROJ#:99-11-0562	4	<2	<2	12
SAMPLE ID: OS-1 DATE:11/15/99 TIME:1025 MATRIX:SEAWATER PROJ#:99-11-0562	27	13	13	<2
SAMPLE ID: B-2 DATE:11/15/99 TIME:1000 MATRIX:SEAWATER PROJ#:99-11-0562	<2	<2	<2	<2
SAMPLE ID: OS-2 DATE:11/15/99 TIME:0915 MATRIX:SEAWATER PROJ#:99-11-0562	220	27	27	2
SAMPLE ID: B-3 DATE:11/15/99 TIME:0805 MATRIX:SEAWATER PROJ#:99-11-0562	<2	<2	<2	<2
SAMPLE ID: OS-3 DATE:11/15/99 TIME:0805 MATRIX:SEAWATER PROJ#:99-11-0562	230	130	130	23

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* CONTINUED *

LABORATORY REPORT		
REPORT NO.	DATE	PAGE
508455	11/23/99	2
PURCHASE ORDER		
PROJECT #:99-11-0562		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: B-4 DATE:11/15/99 TIME:1200 MATRIX:SEAWATER PROJ#:99-11-0562	23	2	2	<2
SAMPLE ID: OS-4 DATE:11/15/99 TIME:1200 MATRIX:SEAWATER PROJ#:99-11-0562	<2	<2	<2	<2
SAMPLE ID: CW-1 DATE:11/15/99 TIME:1330 MATRIX:SEAWATER PROJ#:99-11-0562	170	23	23	80
SAMPLE ID: CW-2 DATE:11/15/99 TIME:1315 MATRIX:SEAWATER PROJ#:99-11-0562	900	170	170	30

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

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LABORATORY REPORT

REPORT NO. DATE PAGE

508455

11/23/99

3

PURCHASE ORDER

PROJECT #:99-11-0562

CONTINUED:

ANALYTICAL RESULTS

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, 9225A-C, 9230A-B, APHA, AWWA, WEF, 18TH EDITION, 1992.


MELISSA CALCCHIA, M.S.
LABORATORY DIRECTOR

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CHAIN OF CUSTODY RECORD

Date 11/15/99
Page 1 of 3

W455

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 99-11-0562			P.O. NO.:			
ADDRESS:			PROJECT CONTACT: Marycarol VALENZUELA			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
Seawater Samples

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	E. coli / Enterococcus	T & F Coliform
			DATE	TIME																			
	B-1	387	11/15/99	1025		2																X	X
	OS-1	388		1025																			
	B-2	389		1000																			
	OS-2	390		0915																			
	B-3	391		0805																			
	OS-3	392		0805																			
	B-4	393		1200																			
	OS-4	394		1200																			
	CW-1	395		1330																			
	CW-2	396		1315																			

Relinquished by: (Signature) <i>[Signature]</i>	Received by: (Signature) <i>[Signature]</i>	Date: 11/15/99	Time: 6:14 PM
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date:	Time:

Q&Q Graphic (714) 898-9702

**CAESCIENCE ENVIRONMENTAL
LABORATORIES, INC.**

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date Nov. 15, 1999
Page 1 of 3

LABORATORY CLIENT: <u>URS Woodward Clyde</u>		CLIENT PROJECT NAME / NUMBER: <u>Malibu Water Quality</u>	P.O. NO.:
ADDRESS: <u>2020 E. First St. #400</u>		PROJECT CONTACT: <u>Paul Salter</u>	QUOTE NO.:
CITY: <u>Santa Ana</u>	STATE: <u>CA</u>	SAMPLER(S): (SIGNATURE) <u>[Signature]</u>	LAB USE ONLY <u>11-0562</u>
ZIP: <u>92705</u>	TEL: <u>714/835/6886</u>	FAX: <u>714-667-747</u>	E-MAIL:

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES																		
TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	E. Coli, Enterococcus	Total & Fecal Coliforms	NO ₂ , NO ₃ , MBAS, BOD	TKN, NH ₄

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	B-1	Beach #1	11/15/99	1025	W	4
	OS-1	Ocean #1		1025		
	B-2	Beach #2		1000		
	OS-2	Ocean #2		0915		
	B-3	Beach #3		0805		
	OS-3	Ocean #3		0805		
	B-4	Beach #4		1200		
	OS-4	Ocean #4		1200		
	CW-1	Creek #1		1330		
	CW-2	Creek #2		1315		

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>11/15/99</u>	Time: <u>1400</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>11/15</u>	Time: <u>1630</u>

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LABORATORY RESULTS FOR WATER QUALITY SAMPLING

22 NOVEMBER, 1999

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/22/99
 Date Received: 11/22/99
 Date Analyzed: 11/24/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-11-0860
 Method: EPA 351.3
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	0.1
B-4	ND	0.1
OS-4	2.5	0.1
B-11	ND	0.1
OS-11	ND	0.1
CW-1	0.8	0.1
CW-2	ND	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
B-10 (Duplicate)	0.5	0.5	0	0 - 25
CW-2 (Duplicate)	ND	ND	NA	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/22/99
 Date Received: 11/22/99
 Date Analyzed: 11/24/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-11-0860
 Method: EPA 351.3
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
P-2	14	1
P-6	1.4	0.5
P-7	0.8	0.5
P-9	2.5	0.5
C-1	8	1
C-2	0.8	0.5
SD-1	ND	0.5
SD-2	46	1
SD-3	7.3	0.5
L-1	ND	0.5
B-1	2.4	0.5
OS-1	0.8	0.5
B-2	ND	0.5
OS-2	ND	0.5
B-3	ND	0.5
OS-3	ND	0.5
B-9	ND	0.5
OS-9	ND	0.5
B-10	0.5	0.5

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/22/99
 Work Order No: 99-11-0860
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality Study

Page 2 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-0860-8	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.11	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-3	99-11-0860-9	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
L-1	99-11-0860-10	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.68	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-1	99-11-0860-11	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.57	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-1	99-11-0860-12	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-2	99-11-0860-13	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-2	99-11-0860-14	Aqueous	11/22/99	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality Study

Page 3 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-3	99-11-0860-15	Aqueous	11/22/99	N/A	11/23/99	991123NO3

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	0.13	0.10	1		mg/l

OS-3	99-11-0860-16	Aqueous	11/22/99	N/A	11/23/99	991123NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	0.37	0.10	1		mg/l

B-9	99-11-0860-17	Aqueous	11/22/99	N/A	11/23/99	991123NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

OS-9	99-11-0860-18	Aqueous	11/22/99	N/A	11/23/99	991123NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

B-10	99-11-0860-19	Aqueous	11/22/99	N/A	11/23/99	991123NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

OS-10	99-11-0860-20	Aqueous	11/22/99	N/A	11/23/99	991123NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	0.11	0.10	1		mg/l

B-4	99-11-0860-21	Aqueous	11/22/99	N/A	11/23/99	NO3991123
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	0.10	0.10	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality Study

Page 4 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-0860-22	Aqueous	11/22/99	N/A	11/23/99	NO3991123

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.11	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-11	99-11-0860-23	Aqueous	11/22/99	N/A	11/23/99	NO3991123

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-11	99-11-0860-24	Aqueous	11/22/99	N/A	11/23/99	NO3991123

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-1	99-11-0860-25	Aqueous	11/22/99	N/A	11/23/99	NO3991123

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	1.9	0.5	5		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-2	99-11-0860-26	Aqueous	11/22/99	N/A	11/23/99	NO3991123

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	1.8	0.5	5		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-93	Aqueous	N/A	N/A	11/23/99	991123NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-94	Aqueous	N/A	N/A	11/23/99	NO3991123

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality Study

Page 1 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-2	99-11-0860-1	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.22	0.04	4		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-6	99-11-0860-2	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.058	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-7	99-11-0860-3	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.014	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-9	99-11-0860-4	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.011	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-1	99-11-0860-5	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.011	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-2	99-11-0860-6	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-1	99-11-0860-7	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality Study

Page 2 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-0860-8	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-3	99-11-0860-9	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.052	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
L-1	99-11-0860-10	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.018	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-1	99-11-0860-11	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-1	99-11-0860-12	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-2	99-11-0860-13	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-2	99-11-0860-14	Aqueous	11/22/99	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality Study

Page 3 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-3	99-11-0860-15	Aqueous	11/22/99	N/A	11/23/99	991123NO2

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-3	99-11-0860-16	Aqueous	11/22/99	N/A	11/23/99	991123NO2
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

B-9	99-11-0860-17	Aqueous	11/22/99	N/A	11/23/99	991123NO2
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-9	99-11-0860-18	Aqueous	11/22/99	N/A	11/23/99	991123NO2
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

B-10	99-11-0860-19	Aqueous	11/22/99	N/A	11/23/99	991123NO2
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-10	99-11-0860-20	Aqueous	11/22/99	N/A	11/23/99	991123NO2
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

B-4	99-11-0860-21	Aqueous	11/22/99	N/A	11/23/99	NO2991123
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality Study

Page 4 of 4

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-0860-22	Aqueous	11/22/99	N/A	11/23/99	NO2991123

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-11	99-11-0860-23	Aqueous	11/22/99	N/A	11/23/99	NO2991123

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-11	99-11-0860-24	Aqueous	11/22/99	N/A	11/23/99	NO2991123

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-1	99-11-0860-25	Aqueous	11/22/99	N/A	11/23/99	NO2991123

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
CW-2	99-11-0860-26	Aqueous	11/22/99	N/A	11/23/99	NO2991123

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	0.012	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-84	Aqueous	N/A	N/A	11/23/99	991123NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-89	Aqueous	N/A	N/A	11/23/99	NO2991123

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/22/99
 Date Received: 11/22/99
 Date Analyzed: 11/24-29/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-11-0860
 Method: EPA 405.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
P-2	2	1
P-6	2	1
P-7	ND	1
P-9	ND	1
C-1	ND	1
C-2	ND	1
SD-1	ND	1
SD-2	146	10
SD-3	20	1
L-1	ND	1
B-1	ND	1
OS-1	4	1
B-2	ND	1
OS-2	ND	1
B-3	ND	1
OS-3	ND	1
B-9	ND	1
OS-9	ND	1
B-10	ND	1

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/22/99
 Date Received: 11/22/99
 Date Analyzed: 11/24-29/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-11-0860
 Method: EPA 405.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	1
B-4	1	1
OS-4	24	1
B-11	ND	1
OS-11	ND	1
CW-1	ND	1
CW-2	ND	1
Method Blank	ND	1
Method Blank	ND	1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-11-0852-1 (Duplicate)	142	150	5	0 - 25
99-11-0922-1 (Duplicate)	161	164	2	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

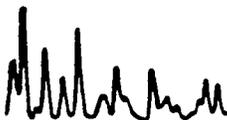
Date Sampled: 11/22/99
 Date Received: 11/22/99
 Date Analyzed: 11/23/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-11-0860
 Method: EPA 425.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
P-2	0.9	0.1
P-6	ND	0.1
P-7	ND	0.1
P-9	0.1	0.1
C-1	ND	0.1
C-2	ND	0.1
SD-1	0.2	0.1
SD-2	0.2	0.1
SD-3	0.8	0.1
L-1	ND	0.1
B-1	ND	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-9	ND	0.1
OS-9	ND	0.1
B-10	ND	0.1



ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/22/99
 Date Received: 11/22/99
 Date Analyzed: 11/23/99

Attn: Paul Salter
 RE: Malibu Water Quality Study

Work Order No.: 99-11-0860
 Method: EPA 425.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
OS-10	ND	0.1
B-4	ND	0.1
OS-4	0.1	0.1
B-11	ND	0.1
OS-11	ND	0.1
CW-1	ND	0.1
CW-2	ND	0.1
Method Blank	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/22/99
 Work Order No: 99-11-0860
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality Study

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
OS-10	Aqueous	8452A	N/A	11/23/99	991123NO3

<u>Parameter</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Nitrate-N	93	93	70-130	0	0-25	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality Study

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-93	Aqueous	8452A	11/23/99		991123NO3

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.508	102	80-120	

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/22/99
 Work Order No: 99-11-0860
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality Study

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
CW-2	Aqueous	8452A	N/A	11/23/99	NO3991123

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrate-N	89	89	70-130	0	0-25	

Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality Study

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-94	Aqueous	8452A	11/23/99		NO3991123

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.467	93	80-120	



Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/22/99
 Work Order No: 99-11-0860
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality Study

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
OS-10	Aqueous	8452A	N/A	11/23/99	991123NO2

<u>Parameter</u>	<u>MS %REC</u>	<u>MSD %REC</u>	<u>%REC CL</u>	<u>RPD</u>	<u>RPD CL</u>	<u>Qualifiers</u>
Nitrite-N	95	98	70-130	2	0-25	

Calscience
Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/22/99
 Work Order No: 99-11-0860
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality Study

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-84	Aqueous	8452A	11/23/99		991123NO2

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0239	96	80-120	

Quality Control - Spike/Spike Duplicate

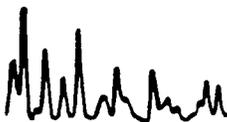
URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/22/99
 Work Order No: 99-11-0860
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality Study

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
B-4	Aqueous	8452A	N/A	11/23/99	NO2991123

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrite-N	99	92	70-130	8	0-25	



Calscience

Environmental

Laboratories, Inc.

Quality Control - Laboratory Control Sample

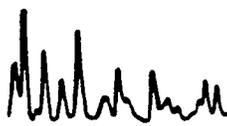
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/22/99
Work Order No: 99-11-0860
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality Study

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-89	Aqueous	8452A	11/23/99		NO2991123

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0236	94	80-120	



QUALITY ASSURANCE SUMMARY
 Method EPA 425.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-11-0860
 Date Analyzed: 11/23/99

Matrix Spike/Matrix Spike Duplicate #1

Sample Spiked: P-2

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	100	96	70 - 130	2	0 - 25

Matrix Spike/Matrix Spike Duplicate #2

Sample Spiked: CW-2

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	97	96	70 - 130	1	0 - 25

Laboratory Control Sample #1

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	1.00	0.89	89	80 - 120

Laboratory Control Sample #2

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	1.00	0.89	89	80 - 120

Work Order Number: 99-11-0860

<u>Qualifier</u>	<u>Definition</u>
ND	Not detected at indicated reporting limit.





SILLIKER LABORATORIES OF CALIFORNIA
1139 EAST DOMINGUEZ ST., SUITE 1 • CARSON, CA 90746
TEL: 310/ 637 7121 • FAX: 310/ 637 2953

LABORATORY REPORT

REPORT NO.	DATE	PAGE
509227	11/30/99	1
ORIGINAL ORDER		
PROJECT #:999-11-0860		

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 11/22/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 12/17/99
REISSUED DATE: 12/17/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:B-1 DATE:11/22 TIME:1615 MATRIX:SEAWATER PROJ#:99-11-0860	<2	<2	<2	<2
SAMPLE ID:OS-1 DATE:11/22 TIME:1615 MATRIX:SEAWATER PROJ#:99-11-0860	170	170	170	130
SAMPLE ID:B-2 DATE:11/22 TIME:1530 MATRIX:SEAWATER PROJ#:99-11-0860	<2	<2	<2	<2
SAMPLE ID:OS-2 DATE:11/22 TIME:1530 MATRIX:SEAWATER PROJ#:99-11-0860	130	130	130	18
SAMPLE ID:B-3 DATE:11/22 TIME:1425 MATRIX:SEAWATER PROJ#:99-11-0860	23	23	23	240
SAMPLE ID:OS-3 DATE:11/22 TIME:1425 MATRIX:SEAWATER PROJ#:99-11-0860	300	300	300	240

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

REPORT NO.	DATE	PAGE
509227	11/30/99	2
CLIENT ORDER		
PROJECT #: 99-11-0860		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: B-9 DATE: 11/22 TIME: 1600 MATRIX: SEAWATER PROJ#: 99-11-0860	<2	<2	<2	2
SAMPLE ID: OS-9 DATE: 11/22 TIME: 1543 MATRIX: SEAWATER PROJ#: 99-11-0860	42	4	4	<2
SAMPLE ID: B-10 DATE: 11/22 TIME: 1515 MATRIX: SEAWATER PROJ#: 99-11-0860	<2	<2	<2	4
SAMPLE ID: OS-10 DATE: 11/22 TIME: 1510 MATRIX: SEAWATER PROJ#: 99-11-0860	70	50	50	23
SAMPLE ID: P-2 DATE: 11/22 TIME: 1040 MATRIX: SEAWATER PROJ#: 99-11-0860	800	<2	800	13
SAMPLE ID: P-6 DATE: 11/22 TIME: 1130 MATRIX: SEAWATER PROJ#: 99-11-0860	17	<2	17	4

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *

REPORT NO.	DATE	PAGE
509227	11/30/99	3
PURCHASE ORDER		
PROJECT #:999-11-0860		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:P-7 DATE:11/22 TIME:1245 MATRIX:SEAWATER PROJ#:99-11-0860	<2	<2	<2	2
SAMPLE ID:P-9 DATE:11/22 TIME:1045 MATRIX:SEAWATER PROJ#:99-11-0860	<2	<2	<2	<2
SAMPLE ID:C-1 DATE:11/22 TIME:1445 MATRIX:SEAWATER PROJ#:99-11-0860	23	<2	<2	<2
SAMPLE ID:C-2 DATE:11/22 TIME:1545 MATRIX:SEAWATER PROJ#:99-11-0860	<2	<2	<2	2
SAMPLE ID:SD-1 DATE:11/22 TIME:1115 MATRIX:SEAWATER PROJ#:99-11-0860	9,000	70	70	240
SAMPLE ID:SD-2 DATE:11/22 TIME:1150 MATRIX:SEAWATER PROJ#:99-11-0860	>16,000	>16,000	>16,000	>1,600

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *



Assuring Quality Worldwide

SILLIKER LABORATORIES OF CALIFORNIA
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LABORATORY REPORT

REPORT NO.	DATE	PAGE
509227	11/30/99	4
PURCHASE ORDER		
PROJECT #-999-11-0860		

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID:SD-3 DATE:11/22 TIME:1345 MATRIX:SEAWATER PROJ#:99-11-0860	>16,000	2,400	2,400	7
SAMPLE ID:L-1 DATE:11/22 TIME:1610 MATRIX:SEAWATER PROJ#:99-11-0860	900	800	900	140
SAMPLE ID:B-4 DATE:11/22 TIME:1652 MATRIX:SEAWATER PROJ#:99-11-0860	80	<2	6	8
SAMPLE ID:OS-4 DATE:11/22 TIME:1700 MATRIX:SEAWATER PROJ#:99-11-0860	800	800	800	13
SAMPLE ID:B-11 DATE:11/22 TIME:1430 MATRIX:SEAWATER PROJ#:99-11-0860	3,000	2,400	2,400	300
SAMPLE ID:OS-11 DATE:11/22 TIME:1430 MATRIX:SEAWATER PROJ#:99-11-0860	13	13	13	80

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* CONTINUED *

LABORATORY REPORT

REPORT NO. DATE PAGE

509227 11/30/99 5

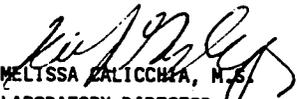
PURCHASE ORDER

PROJECT #:999-11-0860

CONTINUED:

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/100ML	E. COLI MPN/100ML	FECAL COLIFORMS MPN/100ML	ENTEROCOCCI MPN/100ML
SAMPLE ID: CW-1 DATE: 11/22 TIME: 1240 MATRIX: SEAWATER PROJ#: 99-11-0860	230	80	80	23
SAMPLE ID: CW-2 DATE: 11/22 TIME: 1210 MATRIX: SEAWATER PROJ#: 99-11-0860	700	130	170	240


MELISSA GALICCHIA, M.S.
LABORATORY DIRECTOR

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LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 999-11-0150			P.O. NO.:			
ADDRESS:			PROJECT CONTACT:			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
**SAMPLES ARE SEAWATER
 NORMAL T.A.T.**

REQUESTED ANALYSES																
TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNM (25.1)	FIXED GASES (25.1) or (D1946)	T & F COLIFORM	E. Coli & Enterococci

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
418	P-2		11/22	1040	W	2
419	P-6			1130		
420	P-7			1245		
421	P-9			1045		
422	C-1			1445		
423	C-2			1545		
424	SD-1			1115		
425	SD-2			1150		
426	SD-3			1345		
427	L-1			1610		

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature)	Date:	Time:

[Signature] *[Signature]* 11-22-99 11/22/99 1900

2 Graphic (714) 898-9702

7440 LINCOLN WAY
 GARDEN GROVE, CA 92841-1432
 TEL: (714) 895-5494 • FAX: (714) 894-7501

Date 11/22/99
 Page 2 of 3

509227

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: 999-11-0860		P.O. NO.:
ADDRESS:			PROJECT CONTACT: MARYCAROL VALENZUELA		QUOTE NO.:
CITY:	STATE:	ZIP:	SAMPLER(S): (SIGNATURE)		LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>
TEL:	FAX:	E-MAIL:			

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___ / ___ / ___

SPECIAL INSTRUCTIONS
SAMPLES ARE SEAWATER

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PbAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T: F COLIFORM	E. COLI: ENTEROCOCCUS	
			DATE	TIME																				
408	B-1		11/22	1615		2																		
409	OS-1																							
410	B-2			1530																				
411	OS-2																							
412	B-3			1425																				
413	OS-3																							
414	B-9			1600																				
415	OS-9			1543																				
416	B-10			1515																				
417	OS-10			1510																				

CSMV NORMAL T.A.T

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature) <i>Perrie Jay</i>	Date: <u>11/22/99</u>	Time: <u>1900</u>

Q&Q Graphic (714) 895-9702

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 11/22/99
Page 3 of 3

LABORATORY CLIENT:			CLIENT PROJECT NAME / NUMBER: <u>99-11-0860</u>			P.O. NO.:			
ADDRESS:			PROJECT CONTACT:			QUOTE NO.:			
CITY		STATE	ZIP		SAMPLER(S): (SIGNATURE)			LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL:	FAX:	E-MAIL:							

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
SAMPLES ARE SEAWATER
NORMAL T.A.T.

REQUESTED ANALYSES																							
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	T & F COLIFORM	E. COLI & ENTEROCOCCUS
			DATE	TIME																			
	428	B-4	11/22/99	1653	W	2																	
	429	OS-4		1700																			
	430	B-11		1430																			
	431	OS-11		1430																			
	432	CW-1		1240																			
	433	CW-2		1210																			

Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature) <u>Ramalo Soto</u>	Date: <u>11/22/99</u>	Time: <u>1900</u>

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.

02/01/99 Revision

**CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.**

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date Nov. 22, 1999

Page 1 of 3

LABORATORY CLIENT: <u>URS Greiner Woodward Clyde</u>		CLIENT PROJECT NAME / NUMBER: <u>Malibu Water Quality</u>		P.O. NO.:
ADDRESS: <u>2020 E. First St. #400</u>		PROJECT CONTACT: <u>Paul Satter</u>		QUOTE NO.:
CITY: <u>Santa Ana</u>	STATE: <u>CA</u>	ZIP: <u>92705</u>	LAB USE ONLY	
TEL: <u>714-835-6886</u>	FAX: <u>714-667-7147</u>	E-MAIL:	<input type="checkbox"/> <input type="checkbox"/> - <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input type="checkbox"/>	
		SAMPLER(S) (SIGNATURE): <u>E. Ford</u>		

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

							REQUESTED ANALYSES																				
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	MBAS, BOD, NO ₃ , NO ₂	TKN, NH ₄	E. Coli + Enterococcus	Total + Fecal Coliforms		
			DATE	TIME																							
	P-2 ✓	Well P-2	11/22/99	1040	W	4																					
	P-6 ✓	Well P-6	}	1130		4																					
	P-7 ✓	Well P-7		1245		4																					
	P-9 ✓	Well P-9		1045		4																					
	C-1 ✓	Well C-1		1445		4																					
	C-2 ✓	Well C-2		1545		4																					
	SD-1 ✓	Storm Drain #1		1115		4																					
	SD-2 ✓	Storm Drain #2		1150		4																					
	SD-3 ✓	Storm Drain #3		1345		4																					
	L-1 ✓	Lagoon #1		1610		4																					

Relinquished by: (Signature) <u>E. Ford</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>11/22</u>	Time: <u>1745</u>
Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>11/22</u>	Time: <u>2000</u>

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date Nov. 22, 1999
Page 2 of 3

LABORATORY CLIENT: <u>URS Greiner Woodward Clyde</u>		CLIENT PROJECT NAME / NUMBER: <u>Malibu Water Quality</u>	P.O. NO.:
ADDRESS: <u>2020 E. First St. #400</u>		PROJECT CONTACT: <u>Paul Salter</u>	QUOTE NO.:
CITY: <u>Santa Ana</u>	STATE: <u>CA</u>	SAMPLER(S) SIGNATURE: <u>[Signature]</u>	LAB USE ONLY <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input checked="" type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5
ZIP: <u>92705</u>			
TEL: <u>714-835-6886</u>	FAX: <u>714-667-7147</u>	E-MAIL:	

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

REQUESTED ANALYSES						
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING DATE	SAMPLING TIME	MATRIX	NO. OF CONT.
	B-1	Beach Site #1	11/22/99	1615	W	4
	OS-1	✓ Ocean Site #1		1615		4
	B-2	✓ Beach Site #2		1530 1625		4
	OS-2	✓ Ocean Site #2		1530 1625		4
	B-3	✓ Beach Site #3		1425		4
	OS-3	✓ Ocean Site #3		1425		4
	B-9	✓ Beach Site #9		1600		4
	OS-9	✓ Ocean Site #9		1543		4
	B-10	✓ Beach Site #10		1515		4
	OS-10	✓ Ocean Site #10		1510		4

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>11/22</u>	Time: <u>1745</u>
Relinquished by: (Signature)	Received by: (Signature) <u>[Signature]</u>	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>11/22</u>	Time: <u>2000</u>

LABORATORY CLIENT: <u>URS Greiner Woodward Clyde</u>		CLIENT PROJECT NAME / NUMBER: <u>Malibu Water Quality</u>		P.O. NO.:
ADDRESS: <u>2020 E. First St. #400</u>		PROJECT CONTACT: <u>Paul Salter</u>		QUOTE NO.:
CITY: <u>Santa Ana</u>	STATE: <u>CA</u>	ZIP: <u>92705</u>	LAB USE ONLY	
TEL: <u>714-835-6886</u>	FAX: <u>714-667-7147</u>	E-MAIL:	<input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/> 3 <input type="checkbox"/> 4 <input type="checkbox"/> 5	
TURNAROUND TIME		REQUESTED ANALYSES		

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	B-4 ✓	Beach Site #4	11-22-99	1652	W	4
	OS-4 ✓	Ocean Site #4		1700		4
	B-11 ✓	Beach Site #11		1430		4
	OS-11 ✓	Ocean Site #11		1430		4
	CW-1 ✓	Malibu Crk #1		1240		4
	CW-2 ✓	Malibu Crk #2		1210		4
— END OF RECORD —						

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCS (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNA's (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	MBAS, BOD, NO ₂ , NO ₃	TKN, NH ₄	E. Coliforms	Total + Fecal Coliforms

Relinquished by: (Signature) <u>Et. Ford</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>11/22/99</u>	Time: <u>1745</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>11/27</u>	Time: <u>2000</u>

LABORATORY RESULTS FOR WATER QUALITY SAMPLING

29 NOVEMBER, 1999

Calscience
Environmental
Laboratories, Inc.

December 13, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-11-1013**
Client Reference: **Malibu Water Quality**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 11/29/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 11/30/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 350.2
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
B-9	ND	0.1
OS-9	ND	0.1
B-10	ND	0.1
OS-10	ND	0.1
B-11	ND	0.1
OS-11	ND	0.1
SD-1	ND	0.1
SD-2	27.6	0.2
SD-3	4.6	0.2
L-1	ND	0.1
B-1	ND	0.1
OS-1	ND	0.1
B-2	ND	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-4	ND	0.1
OS-4	ND	0.1
C-1	6.8	0.1
C-2	0.3	0.1
Method Blank	ND	0.1

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 11/30/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 350.2
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
SD-2 (Duplicate)	27.6	27.7	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 351.3
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
B-9	ND	0.5
OS-9	ND	0.5
B-10	ND	0.5
OS-10	2.2	0.5
B-11	ND	0.5
OS-11	ND	0.5
SD-1	0.8	0.5
SD-2	50	1
SD-3	7.0	0.5
L-1	0.8	0.5
B-1	ND	0.5
OS-1	ND	0.5
B-2	ND	0.5
OS-2	ND	0.5
B-3	ND	0.5
OS-3	ND	0.5
B-4	ND	0.5
OS-4	ND	0.5
C-1	7.0	0.5
C-2	0.6	0.5
Method Blank	ND	0.5

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 351.3
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
SD-2 (Duplicate)	50	51	2	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1013
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 1 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-9	99-11-1013-1	Aqueous	11/29/99	N/A	12/01/99	991201NO3

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

OS-9	99-11-1013-2	Aqueous	11/29/99	N/A	12/01/99	991201NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

B-10	99-11-1013-3	Aqueous	11/29/99	N/A	12/01/99	991201NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	0.80	0.10	1		mg/l

OS-10	99-11-1013-4	Aqueous	11/29/99	N/A	12/01/99	991201NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

B-11	99-11-1013-5	Aqueous	11/29/99	N/A	12/01/99	991201NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

OS-11	99-11-1013-6	Aqueous	11/29/99	N/A	12/01/99	991201NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

SD-1	99-11-1013-7	Aqueous	11/29/99	N/A	12/01/99	991201NO3
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	0.73	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1013
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 2 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-1013-8	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-3	99-11-1013-9	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
L-1	99-11-1013-10	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.98	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-1	99-11-1013-11	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-1	99-11-1013-12	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-2	99-11-1013-13	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-2	99-11-1013-14	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/29/99
 Work Order No: 99-11-1013
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-3	99-11-1013-15	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-3	99-11-1013-16	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	0.16	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-4	99-11-1013-17	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
OS-4	99-11-1013-18	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-1	99-11-1013-19	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
C-2	99-11-1013-20	Aqueous	11/29/99	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-109	Aqueous	N/A	N/A	12/01/99	991201NO3

Parameter	Result	RL	DF	Qual	Units
Nitrate-N	ND	0.10	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/29/99
 Work Order No: 99-11-1013
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Page 1 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-9	99-11-1013-1	Aqueous	11/29/99	N/A	12/01/99	NO2991201

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

OS-9	99-11-1013-2	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

B-10	99-11-1013-3	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

OS-10	99-11-1013-4	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

B-11	99-11-1013-5	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

OS-11	99-11-1013-6	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

SD-1	99-11-1013-7	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1013
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

Page 2 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
SD-2	99-11-1013-8	Aqueous	11/29/99	N/A	12/01/99	NO2991201

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

SD-3	99-11-1013-9	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

L-1	99-11-1013-10	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.021	0.010	1		mg/l

B-1	99-11-1013-11	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-1	99-11-1013-12	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

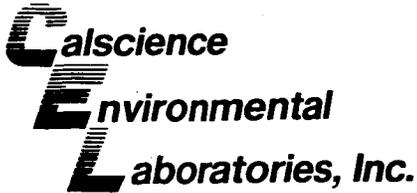
B-2	99-11-1013-13	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-2	99-11-1013-14	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1013
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

Page 3 of 3

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
B-3	99-11-1013-15	Aqueous	11/29/99	N/A	12/01/99	NO2991201

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-3	99-11-1013-16	Aqueous	11/29/99	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

B-4	99-11-1013-17	Aqueous	11/29/99	N/A	12/01/99	NO2991201
-----	---------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

OS-4	99-11-1013-18	Aqueous	11/29/99	N/A	12/01/99	NO2991201
------	---------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

C-1	99-11-1013-19	Aqueous	11/29/99	N/A	12/01/99	NO2991201
-----	---------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

C-2	99-11-1013-20	Aqueous	11/29/99	N/A	12/01/99	NO2991201
-----	---------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

Method Blank	099-05-001-112	Aqueous	N/A	N/A	12/01/99	NO2991201
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<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

RL - Reporting Limit , DF - Dilution Factor , Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01-06/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 405.1
 Page 1 of 2

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
B-9	ND	1
OS-9	ND	1
B-10	ND	1
OS-10	ND	1
B-11	ND	1
OS-11	ND	1
SD-1	ND	1
SD-2	536	10
SD-3	3	1
L-1	ND	1
B-1	ND	1
OS-1	ND	1
B-2	ND	1
OS-2	ND	1
B-3	ND	1
OS-3	ND	1
B-4	ND	1
OS-4	ND	1
C-1	ND	1
C-2	ND	1
Method Blank	ND	1
Method Blank	ND	1

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01-06/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 405.1
 Page 2 of 2

All concentrations are reported in mg/L (ppm).

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-11-1060-2 (Duplicate)	ND	ND	NA	0 - 25
99-12-0009-1 (Duplicate)	328	323	2	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1013
 Method: EPA 425.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
B-9	ND	0.1
OS-9	ND	0.1
B-10	0.1	0.1
OS-10	0.2	0.1
B-11	0.1	0.1
OS-11	ND	0.1
SD-1	ND	0.1
SD-2	0.1	0.1
SD-3	0.8	0.1
L-1	ND	0.1
B-1	0.4	0.1
OS-1	ND	0.1
B-2	0.2	0.1
OS-2	ND	0.1
B-3	ND	0.1
OS-3	ND	0.1
B-4	ND	0.1
OS-4	ND	0.1
C-1	0.1	0.1
C-2	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/29/99
 Work Order No: 99-11-1013
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
B-9	Aqueous	8453	N/A	12/01/99	991201NO3

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrate-N	91	94	70-130	3	0-25	



Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

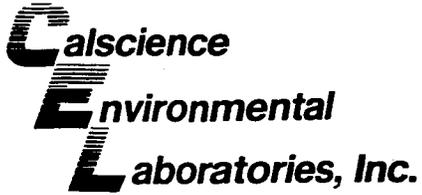
Date Received:
Work Order No:
Preparation:
Method:

11/29/99
99-11-1013
N/A
EPA 353.3

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-109	Aqueous	8453	12/01/99		991201NO3

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.463	93	80-120	



Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/29/99
 Work Order No: 99-11-1013
 Preparation: N/A
 Method: EPA 354.1

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
B-9	Aqueous	8453	N/A	12/01/99	NO2991201

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrite-N	104	106	70-130	2	0-25	



Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received:
Work Order No:
Preparation:
Method:

11/29/99
99-11-1013
N/A
EPA 354.1

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-112	Aqueous	8453	12/01/99		NO2991201

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0240	96	80-120	

QUALITY ASSURANCE SUMMARY
Method EPA 425.1

URS Greiner Woodward Clyde
Page 1 of 1

Work Order No.: 99-11-1013
Date Analyzed: 12/01/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: B-9

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	98	102	70 - 130	4	0 - 25

Laboratory Control Sample

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	0.50	0.49	98	80 - 120

GLOSSARY OF TERMS AND QUALIFIERS

Work Order Number: 99-11-1013

<u>Qualifier</u>	<u>Definition</u>
ND	Not detected at indicated reporting limit.



SILLIKER LABORATORIES OF SOUTHERN CALIFORNIA

1139 East Dominguez, Suite I
Carson, CA 90746
310-637-7121 Fax 310-637-2953

FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001694-0
Supersedes:	None
COA Date	12/7/99
Page 1 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1: Sample ID:B-9	Desc. 4: Matrix:Seawater	Laboratory ID: 150009929
Desc. 2: Date:11/29/99	Desc. 5: Desc:Beach Site #9	Condition Rec'd: NORMAL
Desc. 3: Time:1045	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u>	<u>Loc.</u>
Coliforms - 5 tube MPN	50	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	50	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	4	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	50	/100mL	APHA, 1970	12/6/99	

Desc. 1: Sample ID:OS-9	Desc. 4: Matrix:Seawater	Laboratory ID: 150009930
Desc. 2: Date:11/29/99	Desc. 5: Desc:Ocean Site #9	Condition Rec'd: NORMAL
Desc. 3: Time:1045	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u>	<u>Loc.</u>
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	<2	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/6/99	

Desc. 1: Sample ID:B-10	Desc. 4: Matrix:Seawater	Laboratory ID: 150009931
Desc. 2: Date:11/29/99	Desc. 5: Desc:Beach Site #10	Condition Rec'd: NORMAL
Desc. 3: Time:1010	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u>	<u>Loc.</u>
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	170	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/6/99	

Desc. 1: Sample ID:OS-10	Desc. 4: Matrix:Seawater	Laboratory ID: 150009932
Desc. 2: Date:11/29/99	Desc. 5: Desc:Ocean Site #10	Condition Rec'd: NORMAL
Desc. 3: Time:1010	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

<u>Analyte</u>	<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u>	<u>Loc.</u>
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	<2	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/6/99	



SILLIKER LABORATORIES OF SOUTHERN CALIFORNIA

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Carson, CA 90746

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FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001694-0
Supersedes:	None
COA Date	12/7/99
Page 2 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1: Sample ID:B-11	Desc. 4: Matrix:Seawater	Laboratory ID: 150009934
Desc. 2: Date:11/29/99	Desc. 5: Desc:Beach Site #11	Condition Rec'd: NORMAL
Desc. 3: Time:0930	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	8000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	2400	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	240	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	2400	/100mL	APHA, 1970	12/6/99	

Desc. 1: Sample ID:OS-11	Desc. 4: Matrix:Seawater	Laboratory ID: 150009935
Desc. 2: Date:11/29/99	Desc. 5: Desc:Ocean Site #11	Condition Rec'd: NORMAL
Desc. 3: Time:0920	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	30	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/6/99	

Desc. 1: Sample ID:SD-1	Desc. 4: Matrix:Seawater	Laboratory ID: 150009936
Desc. 2: Date:11/29/99	Desc. 5: Desc:Storm Drain #1	Condition Rec'd: NORMAL
Desc. 3: Time:1300	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	16000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	300	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	500	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	300	/100mL	APHA, 1970	12/6/99	

Desc. 1: Sample ID:SD-2	Desc. 4: Matrix:Seawater	Laboratory ID: 150009937
Desc. 2: Date:11/29/99	Desc. 5: Desc:Storm Drain #2	Condition Rec'd: NORMAL
Desc. 3: Time:1255	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	>16000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	1300	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	>1600	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	1300	/100mL	APHA, 1970	12/6/99	



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CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001694-0
Supersedes:	None
COA Date	12/7/99
Page 3 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:SD-3	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009938
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Storm Drain #3	Condition Rec'd:	NORMAL
Desc. 3:	Time:1235	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		16000	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		800	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		900	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		800	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:L-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009939
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Lagoon Site #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:0945	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		110	/100mL	SMEWW 18th ed. 1992	12/6/99
Coliforms - 5 tube MPN		3000	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		110	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		>1600	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		110	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:B-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009940
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:0945	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		240	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009941
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:0907	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		110	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		110	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		2	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		110	/100mL	APHA, 1970	12/6/99

The results of these tests relate only to the samples tested. This report shall not be reproduced except in full, without the written approval of the laboratory.



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Carson, CA 90746
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CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001694-0
Supersedes:	None
COA Date	12/7/99
Page 4 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1: Sample ID:B-2	Desc. 4: Matrix:Seawater	Laboratory ID: 150009942
Desc. 2: Date:11/29/99	Desc. 5: Desc:Beach Site #2	Condition Rec'd: NORMAL
Desc. 3: Time:1005	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2
Analyte	Result Units	Method Reference Test Date Loc.
Coliforms - 5 tube MPN	<2 /100mL	SMEWW 18th ed. 1992 12/6/99
E. coli - 5 tube MPN	<2 /100mL	AOAC 966.23 12/6/99
Enterococci - 10X10 ml MPN	<2 /100mL	SMEWW, 19th ed. 12/6/99
Fecal Coliforms - 5 tube MPN	<2 /100mL	APHA, 1970 12/6/99
Desc. 1: Sample ID:OS-2	Desc. 4: Matrix:Seawater	Laboratory ID: 150009943
Desc. 2: Date:11/29/99	Desc. 5: Desc:Ocean Site #2	Condition Rec'd: NORMAL
Desc. 3: Time:1000	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2
Analyte	Result Units	Method Reference Test Date Loc.
Coliforms - 5 tube MPN	170 /100mL	SMEWW 18th ed. 1992 12/6/99
E. coli - 5 tube MPN	20 /100mL	AOAC 966.23 12/6/99
Enterococci - 10X10 ml MPN	20 /100mL	SMEWW, 19th ed. 12/6/99
Fecal Coliforms - 5 tube MPN	20 /100mL	APHA, 1970 12/6/99
Desc. 1: Sample ID:B-3	Desc. 4: Matrix:Seawater	Laboratory ID: 150009944
Desc. 2: Date:11/29/99	Desc. 5: Desc:Beach Site #3	Condition Rec'd: NORMAL
Desc. 3: Time:1105	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2
Analyte	Result Units	Method Reference Test Date Loc.
Coliforms - 5 tube MPN	800 /100mL	SMEWW 18th ed. 1992 12/6/99
E. coli - 5 tube MPN	140 /100mL	AOAC 966.23 12/6/99
Enterococci - 10X10 ml MPN	23 /100mL	SMEWW, 19th ed. 12/6/99
Fecal Coliforms - 5 tube MPN	140 /100mL	APHA, 1970 12/6/99
Desc. 1: Sample ID:OS-3	Desc. 4: Matrix:Seawater	Laboratory ID: 150009945
Desc. 2: Date:11/29/99	Desc. 5: Desc:Ocean Site #3	Condition Rec'd: NORMAL
Desc. 3: Time:1105	Desc. 6: Project #:99-11-1013	Temp Rec'd (°C): 16.2
Analyte	Result Units	Method Reference Test Date Loc.
Coliforms - 5 tube MPN	2300 /100mL	SMEWW 18th ed. 1992 12/6/99
E. coli - 5 tube MPN	2300 /100mL	AOAC 966.23 12/6/99
Enterococci - 10X10 ml MPN	70 /100mL	SMEWW, 19th ed. 12/6/99
Fecal Coliforms - 5 tube MPN	2300 /100mL	APHA, 1970 12/6/99

The results of these tests relate only to the samples tested. This report shall not be reproduced except in full, without the written approval of the laboratory.



SILLIKER LABORATORIES OF SOUTHERN CALIFORNIA

1139 East Dominguez, Suite I
Carson, CA 90746
310-637-7121 Fax 310-637-2953

FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001694-0
Supersedes:	None
COA Date	12/7/99
Page 5 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:B-4	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009947
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #4	Condition Rec'd:	NORMAL
Desc. 3:	Time:0915	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		4	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-4	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009948
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #4	Condition Rec'd:	NORMAL
Desc. 3:	Time:0925	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date
Coliforms - 5 tube MPN		2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		<2	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:C-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009949
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Well C-1	Condition Rec'd:	NORMAL
Desc. 3:	Time:1155	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		13	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:C-2	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009950
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Well C-2	Condition Rec'd:	NORMAL
Desc. 3:	Time:1050	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		23	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99

The results of these tests relate only to the samples tested. This report shall not be reproduced except in full, without the written approval of the laboratory.



**SILLIKER LABORATORIES
OF SOUTHERN CALIFORNIA**

1139 East Dominguez, Suite I
Carson, CA 90746
310-637-7121 Fax 310-637-2953
FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001694-0
Supersedes:	None
COA Date	12/7/99
Page 6 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Melissa Calicchia

Melissa Calicchia

Lab Director

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date Nov. 29, 1999
Page 1 of 2

LABORATORY CLIENT: <u>URS Greiner Woodward Clyde</u>		CLIENT PROJECT NAME / NUMBER: <u>Malibu Water Quality</u>		P.O. NO.:
ADDRESS: <u>2020 E. First St. #400</u>		PROJECT CONTACT: <u>Paul Satter</u>		QUOTE NO.:
CITY: <u>Santa Ana</u>	STATE: <u>CA</u>	ZIP: <u>92705</u>	SAMPLER(S): (SIGNATURE) <u>[Signature]</u>	
TEL: <u>714-835-6800</u>	FAX: <u>714-667-7147</u>	E-MAIL:		LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/> <input checked="" type="checkbox"/>

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS

							REQUESTED ANALYSES																		
LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	Total + Fecal Coliforms	Enterococci, E. Coli	MBAS, BOD, NO ₃ , NO ₂	TKN, NH ₄
			DATE	TIME																					
	B-9	Beach site #9	11/29/99	1045	W	4																			
	OS-9	Ocean Site #9		1045		4																			
	B-10	Beach site #10		1010		4																			
	OS-10	Ocean Site #10		1010		4																			
	B-11	Beach Site #11		930		4																			
	OS-11	Ocean Site #11		920		4																			
	SD-1	Storm Drain #1		1300		4																			
	SD-2	Storm Drain #2		1255		4																			
	SD-3	Storm Drain #3		1235		4																			
	L-1	Lagoon Site #1		0945		4																			

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature) <u>[Signature]</u>	Date: <u>11/29/99</u>	Time: <u>13:40</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature) <u>[Signature]</u>	Received for Laboratory by: (Signature) <u>[Signature]</u>	Date: <u>11/29/99</u>	Time: <u>17:00</u>

Calscience
Environmental
Laboratories, Inc.

December 06, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-11-1024**
Client Reference: **Malibu Water Quality**

Dear Client:

Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 11/29/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 11/30/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1024
 Method: EPA 350.2
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
P-2	8.5	0.2
P-6	1.6	0.1
P-7	ND	0.1
P-9	2.2	0.1
P-1	ND	0.1
CW-1	ND	0.1
CW-2	ND	0.1
Method Blank	ND	0.1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
P-2 (Duplicate)	8.5	8.6	1	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1024
 Method: EPA 351.3
 Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Nitrogen, Total Kjeldahl Concentration</u>	<u>Reporting Limit</u>
P-2	9.5	0.5
P-6	2.0	0.5
P-7	ND	0.5
P-9	3.4	0.5
P-1	ND	0.5
CW-1	1.1	0.5
CW-2	2.8	0.5
Method Blank	ND	0.5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
P-2 (Duplicate)	9.5	9.5	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1024
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

Page 1 of 2

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-2	99-11-1024-1	Aqueous	11/29/99	N/A	12/01/99	NO3991201

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

P-6	99-11-1024-2	Aqueous	11/29/99	N/A	12/01/99	NO3991201
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

P-7	99-11-1024-3	Aqueous	11/29/99	N/A	12/01/99	NO3991201
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

P-9	99-11-1024-4	Aqueous	11/29/99	N/A	12/01/99	NO3991201
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l

P-1	99-11-1024-5	Aqueous	11/29/99	N/A	12/01/99	NO3991201
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	3.1	1.0	10		mg/l

CW-1	99-11-1024-6	Aqueous	11/29/99	N/A	12/01/99	NO3991201
------	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	1.4	0.5	5		mg/l

CW-2	99-11-1024-7	Aqueous	11/29/99	N/A	12/01/99	NO3991201
------	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	1.6	0.5	5		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received: 11/29/99
 Work Order No: 99-11-1024
 Preparation: N/A
 Method: EPA 353.3

Project: Malibu Water Quality

Page 2 of 2

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-110	Aqueous	N/A	N/A	12/01/99	NO3991201

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrate-N	ND	0.10	1		mg/l



ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1024
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

Page 1 of 2

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
P-2	99-11-1024-1	Aqueous	11/29/99	N/A	12/01/99	991201NO2

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.059	0.010	1		mg/l

P-6	99-11-1024-2	Aqueous	11/29/99	N/A	12/01/99	991201NO2
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.046	0.010	1		mg/l

P-7	99-11-1024-3	Aqueous	11/29/99	N/A	12/01/99	991201NO2
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.018	0.010	1		mg/l

P-9	99-11-1024-4	Aqueous	11/29/99	N/A	12/01/99	991201NO2
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	ND	0.010	1		mg/l

P-1	99-11-1024-5	Aqueous	11/29/99	N/A	12/01/99	991201NO2
-----	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.014	0.010	1		mg/l

CW-1	99-11-1024-6	Aqueous	11/29/99	N/A	12/01/99	991201NO2
------	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.013	0.010	1		mg/l

CW-2	99-11-1024-7	Aqueous	11/29/99	N/A	12/01/99	991201NO2
------	--------------	---------	----------	-----	----------	-----------

<u>Parameter</u>	<u>Result</u>	<u>RL</u>	<u>DF</u>	<u>Qual</u>	<u>Units</u>
Nitrite-N	0.010	0.010	1		mg/l

RL - Reporting Limit DF - Dilution Factor Qual - Qualifiers

ANALYTICAL REPORT

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1024
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

Page 2 of 2

Client Sample Number:	Lab Sample Number:	Matrix:	Date Collected:	Date Prepared:	Date Analyzed:	QC Batch ID:
Method Blank	099-05-001-113	Aqueous	N/A	N/A	12/01/99	991201NO2

Parameter	Result	RL	DF	Qual	Units
Nitrite-N	ND	0.010	1		mg/l

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 11/29/99
Date Received: 11/29/99
Date Analyzed: 12/01-06/99

Attn: Paul Salter
RE: Malibu Water Quality

Work Order No.: 99-11-1024
Method: EPA 405.1
Page 1 of 1

All concentrations are reported in mg/L (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
P-2	1	1
P-6	5	1
P-7	ND	1
P-9	1	1
P-1	ND	1
CW-1	ND	1
CW-2	ND	1
Method Blank	ND	1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
99-12-0009-1 (Duplicate)	328	323	2	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 11/29/99
 Date Received: 11/29/99
 Date Analyzed: 12/01/99

Attn: Paul Salter
 RE: Malibu Water Quality

Work Order No.: 99-11-1024
 Method: EPA 425.1
 Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
P-2	1.2	0.1
P-6	0.1	0.1
P-7	0.1	0.1
P-9	0.4	0.1
P-1	ND	0.1
CW-1	ND	0.1
CW-2	ND	0.1
Method Blank	ND	0.1

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward-Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received:
 Work Order No:
 Preparation:
 Method:

11/29/99
 99-11-1024
 N/A
 EPA 353.3

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
P-2	Aqueous	8453	N/A	12/01/99	NO3991201

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrate-N	106	110	70-130	3	0-25	

Calscience

Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1024
Preparation: N/A
Method: EPA 353.3

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-110	Aqueous	8453	12/01/99		NO3991201

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrate-N	0.500	0.465	93	80-120	

Quality Control - Spike/Spike Duplicate

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Received:
 Work Order No:
 Preparation:
 Method:

11/29/99
 99-11-1024
 N/A
 EPA 354.1

Project: Malibu Water Quality

Spiked Sample ID	Matrix	Instrument	Date Prepared	Date Analyzed	MS/MSD Batch Number
P-9	Aqueous	8453	N/A	12/01/99	991201NO2

Parameter	MS %REC	MSD %REC	%REC CL	RPD	RPD CL	Qualifiers
Nitrite-N	110	110	70-130	0	0-25	



Environmental Quality Control - Laboratory Control Sample
Laboratories, Inc.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Received: 11/29/99
Work Order No: 99-11-1024
Preparation: N/A
Method: EPA 354.1

Project: Malibu Water Quality

LCS Sample Number	Matrix	Instrument	Date Analyzed	Lab File ID	LCS Batch Number
099-05-001-113	Aqueous	8453	12/01/99		991201NO2

<u>Parameter</u>	<u>Conc Added</u>	<u>Conc Recovered</u>	<u>%Rec</u>	<u>%Rec CL</u>	<u>Qualifiers</u>
Nitrite-N	0.0250	0.0268	107	80-120	

QUALITY ASSURANCE SUMMARY
 Method EPA 425.1

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-11-1024
 Date Analyzed: 12/01/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: 99-11-1060-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	94	96	70 - 130	2	0 - 25

Laboratory Control Sample

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	0.50	0.49	98	80 - 120

GLOSSARY OF TERMS AND QUALIFIERS

Work Order Number: 99-11-1024

<u>Qualifier</u>	<u>Definition</u>
ND	Not detected at indicated reporting limit.



SILLIKER LABORATORIES OF SOUTHERN CALIFORNIA

1139 East Dominguez, Suite I
Carson, CA 90746
310-637-7121 Fax 310-637-2953
FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15001724-0
Supersedes:	None
COA Date	12/7/99
Page 1 of 2	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/30/99
P.O.# / ID:	Proj:99-11-1024
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:P-2	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010698
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/4/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		30	/100mL	SMEWW, 19th ed.	12/3/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Presumptive Coliforms - 5 tube MPN		900	/100mL	SMEWW 18th ed. 1992	12/3/99
Presumptive E. coli - 5 tube MPN (LST)		900	/100mL	AOAC 966.23	12/3/99
Desc. 1:	Sample ID:P-6	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010699
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		30	/100mL	SMEWW 18th ed. 1992	12/4/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		100	/100mL	SMEWW, 19th ed.	12/3/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:P-7	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010700
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/3/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/3/99
Enterococci - 10X10 ml MPN		23	/100mL	SMEWW, 19th ed.	12/3/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/7/99
Desc. 1:	Sample ID:P-9	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010701
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		4	/100mL	SMEWW 18th ed. 1992	12/4/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		50	/100mL	SMEWW, 19th ed.	12/3/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/7/99

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FOOD SAFETY • QUALITY • NUTRITION

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Page 2 of 2	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/30/99
P.O.# / ID:	Proj:99-11-1024
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:P-1	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010703
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/7/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/7/99	
Enterococci - 10X10 ml MPN	<2	/100mL	SMEWW, 19th ed.	12/3/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/7/99	

Desc. 1:	Sample ID:CW-1	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010705
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	500	/100mL	SMEWW 18th ed. 1992	12/7/99	
E. coli - 5 tube MPN	500	/100mL	AOAC 966.23	12/7/99	
Enterococci - 10X10 ml MPN	17	/100mL	SMEWW, 19th ed.	12/3/99	
Fecal Coliforms - 5 tube MPN	500	/100mL	APHA, 1970	12/7/99	

Desc. 1:	Sample ID:CW-2	Desc. 4:	Matrix:Wastewater	Laboratory ID:	150010707
Desc. 2:	Date:11/29	Desc. 5:	Project #:99-11-1024	Condition Rec'd:	NORMAL
Desc. 3:	Time:N/A			Temp Rec'd (°C):	12.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	2300	/100mL	SMEWW 18th ed. 1992	12/7/99	
E. coli - 5 tube MPN	300	/100mL	AOAC 966.23	12/7/99	
Enterococci - 10X10 ml MPN	30	/100mL	SMEWW, 19th ed.	12/3/99	
Fecal Coliforms - 5 tube MPN	300	/100mL	APHA, 1970	12/7/99	

Melissa Calicchia

Melissa Calicchia

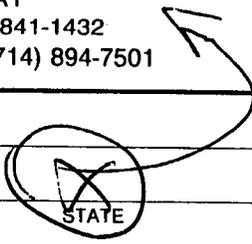
Lab Director

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 11/29/99
Page 1 of 1



LABORATORY CLIENT:
ADDRESS:
CITY: _____ STATE: _____ ZIP: _____
TEL: _____ FAX: _____ E-MAIL: _____

CLIENT PROJECT NAME / NUMBER:
99-11-1024/URS
PROJECT CONTACT:
MARY CAROL VALENZUELA
SAMPLER(S): (SIGNATURE)
P.O. NO.: _____
QUOTE NO.: _____
LAB USE ONLY
 -

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___
SPECIAL INSTRUCTIONS
SEA WATER
NORMAL TURN

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.
			DATE	TIME		
	P-2		11/29		W	2
	P-6					2
	P-7					2
	P-9					2
	P-1					2
	CW-1					2
	CW-2					2

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T: F COLIFORS	E: COLI ENTEROCOCCUS
															X	X

ALS-AD-7-SCA-990006
12/1/99

Relinquished by: (Signature)
M. Valenzuela
Relinquished by: (Signature)
Relinquished by: (Signature)

Received by: (Signature)
[Signature]
Received by: (Signature)
Received for Laboratory by: (Signature)

Date: 10-30
Time:
Date:
Time:
Date:
Time:

McQ Graphic (714) 898-9702

Calscience
Environmental
Laboratories, Inc.

January 04, 2000

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-11-1013**
Client Reference: **Malibu Water Quality**

Dear Client:

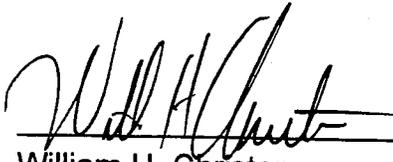
Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 11/29/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager



SILLIKER LABORATORIES OF SOUTHERN CALIFORNIA

1139 East Dominguez, Suite I
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CERTIFICATE OF ANALYSIS

COA No.:	SCA-15003727-0
Supersedes:	SCA-15001694-0
COA Date	12/29/99
Page 1 of 6	

TO:
Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:B-9	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009929
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #9	Condition Rec'd:	NORMAL
Desc. 3:	Time:1045	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		50	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		50	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		4	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		50	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-9	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009930
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #9	Condition Rec'd:	NORMAL
Desc. 3:	Time:1045	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		<2	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:B-10	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009931
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #10	Condition Rec'd:	NORMAL
Desc. 3:	Time:1010	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		170	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-10	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009932
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #10	Condition Rec'd:	NORMAL
Desc. 3:	Time:1010	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		<2	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99

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FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15003727-0
Supersedes:	SCA-15001694-0
COA Date	12/29/99
Page 2 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:B-11	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009934
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #11	Condition Rec'd:	NORMAL
Desc. 3:	Time:0930	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	8000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	2400	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	240	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	2400	/100mL	APHA, 1970	12/6/99	

Desc. 1:	Sample ID:OS-11	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009935
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #11	Condition Rec'd:	NORMAL
Desc. 3:	Time:0920	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	30	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/6/99	

Desc. 1:	Sample ID:SD-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009936
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Storm Drain #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:1300	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	16000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	300	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	500	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	300	/100mL	APHA, 1970	12/6/99	

Desc. 1:	Sample ID:SD-2	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009937
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Storm Drain #2	Condition Rec'd:	NORMAL
Desc. 3:	Time:1255	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	>16000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	1300	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	>1600	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	1300	/100mL	APHA, 1970	12/6/99	

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COA Date	12/29/99
Page 3 of 6	

TO:
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Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:SD-3	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009938
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Storm Drain #3	Condition Rec'd:	NORMAL
Desc. 3:	Time:1235	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	16000	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	800	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	900	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	800	/100mL	APHA, 1970	12/6/99	

Desc. 1:	Sample ID:L-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009939
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Lagoon Site #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:0945	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	110	/100mL	SMEWW 18th ed. 1992	12/22/99	
E. coli - 5 tube MPN	110	/100mL	AOAC 966.23	12/22/99	
Enterococci - 10X10 ml MPN	>1600	/100mL	SMEWW, 19th ed.	12/22/99	
Fecal Coliforms - 5 tube MPN	110	/100mL	APHA, 1970	12/22/99	

Desc. 1:	Sample ID:B-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009940
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:0945	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	<2	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	<2	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	240	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	<2	/100mL	APHA, 1970	12/6/99	

Desc. 1:	Sample ID:OS-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009941
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #1	Condition Rec'd:	NORMAL
Desc. 3:	Time:0907	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2

Analyte	Result	Units	Method Reference	Test Date	Loc.
Coliforms - 5 tube MPN	110	/100mL	SMEWW 18th ed. 1992	12/6/99	
E. coli - 5 tube MPN	110	/100mL	AOAC 966.23	12/6/99	
Enterococci - 10X10 ml MPN	2	/100mL	SMEWW, 19th ed.	12/6/99	
Fecal Coliforms - 5 tube MPN	110	/100mL	APHA, 1970	12/6/99	

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Page 4 of 6	

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Project Manager
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Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:B-2	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009942
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #2	Condition Rec'd:	NORMAL
Desc. 3:	Time:1005	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
<u>Analyte</u>		<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u> <u>Loc.</u>
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		<2	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-2	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009943
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #2	Condition Rec'd:	NORMAL
Desc. 3:	Time:1000	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
<u>Analyte</u>		<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u> <u>Loc.</u>
Coliforms - 5 tube MPN		170	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		20	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		20	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		20	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:B-3	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009944
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #3	Condition Rec'd:	NORMAL
Desc. 3:	Time:1105	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
<u>Analyte</u>		<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u> <u>Loc.</u>
Coliforms - 5 tube MPN		800	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		140	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		23	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		140	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-3	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009945
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #3	Condition Rec'd:	NORMAL
Desc. 3:	Time:1105	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
<u>Analyte</u>		<u>Result</u>	<u>Units</u>	<u>Method Reference</u>	<u>Test Date</u> <u>Loc.</u>
Coliforms - 5 tube MPN		2300	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		2300	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		70	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		2300	/100mL	APHA, 1970	12/6/99

The results of these tests relate only to the samples tested. This report shall not be reproduced except in full, without the written approval of the laboratory.



SILLIKER LABORATORIES OF SOUTHERN CALIFORNIA

1139 East Dominguez, Suite I
Carson, CA 90746
310-637-7121 Fax 310-637-2953

FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15003727-0
Supersedes:	SCA-15001694-0
COA Date	12/29/99
Page 5 of 6	

TO:
Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted) Carson, CA	

Analytical Results

Desc. 1:	Sample ID:B-4	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009947
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Beach Site #4	Condition Rec'd:	NORMAL
Desc. 3:	Time:0915	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		4	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:OS-4	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009948
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Ocean Site #4	Condition Rec'd:	NORMAL
Desc. 3:	Time:0925	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		<2	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:C-1	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009949
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Well C-1	Condition Rec'd:	NORMAL
Desc. 3:	Time:1155	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		13	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99
Desc. 1:	Sample ID:C-2	Desc. 4:	Matrix:Seawater	Laboratory ID:	150009950
Desc. 2:	Date:11/29/99	Desc. 5:	Desc:Well C-2	Condition Rec'd:	NORMAL
Desc. 3:	Time:1050	Desc. 6:	Project #:99-11-1013	Temp Rec'd (°C):	16.2
Analyte		Result	Units	Method Reference	Test Date Loc.
Coliforms - 5 tube MPN		<2	/100mL	SMEWW 18th ed. 1992	12/6/99
E. coli - 5 tube MPN		<2	/100mL	AOAC 966.23	12/6/99
Enterococci - 10X10 ml MPN		23	/100mL	SMEWW, 19th ed.	12/6/99
Fecal Coliforms - 5 tube MPN		<2	/100mL	APHA, 1970	12/6/99

The results of these tests relate only to the samples tested. This report shall not be reproduced except in full, without the written approval of the laboratory.



**SILLIKER LABORATORIES
OF SOUTHERN CALIFORNIA**

1139 East Dominguez, Suite I
Carson, CA 90746
310-637-7121 Fax 310-637-2953

FOOD SAFETY • QUALITY • NUTRITION

CERTIFICATE OF ANALYSIS

COA No.:	SCA-15003727-0
Supersedes:	SCA-15001694-0
COA Date	12/29/99
Page 6 of 6	

TO:

Ms. Marycarol Valenzuela
Project Manager
Calscience Environmental Laboratories
7440 Lincoln Way
Garden Grove, CA 92841-1432

Received From:	Garden Grove, CA
Received Date:	11/29/99
P.O.# / ID:	Prj#99-11-1013
Location of Test: (except where noted)	Carson, CA

Analytical Results

Melissa Calicchia
Melissa Calicchia Lab Director

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 11/29/99
Page 1 of 2

LABORATORY CLIENT: <u>CALSCIENCE ENVIR. LAB</u>		CLIENT PROJECT NAME/NUMBER: <u>URSGWUC/99-11-1013</u>		P.O. NO.:	
ADDRESS: <u>7440 LINCOLN WAY</u>		PROJECT CONTACT: <u>MARY CAROL VALENZUELA</u>		QUOTE NO.:	
CITY: <u>GARDEN GROVE</u> STATE: <u>CA</u> ZIP: <u>92891</u>		SAMPLER(S): (SIGNATURE)		LAB USE ONLY <input type="checkbox"/> <input type="checkbox"/> - <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
TEL: <u>(714) 895-5494</u>	FAX:	E-MAIL:			

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS

SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL / /

SPECIAL INSTRUCTIONS
NORMAL TURNAROUND TIME
SAMPLES ARE SEAWATER

REQUESTED ANALYSES

TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCS (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	T & F Coliform	E. Coli ENTEROCOCCUS
															X	X

2413-AD-7-SCA-990002
11/30/99

Relinquished by: (Signature) <u>[Signature]</u>	Received by: (Signature)	Date: <u>11/29/99</u>	Time: <u>16:10</u>
Relinquished by: (Signature)	Received by: (Signature)	Date:	Time:
Relinquished by: (Signature)	Received for Laboratory by: (Signature) <u>Dandy McNece</u>	Date: <u>11-29-99</u>	Time: <u>16:10</u>

CALSCIENCE ENVIRONMENTAL LABORATORIES, INC.

7440 LINCOLN WAY
GARDEN GROVE, CA 92841-1432
TEL: (714) 895-5494 • FAX: (714) 894-7501

CHAIN OF CUSTODY RECORD

Date 11/29/99
Page 2 of 2

LABORATORY CLIENT: CALSCIENCE ENVIRONMENTAL
ADDRESS: 7440 LINCOLN WAY
CITY: GARDEN GROVE STATE CA ZIP 92841
TEL: (714) 895-5494 FAX: _____ E-MAIL: _____

CLIENT PROJECT NAME / NUMBER: URSGWNC/99-11-1013
PROJECT CONTACT: MARY CAROL VALENZUELA
SAMPLER(S): (SIGNATURE) _____
P.O. NO.: _____
QUOTE NO.: _____
LAB USE ONLY
 -

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL / /
SPECIAL INSTRUCTIONS
NORMAL TURN AROUND TIME
SAMPLES ARE SEAWATER

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PbAs (8310)	VOCs (T0-14A) or (T0-15)	CH ₄ / TGNM0 (25.1)	FIXED GASES (25.1) or (D1946)	T & F Coliform	E. COLI ENTERICUS	
			DATE	TIME																				
	B-1	BEACH SITE #1	11/29/99	0945	W	2																		
	OS-1	OCEAN SITE #1		0907		2																		
	B-2	BEACH SITE #2		1005		2																		
	OS-2	OCEAN SITE #2		1000		2																		
	B-3	BEACH SITE #3		1105		2																		
	OS-3	OCEAN SITE #3		1105		2																		
	B-4	BEACH SITE #4		0915		2																		
	OS-4	OCEAN SITE #4		0925		2																		
	C-1	WELL C-1		11:55		2																		
	C-2	WELL C-2		10:50		2																		

Relinquished by: (Signature) [Signature] Received by: (Signature) _____ Date: 11/29/99 Time: 16:10
Relinquished by: (Signature) _____ Received by: (Signature) _____ Date: _____ Time: _____
Relinquished by: (Signature) _____ Received for Laboratory by: (Signature) [Signature] Date: 11-29-99 Time: 16:10

J&Q Graphic (714) 898-9702

LABORATORY RESULTS FOR SEDIMENT SAMPLING

2 SEPTEMBER, 1999

Calscience
Environmental
Laboratories, Inc.

September 10, 1999

Paul Salter
URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Subject: **Calscience Work Order No.: 99-09-0096**
Client Reference: **MALIBU/57-09912032.01**

Dear Client:

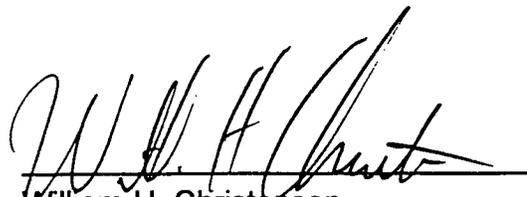
Enclosed is an analytical report for the above-referenced project. The samples included in this report were received 09/02/99 and analyzed in accordance with the attached chain-of-custody.

The results in this analytical report are limited to the samples tested and any reproduction of this report must be made in its entirety.

If you have any questions regarding this report, require sampling supplies or field services, or information on our analytical services, please feel free to call me at (714) 895-5494.

Sincerely,


Calscience Environmental
Laboratories, Inc.
Marycarol Valenzuela
Project Manager


William H. Christensen
Quality Assurance Manager

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 09/02/99
 Date Received: 09/02/99
 Date Analyzed: 09/07/99

Attn: Paul Salter
 RE: MALIBU/57-09912032.01

Work Order No.: 99-09-0096
 Method: EPA 350.2M
 Page 1 of 1

All concentrations are reported in mg/kg (ppm).

<u>Sample Number</u>	<u>Ammonia-N Concentration</u>	<u>Reporting Limit</u>
OF-1	14	5
OF-2	62	5
OF-3	59	5
Method Blank	ND	5

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
OF-1 (Duplicate)	14	14	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

LABORATORIES C.
 7440 LINCOLN WAY
 GARDEN GROVE, CA 92841-1432
 TEL: (714) 895-5494 • FAX: (714) 894-7501

CLINICAL CHEMISTRY
 Date 9/03/99
 Page 1 of 1

494792

LABORATORY CLIENT:
 ADDRESS:
 CITY STATE ZIP
 TEL: FAX: E-MAIL:

CLIENT PROJECT NAME / NUMBER:
99-09-0096
 PROJECT CONTACT:
MARY CAROL VALENZUELA
 SAMPLER(S): (SIGNATURE)
 P.O. NO.:
 QUOTE NO.:
 LAB USE ONLY
 -

TURNAROUND TIME
 SAME DAY 24 HR 48 HR 72 HR 5 DAYS 10 DAYS
 SPECIAL REQUIREMENTS (ADDITIONAL COSTS MAY APPLY)
 RWQCB REPORTING ARCHIVE SAMPLES UNTIL ___/___/___

SPECIAL INSTRUCTIONS
 * use 3 tubes, dilutions 1-5 per Maryland 9/3/99, # 4:41
 OSMU

REQUESTED ANALYSES

LAB USE ONLY	SAMPLE ID	LOCATION/DESCRIPTION	SAMPLING		MATRIX	NO. OF CONT.	TPH (G)	TPH (D) (O)	BTEX / MTBE (8021B)	HALOCARBONS (8021B)	VOCs (8260B)	SVOCs (8270C)	PEST (8081A)	PCBs (8082)	EDB / DBCP (504.1) or (8011)	CAC, T22 METALS (6010B)	ICP/MS METALS (6020)	PNAs (8310)	VOCs (TO-14A) or (TO-15)	CH ₄ / TGNMO (25.1)	FIXED GASES (25.1) or (D1946)	TOTAL COLIFORM *	FECAL COLIFORM *	
			DATE	TIME																				
203	OF-1		9/2/99	—	SED	1																		
204	OF-2		9/2/99	↓	↓	↓																X	X	
205	OF-3		9/2/99	↓	↓	↓																X	X	

Relinquished by: (Signature) _____ Received by: (Signature) _____ Date: _____ Time: _____
 Relinquished by: (Signature) _____ Received by: (Signature) _____ Date: _____ Time: _____
 Relinquished by: (Signature) _____ Received for Laboratory by: (Signature) _____ Date: 9/3/99 Time: 1020

DISTRIBUTION: White with final report, Green to File, Yellow and Pink to Client.
 Please note that pages 1 and 2 of 2 of our T/Cs are printed on the reverse side of the Yellow and Pink copies respectively.

Q&Q Graphic (714) 895-9702

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 09/02/99
 Date Received: 09/02/99
 Date Analyzed: 09/07/99

Attn: Paul Salter
 RE: MALIBU/57-09912032.01

Work Order No.: 99-09-0096
 Method: EPA 351.3M
 Page 1 of 1

All concentrations are reported in mg/kg (ppm).

<u>Sample Number</u>	<u>Total Kjeldahl Nitrogen Concentration</u>	<u>Reporting Limit</u>
OF-1	154	20
OF-2	784	80
OF-3	504	80
Method Blank	ND	10

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
OF-1 (Duplicate)	154	154	0	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 09/02/99
Date Received: 09/02/99
Date Analyzed: 09/04/99

Attn: Paul Salter
RE: MALIBU/57-09912032.01

Work Order No.: 99-09-0096
Method: EPA 353.3M
Page 1 of 1

All concentrations are reported in mg/kg (ppm).

<u>Sample Number</u>	<u>Nitrate-N Concentration</u>	<u>Reporting Limit</u>
OF-1	0.6	0.5
OF-2	ND	0.5
OF-3	ND	0.5
Method Blank	ND	0.5

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 09/02/99
Date Received: 09/02/99
Date Analyzed: 09/04/99

Attn: Paul Salter
RE: MALIBU/57-09912032.01

Work Order No.: 99-09-0096
Method: EPA 354.1M
Page 1 of 1

All concentrations are reported in mg/kg (ppm).

<u>Sample Number</u>	<u>Nitrite-N Concentration</u>	<u>Reporting Limit</u>
OF-1	0.66	0.05
OF-2	ND	0.05
OF-3	ND	0.05
Method Blank	ND	0.05

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

ANALYTICAL REPORT

URS Greiner Woodward Clyde
 2020 East 1st Street, Suite 400
 Santa Ana, CA 92705

Date Sampled: 09/02/99
 Date Received: 09/02/99
 Date Analyzed: 09/03-08/99

Attn: Paul Salter
 RE: MALIBU/57-09912032.01

Work Order No.: 99-09-0096
 Method: EPA 405.1M
 Page 1 of 1

All concentrations are reported in mg/kg (ppm).

<u>Sample Number</u>	<u>Biochemical Oxygen Demand Concentration</u>	<u>Reporting Limit</u>
OF-1	11	5
OF-2	2020	100
OF-3	1050	100
Method Blank	ND	1

QA/QC

<u>Sample Number</u>	<u>Sample Conc.</u>	<u>Duplicate Conc.</u>	<u>%RPD</u>	<u>Control Limits (%)</u>
OF-2 (Duplicate)	2020	2180	8	0 - 25

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

QUALITY ASSURANCE SUMMARY
 Method EPA 354.1M

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-09-0096
 Date Analyzed: 09/04/99

Matrix Spike/Matrix Spike Duplicate
 Sample Spiked: OF-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrite-N	111	111	70 - 130	0	0 - 25

Laboratory Control Sample

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Nitrite-N	0.25	0.25	100	80 - 120

QUALITY ASSURANCE SUMMARY
 Method EPA 425.1M

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-09-0096
 Date Analyzed: 09/08/99

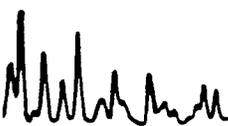
Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OF-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Surfactants	78	81	70 - 130	4	0 - 25

Laboratory Control Sample

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Surfactants	5.0	4.85	97	80 - 120



URS Greiner Woodward Clyde
2020 East 1st Street, Suite 400
Santa Ana, CA 92705

Date Sampled: 09/02/99
Date Received: 09/02/99
Date Analyzed: 09/08/99

Attn: Paul Salter
RE: MALIBU/57-09912032.01

Work Order No.: 99-09-0096
Method: EPA 425.1
Page 1 of 1

All concentrations are reported in mg/L (ppm). Calculated as LAS, molecular wt. 320.

<u>Sample Number</u>	<u>Surfactants (MBAS) Concentration</u>	<u>Reporting Limit</u>
OF-1	ND	0.5
OF-2	1.9	0.5
OF-3	1.4	0.5
Method Blank	ND	0.5

ND denotes not detected at indicated reportable limit.

Each sample was received by CEL chilled, intact, and with chain-of-custody attached.

QUALITY ASSURANCE SUMMARY
 Method EPA 353.3M

URS Greiner Woodward Clyde
 Page 1 of 1

Work Order No.: 99-09-0096
 Date Analyzed: 09/04/99

Matrix Spike/Matrix Spike Duplicate

Sample Spiked: OF-1

<u>Analyte</u>	<u>MS%REC</u>	<u>MSD%REC</u>	<u>Control Limits</u>	<u>%RPD</u>	<u>Control Limits</u>
Nitrate-N	94	94	70 - 130	0	0 - 25

Laboratory Control Sample

<u>Analyte</u>	<u>Conc. Added</u>	<u>Conc. Rec.</u>	<u>%REC</u>	<u>Control Limits</u>
Nitrate-N	2.50	2.74	110	80 - 120

SILLIKER LABORATORIES OF CALIFORNIA
1139 EAST DOMINGUEZ ST., SUITE 1 • CARSON, CA 90746
TEL: 310/ 637 7121 • FAX: 310/ 637 2953

LABORATORY REPORT

REPORT NO. DATE PAGE

494792

9/08/99

1

PURCHASE ORDER

PROJECT #:99-09-0096

MS. MARYCAROL VALENZUELA
PROJECT MANAGER
CALSCIENCE ENVIRONMENTAL
LABORATORIES, INC.
7440 LINCOLN WAY
GARDEN GROVE CA 92841-1432

SAMPLES RECEIVED: 9/03/99
RECEIVED FROM: GARDEN GROVE, CA
REPORT FAXED: 9/17/99
REISSUED DATE: 9/17/99

ANALYTICAL RESULTS

SAMPLE DESCRIPTION	COLIFORMS MPN/G	MPN FECAL COLIFORMS/G
SAMPLE ID:OF-1 DATE:9/2/99 TIME:NOT GIVEN MATRIX:SEDIMENT PROJ#:99-09-0096	<3	<3
SAMPLE ID:OF-2 DATE:9/2/99 TIME:NOT GIVEN MATRIX:SEDIMENT PROJ#:99-09-0096	230	23
SAMPLE ID:OF-3 DATE:9/2/99 TIME:NOT GIVEN MATRIX:SEDIMENT PROJ#:99-09-0096	930	15

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

* CONTINUED *



SILLIKER LABORATORIES OF CALIFORNIA
1139 EAST DOMINGUEZ ST., SUITE 1 • CARSON, CA 90746
TEL: 310/ 637 7121 • FAX: 310/ 637 2953

LABORATORY REPORT		
REPORT NO.	DATE	PAGE
494792	9/08/99	2
PURCHASE ORDER		
PROJECT #:99-09-0096		

CONTINUED:

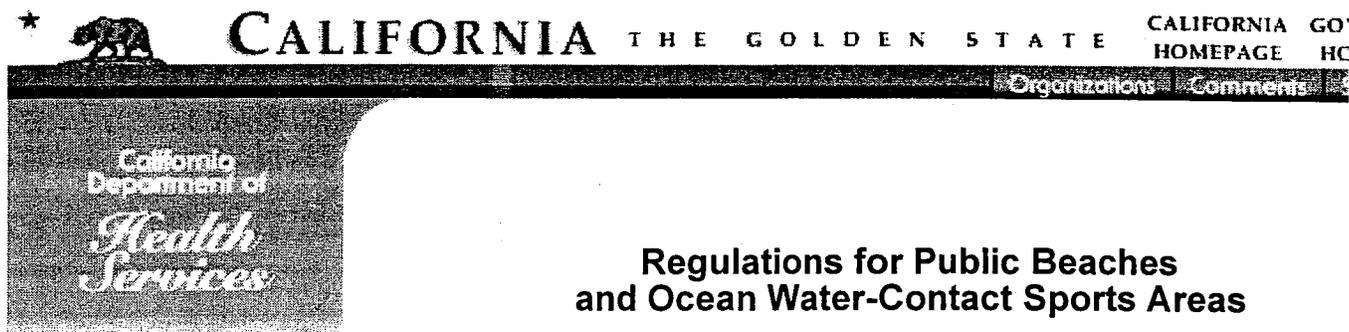
ANALYTICAL RESULTS

TEST METHOD: STANDARD METHODS FOR THE EXAMINATION OF WATER AND WASTEWATER,
SECTION 9221A-E, APHA, AWWA, WEF, 18TH EDITION, 1992.

MELISSA CALICCHIA, M.S.
LABORATORY DIRECTOR

The results of this report relate only to the samples tested. This report shall not be reproduced unless written approval has been obtained from the laboratory.

ASSEMBLY BILL 411 REGULATIONS AND GUIDANCE



Last Update: March 28, 2000

The California Department of Health Services' (DHS') regulations for public beaches and ocean water contact sports areas include those developed in response to requirements of Health and Safety Code §115880 (Assembly Bill 411, Statutes of 1997, Chapter 765). The text of AB 411 is included in **Appendix A** to DHS' beaches guidance documents.

The AB 411-implementing regulations, included below, are described and explained in the **Initial Statement of Reasons**.

Title 17 of the California Code of Regulations

Group 10. Sanitation, Healthfulness and Safety of Ocean Water-Contact Sports Area

Article 2. Definitions

7956. Storm Drain.

"Storm drain" means a conveyance through which water flows onto or adjacent to a public beach includes rivers, creeks, and streams, whether in natural or in man-made channels.

NOTE: Authority cited: Sections 100275, 115880, and 116075, Health and Safety Code. Referenc Sections 115880, 116075, and 116080, Health and Safety Code.

HISTORY:

1. New section filed 7-26-99 as an emergency; operative 7-26-99 (Register 99, No. 31). A Certificate of Compliance must be transmitted to OAL by 11-23-99 or emergency language will be repealed operation of law on the following day.
2. Certificate of Compliance as to 7-26-99 order transmitted to OAL 10-15-99 and filed 11-30-99 (Register 99, No. 49).

Article 4. Healthfulness

7957. Physical Standard.

No sewage, sludge, grease, or other physical evidence of sewage discharge shall be visible at any on any public beaches or water-contact sports areas.

NOTE: Authority cited: Sections 208, and 24156, Health and Safety Code. Reference: Sections 24 Health and Safety Code.

HISTORY:

1. New NOTE filed 3-20-84 (Register 84, No. 12).

7958. Bacteriological Standards.

(a) The minimum protective bacteriological standards for waters adjacent to public beaches and water-contact sports areas shall be as follows:

(1) Based on a single sample, the density of bacteria in water from each sampling station a public beach or public water contact sports area shall not exceed:

- (A) 1,000 total coliform bacteria per 100 milliliters, if the ratio of fecal/total coliform bacteria exceeds 0.1; or
- (B) 10,000 total coliform bacteria per 100 milliliters; or
- (C) 400 fecal coliform bacteria per 100 milliliters; or
- (D) 104 enterococcus bacteria per 100 milliliters.

(2) Based on the mean of the logarithms of the results of at least five weekly samples during any 30-day sampling period, the density of bacteria in water from any sampling station at public beach or public water contact sports area, shall not exceed:

- (A) 1,000 total coliform bacteria per 100 milliliters; or
- (B) 200 fecal coliform bacteria per 100 milliliters; or
- (C) 35 enterococcus bacteria per 100 milliliters.

(b) Water samples shall be submitted for bacteriological analyses to a laboratory certified by the Environmental Laboratory Accreditation Program, California Department of Health Services in microbiology for methods for the analysis of the sample type. [see **recommended methods**]

NOTE: Authority cited: Sections 100275, 115880, and 116075, Health and Safety Code. Reference Sections 115880, 116075, and 116080, Health and Safety Code.

HISTORY:

1. Amendment filed 7-15-85; effective thirtieth day thereafter (Register 85, No. 29).
2. Repealer and new section and amendment of Note filed 7-26-99 as an emergency; operative 7 99 (Register 99, No. 31). A Certificate of Compliance must be transmitted to OAL by 11-23-99 or emergency language will be repealed by operation of law on the following day.
3. Certificate of Compliance as to 7-26-99 order transmitted to OAL 10-15-99 and filed 11-30-99 (Register 99, No. 49).

7959. Bacteriological Sampling.

(a) In order to determine that the bacteriological standards specified in Section 7958 above are met in a water-contact sports area designated by a Regional Water Quality Control Board in water affected by a waste discharge, water samples shall be collected at such sampling stations and at frequencies as may be specified by said board in its waste discharge requirements.

(b) In waters of a public beach or water-contact sports area that has not been so designated by a Regional Water Quality Control Board, water samples shall be collected at such frequencies as are determined by the local health officer or Department. Local health officers shall be responsible for proper collection and analysis of water samples in such areas.

NOTE: Authority cited: Sections 208, and 24156, Health and Safety Code. Reference: Sections 24 and 24157, Health and Safety Code.

HISTORY:

1. Amendment filed 7-15-85; effective thirtieth day thereafter (Register 85, No. 29).

7960. Corrective Action.

(a) When a public beach or public-water-contact sports area fails to meet any of the standards set forth in Section 7957 or 7958 above, the local health officer or the Department, after taking into consideration the causes therefor, may at his or its discretion close, post with warning signs, or otherwise restrict use of said public beach or public water-contact sports area, until such time as corrective action has been taken and the standards as set forth in 7957 and 7958 above are met

NOTE: Authority cited: Sections 208, and 24156, Health and Safety Code. Reference: Sections 24 and 24157, Health and Safety Code.

HISTORY:

1. Amendment filed 7-15-85; effective thirtieth day thereafter (Register 85, No. 29).

7961. Public Beaches Visited by More than 50,000 People Annually and Adjacent to Storm Drains.

(a) Waters adjacent to a public beach shall be tested for bacteria identified in Section 7958 on at a weekly basis from April 1 to October 31, inclusive, if the beach is

- (1) Visited by more than 50,000 people annually, and
- (2) Located adjacent to a storm drain that flows in the summer.

(b) Water samples shall be taken from locations that include areas affected by storm drains. Samples shall be taken in ankle- to knee-deep water, approximately 4 to 24 inches below the water surface

(c) When testing reveals that the waters adjacent to a public beach fail to meet any of the standards set forth in Section 7958(a)(1), the local health officer shall post the beach pursuant to Health and Safety Code Section 115915, and shall use the standards of Sections 7958(a)(1) and (2) in determining the necessity to restrict the use of or close the public beach or portion thereof.

(d) In the event of a known release of untreated sewage into waters adjacent to a public beach, local health officer shall:

- (1) Immediately post and close the beach or a portion thereof, or otherwise restrict its use the source of the sewage release is eliminated;
- (2) Sample the affected waters; and
- (3) Continue closure or restriction of the beach or a portion thereof and posting the beach until testing results establish that the standards of Sections 7958(a)(1) are satisfied.

NOTE: Authority cited: Sections 100275, 115880, and 116075, Health and Safety Code. Reference: Sections 115880, 116075, and 116080, Health and Safety Code.

HISTORY:

- 1. New section filed 7-26-99 as an emergency; operative 7-26-99 (Register 99, No. 31). A Certificate of Compliance must be transmitted to OAL by 11-23-99 or emergency language will be repealed operation of law on the following day.
- 2. Certificate of Compliance as to 7-26-99 order transmitted to OAL 10-15-99 and filed 11-30-99 (Register 99, No. 49).

7962. Duties Imposed on a Local Public Officer or Agency.

(a) Pursuant to Health and Safety Code Sections 115880(h), 115885(g), and 115915(c), any duty imposed upon a local public officer or agency by Section 7961 shall be mandatory only during a fiscal year in which the Legislature has appropriated sufficient funds, as determined by the State Director of Health Services, in the annual Budget Act or otherwise for local agencies to cover the costs to the agencies associated with performance of these duties.

NOTE: Authority cited: Section 100275, Health and Safety Code. Reference: Sections 115880, 115915, Health and Safety Code.

HISTORY:

- 1. New section filed 7-26-99 as an emergency; operative 7-26-99 (Register 99, No. 31). A Certificate of Compliance must be transmitted to OAL by 11-23-99 or emergency language will be repealed operation of law on the following day.
- 2. Certificate of Compliance as to 7-26-99 order transmitted to OAL 10-15-99 and filed 11-30-99 (Register 99, No. 49).

Return to Beaches Guidance and Regulations




 California
 Department of

*Health
 Services*


Appendices — Guidance for Beaches and Recreational Waters (DRAFT)

Last Update: March 7, 2000
 Initial Draft: November 1997

APPENDICES

Appendix A . State Regulation of Beaches and Recreational Waters and Beaches

- A.1 Ocean Beaches and Ocean Water-Contact Sports Areas
- A.2 Freshwater Beaches

Appendix B . US EPA Guidance for Recreational Waters and Beaches

- B.1 The Federal Water Quality Criterion for Recreational Waters
- B.2 Ocean Waters
- B.3 Fresh Water

Appendix C . Local Guidance and Ordinances

- C.1 Ocean Waters
- C.2 Inland Salt Water (Salton Sea)
- C.3 Fresh Water

Appendix D . Microbiological Indicator Organisms in Standards and Guidance

Appendix E . Epidemiological Studies Related to Ocean Water and Fresh Water Recreation

- E.1 Ocean Waters
- E.2 Fresh Water

References

Appendix A

STATE REGULATION OF BEACHES AND RECREATIONAL WATERS

A.1. OCEAN BEACHES AND OCEAN WATER-CONTACT SPORTS AREAS

A.1.1. Statutory Authority

Health and Safety Code Sections 100275, 115880, 116075, and 116080 authorize the Department of Health Services to adopt regulations pertaining to beach safety.

A.1.1.1 Statutes Related to Beaches

[*Note: Assembly Bill 411 (Statutes of 1997, Chapter 765) amended Sections 115880, 115885, and 115915.*]

The following sections from the Health and Safety Code address beaches and water contact sports areas.

115875. "Public beach," as used in Sections 115875 to 115895, inclusive, means any beach area used by the public for recreational purpose that is owned, operated, or controlled by the state, any state agency, any local agency, or any private person in this state.

115880. (a) The department shall by regulation, in consultation with local health officers and the public, establish minimum standards for the sanitation of public beaches, including, but not limited to, the removal of refuse, as it determines are reasonably necessary for the protection of the public health and safety.

(b) Prior to final adoption by the department, the regulations and standards required by this section shall undergo an external comprehensive review process similar to the process set forth in Section 57004 of the Health and Safety Code.

(c) The regulations shall, at a minimum, do all of the following, by December 31, 1998:

(1) Require the testing of the waters adjacent to all public beaches for microbiological contaminants, including, but not limited to, total coliform, fecal coliform, and enterococci bacteria. The department may require the testing of waters adjacent to all public beaches for microbiological indicators other than those set forth in this paragraph, or a subset of those set forth in this paragraph, if the department affirmatively establishes, based on the best available scientific studies and the weight of the evidence, that the alternative indicators are as protective of the public health.

(2) Establish protective minimum standards for total coliform, fecal coliform, and enterococci bacteria, or for other microbiological indicators that the department determines are appropriate for testing pursuant to paragraph (1).

(3) Establish protocols for all of the following:

(A) Determining monitoring site locations and monitoring frequency based on risks to public health.

(B) Making decisions regarding public notification of health hazards, including, but not limited to the posting, closing, and reopening of public beaches.

(4) Require that the waters adjacent to public beaches be tested for total coliform, fecal coliform, and enterococci bacteria, or for other microbiological indicators that the department determines are appropriate for testing pursuant to paragraph (1). Except as set forth in paragraph (5), testing shall be conducted on at least a weekly basis, from April 1 to October 31, inclusive, of each year, beginning in 1999, if all of the following apply:

(A) The beach is visited by more than 50,000 people annually.

(B) The beach is located on an area adjacent to a storm drain that flows in the summer.

(5) The monitoring frequency and locations established pursuant to this subdivision and related regulations may only be reduced or altered after the testing required pursuant to

paragraph (4) reveals levels of microbiological contaminants that do not exceed for a period of two years the minimum protective standards established pursuant to paragraph (2).

(d) The local health officer shall be responsible for testing the waters adjacent to, and coordinating the testing of, all public beaches within his or her jurisdiction.

(e) The local health officer may meet the testing requirements of this section by utilizing test results from other agencies conducting microbiological contamination testing of the waters under his or her jurisdiction.

(f) Any city or county may adopt standards for the sanitation of public beaches within its jurisdiction that are stricter than the standards adopted by the state department pursuant to this section.

(g) For purposes of this section, "public beach" means any public beach located within the coastal zone, as defined in Section 30103 of the Public Resources Code.

(h) Any duty imposed upon a local public officer or agency pursuant to this section shall be mandatory only during a fiscal year in which the Legislature has appropriated sufficient funds, as determined by the State Director of Health Services, in the annual Budget Act or otherwise for local agencies to cover the costs to those agencies associated with the performance of these duties. The State Director of Health Services shall annually, within 15 days after enactment of the Budget Act, file a written statement with the Secretary of the Senate and with the Chief Clerk of the Assembly memorializing whether sufficient funds have been appropriated.

115885. The health officer having jurisdiction over the area in which a public beach is created shall:

(a) Inspect the public beach to determine whether the standards established pursuant to Section 115880 are being complied with. If the health officer finds any violation of the standards, he or she may restrict the use of, or close, the public beach or portion thereof in which the violation occurs until the standard is complied with.

(b) Investigate any complaint of a person of a violation of any standard established by the department pursuant to Section 115880. If the health officer finds any violation of the standards prescribed by the department, he or she may restrict the use of, or close, the public beach or portion thereof until the standard is complied with. If the person who made the complaint is not satisfied with the action taken by the health officer, he or she may report the violation to the department. The department shall investigate the reported violation, and, if it finds that the violation exists, it may restrict the use of or close the public beach or portion thereof until the standard violated is complied with.

(c) (1) Whenever a beach is posted, closed, or otherwise restricted in accordance with Section 115915, the health officer shall inform the agency responsible for the operation and maintenance of the public beach within 24 hours of the posting, closure, or restriction.

(2) The health officer shall establish a telephone hotline to inform the public of all beaches currently closed, posted, or otherwise restricted. The hotline shall be updated as needed in order to convey changes in public health risks.

(d) Report any violation of the standards established pursuant to Section 115880 to the district attorney, or if the violation occurred in a city and, pursuant to Section 41803.5 of the Government Code, the city attorney is authorized to prosecute misdemeanors, to the city

attorney.

(e) In the event of a known untreated sewage release, the local health officer shall immediately test the waters adjacent to the public beach and to take action pursuant to regulations established under Section 115880.

(f) Notwithstanding any other provision of law, in the event of an untreated sewage release that is known to have reached recreational waters adjacent to a public beach, the local health officer shall immediately close those waters until it has been determined by the local health officer that the waters are in compliance with the standards established pursuant to Section 115880.

(g) Any duty imposed upon a local public officer or agency pursuant to this section shall be mandatory only during a fiscal year in which the Legislature has appropriated sufficient funds, as determined by the State Director of Health Services, in the annual Budget Act or otherwise for local agencies to cover the costs to those agencies associated with the performance of these duties. The State Director of Health Services shall annually, within 15 days after enactment of the Budget Act, file a written statement with the Secretary of the Senate and with the Chief Clerk of the Assembly memorializing whether sufficient funds have been appropriated.

115890. Prior to restricting the use of or closing a public beach or portion thereof alleged to be in violation of standards, the health officer, or the department as the case may be, shall give reasonable notice of the violation to the owner of, or person or agency in charge of, the beach.

115895. Any private person who violates any regulation adopted by the state department pursuant to Section 115880 is guilty of a misdemeanor.

115900. For the purposes of Sections 115900 to 115915, inclusive, the following definitions apply:

(a) "Beach" means any public beach of the ocean waters and bays of the state where water-contact sports are engaged in by the public.

(b) "Board" means the State Water Resources Control Board.

(c) "Health officer" means the legally appointed health officer or director of environmental health of the county or city having jurisdiction of the area in which a public saltwater beach is located.

115905. The Legislature finds and declares all of the following:

(a) California's world-famous beaches are an invaluable economic, environmental, and recreational resource that must be protected for present and future generations. Millions of residents and visitors alike visit the state's beaches annually.

(b) Pollution from toxic spills, untreated municipal sewage, and agricultural and urban runoff threatens this critical resource.

(c) During 1989 through 1991 alone, at least 400 of the state's beaches had to be posted "off-limits" due to dangerous levels of bacterial and toxic contamination.

(d) Due to this pollution, local health officials were forced to close one or more beaches

between San Diego and Mendocino Counties for all but 18 days in 1991.

(e) This contamination of our beaches poses serious threats to the public's health, increasing the risk that persons who use the beaches will suffer from hepatitis, gastroenteritis, and other dangerous illnesses.

(f) Notwithstanding the importance and potential severity of this problem, the state has never conducted a statewide survey to document annual beach closings.

(g) The state does not have uniform testing protocols that must be followed to ensure that the public is never exposed to dangerous contamination at the state's beaches.

(h) The state does not have uniform standards requiring beach postings when California Ocean Plan bathing water standards, as adopted by the board pursuant to Section 13170.2 of the Water Code, are exceeded.

(i) The state does not have uniform requirements mandating the frequency with which beach waters must be tested to ensure public safety. Beach water sampling currently varies greatly from county to county. For example, Los Angeles County tests its beaches every week of the year while other coastal counties test much less frequently.

(j) More accurate and centralized record keeping on the relative contributions of pollutant sources to beach closures would enable more effective targeting of corrective actions to keep our beaches safe and our coastal areas economically strong.

115910. (a) On or before March 30, 1994, and annually thereafter, each health officer shall submit to the board a survey documenting all beach postings and closures due to threats to the public health that occurred during the preceding calendar year. The survey shall, at a minimum, include the location and duration of each beach closure in its jurisdiction and the suspected sources of the contamination that caused the closure, if known.

(b) On or before September 30, 1994, and annually thereafter, the board shall publish a statewide report documenting the beach posting and closure data provided to the board by health officers for the preceding calendar year. The report shall, at a minimum, include the location and duration of each beach closure and the suspected sources of the contamination that caused the closure, if known.

(c) Within 30 days of publication of the report, the state board shall distribute copies of the report to the Governor, the Legislature, and major media organizations, and copies of the report shall be made available to the public.

115915. (a) Whenever any beach fails to meet the bacteriological standards established pursuant to subdivision (b) of Section 115880, the health officer shall, at a minimum, post the beach with conspicuous warning signs to inform the public of the nature of the problem and the possibility of risk to public health.

(b) A warning sign shall be visible from each legal primary beach access point, as identified in the coastal access inventory prepared and updated pursuant to Section 30531 of the Public Resources Code, and any additional access points identified by the health officer.

(c) Any duty imposed upon a local public officer or agency pursuant to this section shall be mandatory only during a fiscal year in which the Legislature has appropriated sufficient funds, as determined by the State Director of Health Services, in the annual Budget Act or otherwise

for local agencies to cover the costs to those agencies associated with the performance of these duties. The State Director of Health Services shall annually, within 15 days after enactment of the Budget Act, file a written statement with the Secretary of the Senate and with the Chief Clerk of the Assembly memorializing whether sufficient funds have been appropriated.

116070. As used in this article, water-contact sport means any sport in which the body of a person comes into physical contact with water, including but not limited to swimming, surfing, paddleboarding, skin diving, and water-skiing. It does not include boating or fishing.

116075. The department has supervision of sanitation, healthfulness, and safety of the public beaches and public water-contact sport areas of the ocean waters and bays of the state and, except as provided in Section 18930, the department may make and enforce regulations pertaining thereto as it deems proper.

116080. Regulations made pursuant to this article shall include suitable standards of safe bacteria count for water-contact sports areas specified by the State Water Pollution Control Board or regional water pollution control boards, which standards shall be applied to all public water-contact sport areas of the ocean waters and bays of the state.

116085. Every person who violates any rule or regulation adopted pursuant to this article is guilty of a misdemeanor.

116090. Nothing contained in this article shall be construed to give the department the authority to fix the areas wherein water-contact sports may be engaged in or to affect the authority of the State Water Pollution Control Board or regional water pollution control boards to fix appropriate areas for various uses.

[Return to Top](#)

[Return to Regulations and Guidance for Beaches](#)

A.1.2 Regulations

A.1.2.1 Department of Health Services

[Also see [DHS' Guidance for Salt Water Beaches](#)]

Regulations for recreational use of ocean waters are published in Title 17 of the California Code of Regulations, in Group 10. Sanitation, Healthfulness and Safety of Ocean Water-Contact Sports Areas. They were expanded in response to requirements of AB 411: Sections 7956, 7961, and 7562 are new, and Section 7958, revised. The [Initial Statement of Reasons](#) includes a description and explanation of these regulations.

Title 17 of the California Code of Regulations

Group 10. Sanitation, Healthfulness and Safety of Ocean Water-Contact Sports Areas

Article 2. Definitions

7952. Public Water-Contact Sports Area Defined.

Public water-contact sports area means any area so designated (1) by a regional water pollution control board, or (2) by any other authorized and responsible public agency.

7956. Storm Drain.

"Storm drain" means a conveyance through which water flows onto or adjacent to a public beach and includes rivers, creeks, and streams, whether in natural or in man-made channels.

Article 4. Healthfulness

7957. Physical Standard.

No sewage, sludge, grease, or other physical evidence of sewage discharge shall be visible at any time on any public beaches or water-contact sports areas.

7958. Bacteriological Standards.

(a) The minimum protective bacteriological standards for waters adjacent to public beaches and public water-contact sports areas shall be as follows:

(1) Based on a single sample, the density of bacteria in water from each sampling station at a public beach or public water contact sports area shall not exceed:

- (A) 1,000 total coliform bacteria per 100 milliliters, if the ratio of fecal/total coliform bacteria exceeds 0.1; or
- (B) 10,000 total coliform bacteria per 100 milliliters; or
- (C) 400 fecal coliform bacteria per 100 milliliters; or
- (D) 104 enterococcus bacteria per 100 milliliters.

(2) Based on the mean of the logarithms of the results of at least five weekly samples during any 30-day sampling period, the density of bacteria in water from any sampling station at a public beach or public water contact sports area, shall not exceed:

- (A) 1,000 total coliform bacteria per 100 milliliters; or
- (B) 200 fecal coliform bacteria per 100 milliliters; or
- (C) 35 enterococcus bacteria per 100 milliliters.

(b) Water samples shall be submitted for bacteriological analyses to a laboratory certified by the Environmental Laboratory Accreditation Program, California Department of Health Services in microbiology for methods for the analysis of the sample type.

7959. Bacteriological Sampling.

(a) In order to determine that the bacteriological standards specified in Section 7958 above are being met in a water-contact sports area designated by a Regional Water Quality Control Board in waters affected by a waste discharge, water samples shall be

collected at such sampling stations and at such frequencies as may be specified by said board in its waste discharge requirements.

(b) In waters of a public beach or water-contact sports area that has not been so designated by a Regional Water Quality Control Board, water samples shall be collected at such frequencies as may be determined by the local health officer or Department. Local health officers shall be responsible for the proper collection and analysis of water samples in such areas.

7960. Corrective Action.

(a) When a public beach or public-water-contact sports area fails to meet any of the standards as set forth in Section 7957 or 7958 above, the local health officer or the Department, after taking into consideration the causes therefor, may at his or its discretion close, post with warning signs, or otherwise restrict use of said public beach or public water-contact sports area, until such time as corrective action has been taken and the standards as set forth in 7957 and 7958 above are met.

7961. Public Beaches Visited by More than 50,000 People Annually and Adjacent to Storm Drains.

(a) Waters adjacent to a public beach shall be tested for bacteria identified in Section 7958 on at least a weekly basis from April 1 to October 31, inclusive, if the beach is

- (1) Visited by more than 50,000 people annually, and
- (2) Located adjacent to a storm drain that flows in the summer.

(b) Water samples shall be taken from locations that include areas affected by storm drains. Samples shall be taken in ankle- to knee-deep water, approximately 4 to 24 inches below the water surface.

(c) When testing reveals that the waters adjacent to a public beach fail to meet any of the standards set forth in Section 7958(a)(1), the local health officer shall post the beach pursuant to Health and Safety Code Section 115915, and shall use the standards of Sections 7958(a)(1) and (2) in determining the necessity to restrict the use of or close the public beach or portion thereof.

(d) In the event of a known release of untreated sewage into waters adjacent to a public beach, the local health officer shall:

- (1) Immediately post and close the beach or a portion thereof, or otherwise restrict its use until the source of the sewage release is eliminated;
- (2) Sample the affected waters; and
- (3) Continue closure or restriction of the beach or a portion thereof and posting the beach until testing results establish that the standards of Sections 7958(a)(1) are satisfied.

7962. Duties Imposed on a Local Public Officer or Agency.

(a) Pursuant to Health and Safety Code Sections 115880(h), 115885(g), and 115915(c), any duty imposed upon a local public officer or agency by Section 7961 shall be

mandatory only during a fiscal year in which the Legislature has appropriated sufficient funds, as determined by the State Director of Health Services, in the annual Budget Act or otherwise for local agencies to cover the costs to those agencies associated with performance of these duties.

[Return to Top](#)

[Return to Regulations and Guidance for Beaches](#)

Regulations for the sanitation of public beaches are published in Title 17 of the California Code of Regulations, in Group 10.1

Group 10.1 Sanitation of Public Beaches

Article 2. Definitions and Exemptions

7972. Saltwater Body.

Saltwater Body means the ocean, a marine bay, estuary or lagoon.

7973. Freshwater Body.

Freshwater Body means a natural or artificial lake, river, reservoir, stream or canal.

7974. Refuse.

Refuse means domestic or industrial garbage, rubbish, or other debris adversely affecting public health and safety as specified by the Health Officer.

7975. Sanitation.

Sanitation means the maintenance of a safe and healthful environmental by means of removal of refuse; provision of sanitary toilet and handwashing facilities; disposal of sewage and liquid wastes; protection of bathing water quality; provision of pure, wholesome and potable drinking water; and control of harmful insects, rodents and animals.

7976. Recreational Purposes.

Recreational purposes include but are not limited to, swimming, camping, scenic enjoyment, fishing, shellfish gathering, surfing, scuba or snorkel diving, boating, equestrianism, use of recreational vehicles, jogging, walking, and beachcombing.

7977. Public Health and Safety.

Public health and safety means the maintenance of an environmental that contributes to human well being, and in which there is an absence of human disease, ill health or injury.

7978. Health Officer.

Health Officer means the legally appointed Health Officer of the county or city having jurisdiction of the area in which a public beach is located.

7979. Exemption.

Sections 7981 through 7991 of Title 17 shall not apply when the Health Officer determines that the beach is maintained primarily as an open space. The criteria, among others, that may be evidence of open space is lack of developed access, lack of parking facilities, lack of lifeguard services, or where casual use normally does not exceed 50 people per mile of shoreline.

7980. Review by Health Officer.

No persons shall begin construction, reconstruction or alteration of any public beach sanitation facility without first submitting plans, specifications and other such information, as may be required, to the Health Officer for his review and written approval. If no action is taken within fifteen (15) days of submission of plans, the project shall be deemed approved. If the Health Officer disapproves, the reason shall be so stated in writing.

Article 3. Day Use Beaches**7981. Application.**

The provisions of this article shall be applicable to public beaches where overnight camping is not permitted.

7982. Toilets.

Toilets shall conform to the State Plumbing Code, Part 5, Title 24, California Administrative Code. Portable toilets may be substituted for plumbed toilets.

7983. Water Supply.

Water when provided for drinking, showers, or handwashing shall be from a source approved by the Health Officer.

7984. Maintenance.

Toilets shall be available to the public at all times the beach is officially open for use. All facilities must be maintained in a clean and sanitary condition at all times.

7985. Refuse Handling.

- (a) Refuse containers approved by the Health Officer shall be provided at all public beaches.
- (b) All refuse shall be stored in the container in a manner which will not create a nuisance.
- (c) Containers shall be emptied at frequencies sufficient to prevent overflow and to be maintained in a sanitary condition.
- (d) Every public beach shall be maintained in a clean condition free of refuse.

7985.1 Animals.

No person shall bring onto or allow any animal, except guide dogs used by the blind, to remain on any beach which has been designated a public swimming beach by the state, or any city, county, or city and county and where life guards are provided, except that horses may be ridden on designated equestrian trails and areas.

This regulation is not intended to prohibit or supersede any local ordinance not in effect or which may be enacted.

Article 4. Beaches Allowing Overnight Camping

7987. Application.

The provisions of this article shall be applicable to public beaches used for overnight camping.

7988. Refuse Handling.

(a) Refuse containers approved by the Health Officer shall be provided in every camping area.

(b) All refuse shall be stored and removed in a manner which will not create a nuisance.

(c) Beach areas and areas set aside for camping shall, at all times, be maintained in a clean condition free of refuse.

7988.1 Animals.

No person shall bring onto or allow any animal, except guide dogs used by the blind, to remain on any beach which has been designated a public swimming beach by the state, or any city, county, or city and county and where life guards are provided, except that horses may be ridden on designated equestrian trails and areas.

This regulation is not intended to prohibit or supersede any local ordinance not in effect or which may be enacted.

7989. Campsites.

(a) No travel trailer, camp car, recreational vehicle or tent shall be located closer than six feet from any building or travel trailer, camp car, recreational vehicle or tent on an adjacent lot or campsite.

(b) Each vehicular lot or campsite in a camping area shall have direct access.

7990. Sanitary Facilities.

(a) Toilets shall conform to the State Plumbing Code, Part 5, Title 24, California Administrative Code.

(b) Shower baths or other bathing facilities are not required; however, when provided, they shall conform to the State Plumbing Code, Part 5, Title 24, California

Administrative Code.

7991. Maintenance.

All sanitary facilities shall be maintained in a clean and safe condition.

7992. Disposal of Sewage Wastes.

(a) Wastewater or material from plumbing fixtures shall not be permitted to be deposited upon the ground.

(b) Campsites not provided with a drain inlet shall not be occupied by a travel trailer, camp car, or recreational vehicle equipped with plumbing unless the drain outlet of the vehicle is capped or as otherwise provided by part (c) of this section. Each campsite for use by vehicles equipped with toilets, unless self-contained shall be provided with a three-inch drain inlet.

(c) Other means of disposing of liquid wastes, not including human wastes, may be approved by the Health Officer.

(d) Trailer sanitation stations approved by the Health Officer and designed to receive the discharge of sewage holding tanks of self-contained vehicles shall be installed or available in an accessible location to every public beach campground area in which there are campsites not provided with drain inlets designed to receive the discharge of sewage wastes. Trailer sanitation stations shall be provided on the basis of one station for each 100 such campsites or portion thereof.

(e) Trailer sanitation stations shall be designed and constructed as required by Sections 5570 through 5580, Title 25, California Administrative Code.

7993. Laundry Facilities.

Laundry facilities are not required; however, when provided they shall conform to the State Plumbing Code, Part 5, Title 24, California Administrative Code.

7994. Water Supply.

When provided, potable water shall be from a source approved by the Health Officer and obtainable from faucets installed not more than 400 feet from each campsite. Potable water shall be adequate for all the requirements of the camping area.

[Return to Top](#)

[Return to Regulations and Guidance for Beaches](#)

A.1.2.2 State Water Resources Control Board (SWRCB)

The SWRCB's Ocean Plan (SWRCB, 1997) establishes the following Water Quality Objectives for microbiological contamination (the sections dealing with kelp beds and shellfish harvesting area have not been included):

II. Water Quality Standards

A. Bacterial Characteristics

1. Water Contact Standards

Within a zone bounded by the shoreline and a distance of 1,000 feet from the shoreline or the 30-foot depth contour, whichever is further from the shoreline, and in areas outside this zone used for water contact sports, as determined by the Regional Board, but including all kelp beds, the following bacterial objectives shall be maintained throughout the water column:

a. Samples of water from each sampling station shall have a density of total coliform organisms less than 1,000 per 100 ml (10 per ml); provided that not more than 20 percent of the samples of any sampling station, in any 30-day period, may exceed 1,000 per 100 ml (10 per ml), and provided further that no single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 per 100 (100 per ml).

b. The fecal coliform density based on a minimum of not less than five samples for any 30-day period, shall not exceed a geometric mean of 200 per 100 ml nor shall more than 10 percent of the total samples during any 60-day period exceed 400 per 100 ml.

B. Bacterial Assessment and Remedial Action Requirements

The requirements listed below shall be used to 1) determine the occurrence and extent of any impairment of a beneficial use due to bacterial contamination; 2) generate information which can be used in the development of an enterococcus standard; and 3) provide the basis for remedial actions necessary to minimize or eliminate any impairment of a beneficial use.

Measurement of enterococcus density shall be conducted at all stations where measurement of total and fecal coliforms are required. In addition to the requirements of Section II.A.I, if a shore station consistently exceeds a coliform objective or exceeds a geometric mean enterococcus density of 24 organisms per 100 ml for a 30-day period or 12 organisms per 100 ml for a six-month period, the Regional Board shall require the appropriate agency to conduct a survey to determine if that agency's discharge is the source of the contamination. The geometric mean shall be a moving average based on no less than five samples per month, spaced evenly over the time interval. When a sanitary survey identifies a controllable source of indicator organisms associated with a discharge of sewage, the Regional Board shall take action to control the source.

Waste discharge requirements shall require the discharger to conduct sanitary surveys when so directed by the Regional Board. Waste discharge requirements shall contain provisions requiring the discharger to control any controllable discharges identified in a sanitary survey.

The Ocean Plan's Standard Monitoring Procedures (Appendix II) provide guidance on monitoring:

Chapter II. A. Bacterial Standards:

For all bacterial analyses, sample dilutions should be performed so the range of values extends from 2 to 16,000. The detection methods used for each analysis shall be reported with the results of the analysis.

Detection methods used for coliforms (total and fecal) shall be those presented in the most recent edition of *Standard Methods for the Examination of Water and Wastewater* or any improved method determined by the Regional Board (and approved by EPA) to be appropriate.

Detection methods used for enterococcus shall be those presented in EPA publication EPA 600/4-85/076, *Test Methods for Escherichia coli and Enterococci in Water by Membrane Filter Procedure* or any improved method determined by the Regional Board to be appropriate.

A.2 FRESH WATER BEACHES

A.2.1 Department of Health Services [Also, see DHS' non-regulatory **Guidance for Fresh Water Beaches.**]

Regulations for public beaches are published in Title 17 of the California Code of Regulations, Group 10.1 Sanitation of Public Beaches, beginning with Section 7972. They provide definitions of terms, and address the provision of water supply, toilets and sanitary facilities, maintenance, refuse handling, campsites and animals. These regulations are presented **above.**

A.2.2 State Water Resources Control Board

The SWRCB's Inland Waters Plan (SWRCB, 1993) and the Enclosed Bays and Estuaries Plan (SWRCB, 1995b) do not address microbiological contamination.

Return to Top

Return to Regulations and Guidance for Beaches

Appendix B

US EPA GUIDANCE FOR RECREATIONAL WATERS AND BEACHES

This section provides guidance from the United States Environmental Protection Agency, which recently released a planning document for beaches and recreational waters, **Action Plan for Beaches and Recreational Waters** (EPA, 1999).

B.1 THE FEDERAL WATER QUALITY CRITERION FOR RECREATIONAL WATERS

The federal water quality criterion for recreational waters was established in 1968 by the Department of the Interior's National Technical Advisory Committee (NTAC, 1968). This criterion was recommended again by the US EPA in 1976 and 1986 (EPA, 1976, 1986). This criterion is as follows:

Fecal coliforms should be used as the indicator organism for evaluating the microbiological suitability of recreation waters. As determined by multiple-tube fermentation or membrane filter procedures and based on a minimum of not less than five samples taken over not more than a 30-day period, the fecal coliform content of primary contact recreation waters shall not exceed a log mean of 200 per 100 ml, nor shall more than 10 percent of total samples during any 30-day period exceed 400 per 100 ml.

The value of 400 fecal coliforms per 100 ml was derived from a concentration of 2300 total coliforms per 100 ml, which corresponded to the density at which a statistically significant increase in swimming-associated gastrointestinal illness was observed. Fecal coliforms comprised about 18 percent of the total coliforms.

B.2 MARINE WATERS

The US EPA evaluated health effects of microbiological contamination on recreational use of marine waters (Cabelli, 1983). Subsequently it published guidance on water quality for recreational use in *Ambient Water Quality Criteria for Bacteria - 1986* (US EPA, 1986).

EPA's guidance for marine recreational waters is based upon an "Acceptable Swimming Associated Gastroenteritis Rate" of 19 cases/1000 swimmers. Its steady state geometric mean indicator density at the acceptable rate is 35 enterococci per 100 ml. The rate of 19 cases of illness per 1000 swimmers is estimated to result from exposures to waters containing bacteria using the fecal coliform indicator group at the maximum geometric mean of 200 per 100 ml.

EPA's criterion (US EPA, 1986) for bathing (full body contact) recreational waters for marine water is as follows:

Based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period), the geometric mean of the enterococci densities should not exceed 35 per 100 ml.

No sample should exceed a one-sided confidence limit (CL), using the following as guidance:

Designated bathing beach area	upper 75% CL
Moderate full body contact recreation	upper 82% CL
Lightly used full body contact recreation	upper 90% CL
Infrequently used full body contact recreation	upper 95% CL

based on a site-specific log standard deviation, or if site data are insufficient to establish a log standard deviation, then using 0.7 as the log standard deviation.

From the EPA's guidance document, single sample limits (in enterococci per 100 ml.) are:

Designated bathing beach area	= 104 enterococci per 100 ml.
Moderate full body contact recreation	= 124 enterococci per 100 ml.
Lightly used full body contact recreation	= 276 enterococci per 100 ml.
Infrequently used full body contact recreation	= 500 enterococci per 100 ml.

The above recommendations notwithstanding, the US EPA did not recommend a change in the stringency of its bacterial criteria for recreational waters, finding that such a change did not appear warranted until more information on the new indicators was accumulated.

B.3 FRESH WATER

The US EPA evaluated health effects of microbiological contamination on recreational use of fresh waters (Dufour, 1984). Subsequently it published guidance on water quality for fresh water recreational use (US EPA, 1986).

EPA's guidance for fresh recreational waters is based upon an "Acceptable Swimming Associated Gastroenteritis Rate" of 8 cases/1000 swimmers at a steady state geometric mean indicator density of 33 enterococci per 100 ml or 126 *E. coli* per 100 ml. The rate of 8 cases of illness per 1000 swimmers is estimated to result from exposures to waters containing bacteria using the fecal coliform indicator group at the maximum geometric mean of 200 per 100 ml.

EPA's criterion for bathing (full body contact) recreational waters for fresh water is as follows (US EPA, 1986):

Based on a statistically sufficient number of samples (generally not less than 5 samples equally spaced over a 30-day period), the geometric mean of the enterococci densities should not exceed one or the other of the following (Note that only one indicator should be used. The regulatory agency should select the appropriate indicator for its conditions.):

- E. coli*, at a concentration of 126 per 100 ml., or
- enterococci, at a concentration of 33 per 100 ml.

No sample should exceed a one-sided confidence limit (CL), using the following as guidance:

Designated bathing beach area	upper 75% CL
Moderate full body contact recreation	upper 82% CL
Lightly used full body contact recreation	upper 90% CL
Infrequently used full body contact recreation	upper 95% CL

based on a site-specific log standard deviation, or if site data are insufficient to establish a log standard deviation, then using 0.4 as the log standard deviation.

From the EPA's guidance document, the single sample limits (in *E. coli* per 100 ml., or in enterococci per 100 ml.) are:

Designated bathing beach area	= 235 <i>E. coli</i> per 100 ml., or 61 enterococci per 100 ml.
Moderate full body contact recreation	= 298 <i>E. coli</i> per 100 ml., or 89 enterococci per 100 ml.
Lightly used full body contact recreation	= 406 <i>E. coli</i> per 100 ml., or 108 enterococci per 100 ml.
Infrequently used full body contact recreation	= 576 <i>E. coli</i> per 100 ml., or

151 enterococci per 100 ml.

As mentioned above, the US EPA did not recommend a change in the stringency of its bacterial criteria for recreational waters, finding that such a change did not appear warranted until more information on the new indicators was accumulated.

B.3.1 Specific Standards Set by US EPA for Colville Indian Reservation, Washington.

The US EPA (40 Code of Federal Regulations 131.35) has established fresh (surface) water quality criteria for several classes of water, as follows:

Class I (Extraordinary), including these designated uses: Water supply (domestic, industrial, agricultural); stock watering; fish and shellfish—migration, rearing, spawning, and harvesting, of salmonids and other fish; wildlife habitat; ceremonial and religious water use; recreation (***primary contact recreation***, sport fishing, boating and aesthetic enjoyment); and commerce and navigation.

For Class I water the bacteriological criteria are: The geometric mean of the enterococci bacteria densities in samples taken over a 30-day period shall not exceed 8 per 100 ml, nor shall any single sample exceed an enterococci density of 35 per 100 milliliters. This limits are calculated as the geometric mean of the collected samples approximately equally spaced over a 30-day period.

Class II (Excellent), including these designated uses: Water supply (domestic, industrial, agricultural); stock watering; fish and shellfish—migration, rearing, spawning, and harvesting, of salmonids and other fish, and crayfish rearing, spawning and harvesting; wildlife habitat; ceremonial and religious water use; recreation (***primary contact recreation***, sport fishing, boating and aesthetic enjoyment); and commerce and navigation.

For Class II water the bacteriological criteria are: The geometric mean of the enterococci bacteria densities in samples taken over a 30-day period shall not exceed 16 per 100 ml, nor shall any single sample exceed an enterococci density of 75 per 100 milliliters. This limits are calculated as the geometric mean of the collected samples approximately equally spaced over a 30-day period.

Class III (Good), including these designated uses: Water supply (industrial, agricultural); stock watering; fish and shellfish—migration, rearing, spawning, and harvesting, of salmonids and other fish, and crayfish rearing, spawning and harvesting; wildlife habitat; recreation (***secondary contact recreation***, sport fishing, boating and aesthetic enjoyment); and commerce and navigation.

For Class III water the bacteriological criteria are: The geometric mean of the enterococci bacteria densities in samples taken over a 30-day period shall not exceed 33 per 100 ml, nor shall any single sample exceed an enterococci density of 150 per 100 milliliters. This limits are calculated as the geometric mean of the collected samples approximately equally spaced over a 30-day period.

Class IV (Fair), including these designated uses: Water supply (industrial); stock watering; fish migration of salmonids and other fish; recreation (***secondary contact recreation***, sport fishing, boating and aesthetic enjoyment); and commerce and navigation.

For Class IV water no bacteriological criteria are identified. No streams are identified as Class IV.

Lake Class, including these designated uses: Water supply (domestic, industrial, agricultural); stock watering; fish and shellfish—migration, rearing, spawning, and harvesting, of salmonids and other fish, and crayfish rearing, spawning, and harvesting; wildlife habitat; ceremonial and religious water use; recreation (**primary contact recreation**, sport fishing, boating and aesthetic enjoyment); and commerce and navigation.

For Lake Class water the bacteriological criteria are: The geometric mean of the enterococci bacteria densities in samples taken over a 30-day period shall not exceed 33 per 100 ml, nor shall any single sample exceed an enterococci density of 150 per 100 milliliters. This limits are calculated as the geometric mean of the collected samples approximately equally spaced over a 30-day period.

[Return to Top](#)

[Return to Regulations and Guidance for Beaches](#)

Appendix C

LOCAL GUIDANCE AND ORDINANCES

DHS polled local environmental health departments about the status of their recreational water programs. The following summarizes the responses DHS received, as of May 1997, for counties that utilize specific numeric levels for monitoring and corrective action.

C.1 OCEAN BEACHES [Certain beaches are subject to **monitoring and posting requirements from April 1 through October 31** of each year. The statutory and regulatory requirements are in **Appendix A**]

C.1.1 Los Angeles County

Los Angeles County has a comprehensive ocean water contact sports area regulatory program. LA County's policy directs the health officer to close a affected portions of a beach and post "Beach Closed" signs "when there is a known incident of sewage pollution or chemical contamination, and ... a health risk exists to persons engaging in water contact activities."

Beaches that are affected by sewage shall be closed for a minimum of 48 hours. Guidelines for closure, in terms of gallons of sewage spilled or discharged, are:

Less than 1,000 gallons	= 1/4 mile each side of discharge
1,000 - 10,000 gallons	= 1/2 mile each side of discharge
10,000 - 100,000 gallons	= 1 mile each side of discharge
100,000 - 1 million gallons	= 3 miles each side of discharge
1 million - 2 million gallons	= 5 miles each side of discharge
More than 2 million gallons	= 10 miles or more on each side of discharge

Subsequent sampling will be done at locations to be determined on the basis of the reported volume of the spill, prevailing winds and currents, location of the discharge, and extent of the closure. The Protocol includes sampling points in relation to the size of the sewage spill (e.g., a spill less than 1,000 gallons would be sampled at three locations: at the spill and 1/4 mile on either side of the spill). Beaches will be reopened when data from bacteriological analyses indicate bacteria counts are within acceptable health levels.

The following bacterial standards are used in the LA County protocol:

1. California total coliform standard (Title 17, California Code of Regulations, Section 7958): No single sample when verified by a repeat sample taken within 48 hours shall exceed 10,000 cfu per 100 ml., nor shall more than 20 percent of the samples within a 30-day period at any sampling station exceed 1,000 cfu per 100 ml.
2. US EPA recommendation for enterococcus: No single sample shall exceed 104 colony forming units (cfu) per 100 ml., nor shall the log mean of five or more samples taken over a 30-day period exceed 35 cfu per 100 ml.
3. Santa Monica Bay Epidemiology Study: No single sample with a total coliform level that exceed 5,000 cfu per 100 ml shall have a total coliform to fecal coliform ratio of 5 or less. (See Haile *et al.*, 1996).

Bacterial levels are considered to be elevated when two consecutive samples reveal the following:

1. Total coliform exceeds 10,000 cfu per 100 ml.
2. Enterococcus exceeds 104 cfu per 100 ml. in combination with total coliform that exceeds 1,000 cfu per 100 ml.
3. Total coliform exceeds 5,000 cfu per 100 ml. in combination with total coliform to fecal coliform ratio of 5 or less.

An evaluation is to be conducted to determine the cause that includes, but is not limited to, an evaluation of the bacteriological data, an on-site field investigations and consultation with monitoring personnel.

LA County also has a public notification process that issues public advisories to wire services whenever a significant beach area is closed to the public. Public advisories are also issued when significant rain storm is predicted or occurs, explaining that storm drain flows may cause elevated bacterial counts for approximately 72 hours and ocean water contact, especially in areas adjacent to storm drain flows, should be avoided.

C.1.2 Mendocino County

Mendocino County reopens beaches following sewage spills when total coliforms are less than 1000 per 100 ml, fecal coliforms are less than 200 per 100 ml, and enterococci are less than 35 per 100 ml.

C.1.3 Orange County

Orange County samples from many regular sampling stations, samples are taken from water ankle-deep in the surf zone, waist-deep or deeper in harbors. Samples are taken 6-12 inches

below the water surface. The county issues beach advisory press releases after 0.2 inches of rain, and posts warning signs at creek or drain mouths due to fluctuating coliform values. It closes beaches after sewage spills or when total 20 percent of coliforms exceed 1000 per 100 ml., and reopens beaches when two consecutive sampling days show levels "well below" 1000 total coliforms per 100 ml.

C.1.4 Monterey County

Monterey County posts warnings on ocean beaches when fecal coliforms meet or exceed 200 per 100 ml., or total coliforms meet or exceed 1000 per 100 ml. Beaches are closed when the standard is exceeded, with visual presence of chemicals or human waste.

C.1.5 San Diego County

San Diego County samples approximately monthly, for total and fecal coliforms. Levels for posting warnings, beach closure, and reopening beaches are 1000 total coliforms and 200 fecal coliforms per 100 ml.

C.1.6 San Francisco

San Francisco samples regularly from shoreline sampling stations at high use areas, and areas adjacent to outfalls. Analyzes for total and fecal coliforms, enterococci, and *E. coli*. Follows 17 CCR §7958 for posting, closure and reopening beaches.

C.1.7 San Luis Obispo County

San Luis Obispo County samples as needed, generally during the rainy season, during heavy rainfall periods. Sampling is also done if a major sewage spill occurs in the watershed supplying stream sources that reach the ocean beach areas. . Analyzes for total and *E. coli*. Follows 17 CCR §7957 for posting, closure and reopening beaches.

C.1.8 San Mateo County

San Mateo samples year round along coastal area under the influence of water treatment plants. Beaches are closed when total coliforms exceed 1000 per 100 ml, or when fecal coliforms exceed 200 per 100 ml.

C.1.9 Santa Cruz County

Santa Cruz County samples one/week or one/month, according to location, some stations all year, some May-September. The county has one regular sampling station per beach, and samples water at ankle depth. Analysis is for fecal coliforms, and there is also extensive parallel testing of total, enterococci, *E. coli* and fecal streptococcus. Warnings are issued when two consecutive samples of fecal coliforms are over 200 MPN per 100 ml. Beach closure occurs with a significant raw sewage spill. Reopening occurs when samples return to 200 MPN per 100 ml for fecal coliforms.

C.2 INLAND SALT WATER BEACHES (Salton Sea)

C.2.1 Imperial County

Imperial County samples monthly, two samples per beach, from regular sampling stations, taken from waist-deep water.. Sampling is from areas most frequented by people, or from sampling grids. Analyzes for total and fecal coliforms. For posting warnings, the county uses

regional water board criteria, coupled with evidence of source of human pollution. It has no guidance for closure/reopening. Uses board authority of health officer to post warnings, in the absence of inland water standards.

C.2.2 Riverside County

Riverside County samples weekly, about four samples per beach, from regular sampling stations, chosen because they represent heavy use areas. Samples are taken from 6 inches below water surface, and analyzed for total and fecal coliforms. Levels for posting warnings and closing beaches are 200 fecal coliforms per 100 ml two weeks in a row. Beaches are reopened with samples lower than 200 per 100 ml.

C.3 FRESH WATER BEACHES

C.1 Kern County

Kern County samples its lakes and reservoirs twice per month, from May through August, three samples per beach/recreational area, from regular sampling stations. Samples are analyzed for total and fecal coliforms. Posting warnings, beach closure, and reopening beaches are based on a total coliform level of 1000 per 100 ml.

C.2 Los Angeles County

For freshwater recreational areas, Los Angeles County's Code uses the following:

(1) Total coliform: No single sample shall exceed 10,000 cfu per 100 ml. Not more than 10 percent of the samples tested shall exceed 1,000 cfu per 100 ml. Of all samples collected over a 30 day period, the mean shall not exceed 500 cfu per 100 ml.

(2) Total coliform/fecal coliform ratio: No single sample with a total coliform level of 5,000 cfu per 100 ml. or greater shall have a total coliform/fecal coliform ratio of 5 or less.

(3) Enterococci: No single sample shall exceed 61 cfu per 100 ml. A minimum of 5 samples equally spaced over a 30-day period shall not exceed a log mean of 33 cfu per 100 ml.

C.3 Riverside County

Riverside County samples weekly, about four samples per beach, from regular sampling stations, chosen because they represent heavy use areas. Samples are taken from 6 inches below water surface, and analyzed for total and fecal coliforms. Levels for posting warnings and closing beaches are 200 fecal coliforms per 100 ml two weeks in a row. Beaches are reopened with samples lower than 200 per 100 ml.

C.4 San Bernardino County

Santa Bernardino County has an ordinance that applies to all water contact recreation resorts (WCRR), where the definition of an WCRR includes all public water contact recreation facilities for which direct or indirect fee is charged for the use of the facility. WCRRs include water theme parks, swim or wave lagoons, natural and man-made lakes and water courses, and similar public water contact recreational places (Ordinance No. 3020). Microbiological quality, which is regulated by the county Department of Environmental Health Services (DEHS) is addressed in section 31.054(b). The regulation calls for routine sampling and analysis at a frequency, and from representative locations, as determined by the DEHS. The fecal coliform density from any consecutive sets of samples collected within any thirty (30) days shall not

exceed an arithmetic mean of two hundred (200) organisms per one hundred (100) ml. When fecal coliform density of any sample collected exceeds one thousand (1,000) per one hundred ml, the DEHS shall order the closure of the water contact area and follow-up daily sampling shall be immediately commenced with waters analyzed for fecal coliform for at least two (2) consecutive days. If any follow-up daily sample exceeds one thousand (1,000) per one hundred (100) ml., the water contact area shall remain closed, and with the appropriate signs posted and maintained by the owner/operator, and shall not reopen without prior written approval being obtained from the DEHS. The DEHS may also direct sampling for specific pathogens. WCRRs that utilize an approved filtration and disinfection system may, upon approval by the DEHS, maintain a daily log of disinfectant and pH test reading in lieu of microbiological sampling. Fecal coliform sampling shall be conducted prior to the commencement of each season's use and as requested by the DEHS. Routine water samples shall be obtained from representative portions of the swim area at a depth of two (2) feet.

C.5 San Joaquin County

San Joaquin County samples its lakes/reservoirs and rivers once per week May through September, one sample per beach from regular sampling stations. Samples are taken from waist-deep water, and analyzed for total and fecal coliforms. Levels for beach closure: one sample exceeding 400 fecal coliform/ per 100 ml or five consecutive samples taken within a 30-day period exceeding a mean of 200 fecal coliforms per 100 ml.

C.6 Santa Cruz County

Santa Cruz County's county ordinance (Ord 1472, 11/25/69) establishes Section 7.72.0030 as the bacteriological standard for freshwater contact sports areas: Samples of water from each sampling station at such a freshwater contact sports area shall have a count of fecal coliform organisms less than 200 organisms per 100 milliliters, provided that not more than 20 percent of the samples at any sampling station, in any 30-day period, may exceed 200 per 100 milliliters.

C.7 Solano County

Solano County samples as needed for complaints during May-September, and routinely analyses for shistosoma complaints only.

C.8 Tuolumne County

Tuolumne County's lakes/reservoirs, rivers, and artificial impoundments are sampled on a volunteer basis, at about 10 organized beaches. Sampling is once per month, one to three samples per beach from regular sampling stations, April through September. Samples are taken six inches deep one foot away from structures/shore, and analyzed for total and fecal coliforms. Warnings and closures occur in response to sewage spills. Beaches are reopened when fecal and total coliforms are back to background levels. The county uses an advisory level for discontinuing water contact of 1200 MPN fecal coliforms per 100 ml., in the absence of sewage contamination.

C.9 Yolo County

Yolo County's rivers and creeks are sampled only when there is a complaint or when an incident of pollution occurs. For warning and closure, the county uses a standard of not to exceed a daily average of 2400 coliforms per 100 ml. Repeated testing at least on two consecutive days is required to establish a warning/closure action, and the same procedure is required for removal of such order.

[Return to Top](#)

[Return to Regulations and Guidance for Beaches](#)

Appendix D

MICROBIOLOGICAL INDICATOR ORGANISMS IN STANDARDS AND GUIDANCE

To protect the recreating public from exposure to microorganisms associated with the presence of sewage in at beaches and in recreational waters, health agencies use microorganisms such as total coliform bacteria, fecal coliform bacteria, enterococci, or *E. coli* as indicators of water quality. Though they are not considered disease-causing agents, their presence above certain numeric levels is suggestive of the presence of other, difficult to detect and quantify pathogenic microorganisms that can cause health effects. The use of the general indicators is an inexpensive, effective way of monitoring the overall well-being of recreational waters.

The use of indicator organisms is public health protective. However, using surrogates as monitoring endpoints makes quantitative risk assessments difficult, and does not enable development of dose/effect relationships, traditional risk assessments (as used in the regulation of chemical contaminants, for example), and predictions of actual risk from disease-causing organisms in recreational waters.. The difficulty arises from:

- determining exposure to the disease-causing microbes (the "dose"), which requires quantitation of the specific organism under actual recreating circumstances, which, even if possible analytically, is expensive. For example, monitoring for specific pathogens such as *Giardia* or *Cryptosporidium* is costly and appears not to yield predictable, reliable results.
- determining the risk of illness (the "effect"), which requires epidemiological studies of the recreating public in parallel with water analyses for specific. Epidemiological studies of recreational bathers that have been done generally use indicator organisms, though case-histories of specific disease outbreaks are more specific (see **[Appendix E](#)**).

D.1 Microbiological Indicator Organisms

D.1.1. Total Coliform Bacteria

The term total coliform bacteria refers to a number of bacteria including *Escherichia*, *Klebsiella*, *Citrobacter* and *Enterobacter*. They are able to grow at 35° C and ferment lactose. These are all gram negative asporogenous rods and have been associated with feces of warm-blooded animals. They are also present in soil.

D.1.2 Fecal Coliform Bacteria

Fecal coliform bacteria are a subgroup of the total coliform group. They are able to grow at 44.5° C and ferment lactose. These bacteria have found use as indicators of fecal contamination, because they are restricted to the intestinal tract of warm-blooded animals. Their use enables separation of bacteria of soil and fecal origin.

Among the fecal coliform group, *E. coli*, an indicator of fresh fecal pollution, has also found some use as an indicator organism (US EPA, 1986).

D.1.3 Streptococcus Bacteria (and Enterococcus Group)

The table below indicates the *Streptococcus* species and subspecies that are used as indicators of fecal contamination. Return to Top

Return to Regulations and Guidance for Beaches

Appendix E

EPIDEMIOLOGICAL AND OTHER STUDIES RELATED TO OCEAN WATER AND FRESH WATER RECREATION

E.1 OCEAN WATER

This section presents a brief overview of epidemiological studies of swimmers and other studies in ocean water and fresh water.

Cabelli, 1983

This study evaluated health effects of microbiological contamination on recreational use of marine waters and developed US EPA criteria, based on the mathematical relationship of the swimming-associated rate of gastrointestinal symptoms among bathers to the quality of their water. Enterococci were used as a fecal indicator.

The data, based on 26,686 subjects who responded to follow-up interviews, were collected in an epidemiological research program of the US EPA from beaches in three areas: (1) New York City, New York, in 1972, 1973 and 1974, 15,882 respondents; (2) Lake Pontchartrain, New Orleans, Louisiana, in 1977 and 1978, 6,751 respondents; and (3) Boston Harbor, Massachusetts, in 1978, 4,053 respondents. Water samples were collected from chest-high depths.

The recommended health effects criterion for marine recreation waters was described by the equation

$$\log X = 0.0456Y + 0.677 \quad \text{[Equation 1]}$$

where:

X is the mean enterococcus density per 100 ml., and
Y is the swimming-associated rate per 1000 people for gastroenteritis (highly credible gastrointestinal symptoms).

Subsequent to the Cabelli study, US EPA developed guidance (US EPA, 1986) for marine recreational waters. This guidance is based upon an "Acceptable Swimming Associated Gastroenteritis Rate" of 19 cases/1000 swimmers, developed from the Cabelli study. The rate of 19 cases of illness per 1000 swimmers is estimated to result from exposures to waters containing bacteria using the fecal coliform indicator group at the maximum geometric mean of 200 per 100 ml. Its steady state geometric mean indicator density at the acceptable rate is 35 enterococci per 100 ml. An acceptable one-time exposure is 104 enterococci per 100 ml.

Cheung et al., 1993

This study of bathers in Hong Kong found *E. coli* to be the best indicator of illness.

Corbett et al., 1993

This study found fecal coliforms to be the best indicator of health effects among Australian swimmers, better than fecal streptococci.

Fleisher et al., 1993

These authors found no difference in health effects between British bathers and non-bathers at fecal streptococci densities less than 40 per 100 ml.

Kay et al., 1994

In a randomized experimental epidemiological study in which British swimmers were assigned to exposed or unexposed groups, fecal streptococci were the best predictor of gastroenteritis effects. The threshold for GI effects was 33 fecal streptococci per 100 ml.

Fleisher et al., 1996

This study of British swimmers found thresholds for febrile respiratory effects and ear effects at 60 and 100 fecal streptococci per 100 ml., respectively.

Haile et al., 1996

This study evaluated health effects of microbiological contamination on recreational use of beaches at Santa Monica Bay in southern California, with attention to proximity of swimmers to large drains that empty onto the beaches. Total coliform, fecal coliform, enterococci, and *E. coli* were used as indicator organisms. The data, collected in 1995 and based on 13,278 subjects who responded to follow-up interviews, were collected at various distances from beach drains: 0, 100 yards downcoast, 100 yards upcoast, and 400 yards upcoast in three different areas: (1) Santa Monica Beach near Ashland Avenue, Will Rogers Beach at Santa Monica Canyon, and Surfrider Beach near Malibu Creek, respondents. Water samples were collected from ankle-high depths.

The authors concluded that swimming in (or near) storm drains resulted in a higher risk of gastrointestinal and respiratory illness, compared to swimming at a distance (~ 400 meters) from those drains. These authors considered the best predictor of swimming-related illness to be the ratio of total coliform organisms/fecal coliform organisms when this ratio was less than 5, when the total coliform level was greater than 5000 per 100 ml. Subsequent analyses (Haile and Witte, undated) showed increased illness when the ratio was lower (e.g., as low as 10 to 18), and when the total coliform level was greater than 1,000 per 100 ml.

Prüss, 1998

This evaluation of health risks associated with poor microbiological quality of recreational water reviews 22 epidemiological investigations, including 15 studies of marine waters and one study of fresh and marine waters.

Spear et al., 1996

The SWRCB (1995a) identified the choice of indicator organism (*i.e.*, coliform vs.

enterococcus) for the water-contact bacterial standard and increased stringency of the water-contact fecal coliform standard as an issue to be addressed in its triennial review of the Ocean Plan. The SWRCB in 1990 required dischargers, if ordered by Regional Water Quality Control Boards (RWQCBs) to: (1) monitor for both coliform and enterococcus organisms, and (2) conduct sanitary surveys when either the coliform standards or a specified enterococcus level was exceeded. This approach, it was thought, would provide information on which organism was best for use in California. However, this was a controversial approach, so in 1992, the SWRCB convened an independent technical group, the Microbiological Advisory Committee (MAC), to provide advice on how to investigate the issue. Subsequently, a study was done under contract with the University of California, Berkeley to investigate the presence of each indicator organism at monitoring stations from two major ocean dischargers (City of San Diego and City and County of San Francisco). Those investigators found good correlation between enterococcus and coliform monitoring, and recommended no change from the total and fecal coliform monitoring, (Spear *et al.*, 1996).

E.2 FRESH WATER

Dufour, 1984

This study evaluated health effects of microbiological contamination on recreational use of freshwaters and developed US EPA criteria. These criteria were based on the mathematical relationship of the swimming-associated rate of gastrointestinal symptoms among bathers to the quality of their water. Enterococci and *Escherichia coli* were used as fecal indicators.

The data, based on 34,598 subjects who responded to follow-up interviews, were collected in an epidemiological research program of from beaches in two areas: (1) Lake Erie, Erie, Pennsylvania, in 1979, 1980 and 1982, 18,299 respondents; (2) Keystone Lake, near Tulsa, Oklahoma, in 1979 and 1980, 16,299 respondents.

The recommended health effects criteria for fresh recreation waters were described by the following equations:

$$\log Y = 1.464 + 0.0687 X \quad \text{[Equation 2]}$$

where

X is the swimming-associated rate per 1000 people for gastroenteritis (highly credible gastrointestinal symptoms), and

Y is the mean *E. coli* density per 100 ml.

$$\log Y = 0.938 + 0.059 X \quad \text{[Equation 3]}$$

where

X is the swimming-associated rate per 1000 people for gastroenteritis (highly credible gastrointestinal symptoms), and

Y is the mean enterococcus density per 100 ml.

Subsequent to the Dufour study, US EPA developed guidance (US EPA, 1986) for fresh recreational waters. EPA's guidance for fresh recreational waters is based upon an "Acceptable Swimming Associated Gastroenteritis Rate" of 8 cases/1000 swimmers. The rate of 8 cases of illness per 1000 swimmers is estimated to result from exposures to waters containing bacteria

using the fecal coliform indicator group at the maximum geometric mean of 200 per 100 ml. Its steady state geometric mean indicator density at the acceptable rate is 33 enterococci per 100 ml. . An acceptable one-time exposure is 65 enterococci per 100 ml.

Calderon et al., 1991

In this study of recreational swimmers using a pond (Calderon *et al.*, 1991) found a greater correlation between infectious disease and the number of other swimmers/bathers than it did between infectious disease and various microbiological indicators.

Fresno County Community Health Department, 1996

A cryptosporidiosis outbreak at a water park in Fresno County was attributed to the ingestion of pool water that may have been contaminated by *Cryptosporidium* oocysts from fecal accidents by infected individuals(s) or from the rinsing off of water from an untreated pond adjacent to the pool area (Fresno County Community Health Department, 1996).

Kramer et al., 1996

The Centers for Disease Control (Kramer *et al.*, 1996) reported 14 outbreaks of gastroenteritis in the US in 1993-1994, 10 of which were attributable to protozoan parasites in recreational water (e.g., *Cryptosporidium parvum* or *Giardia lamblia*) and the rest to *Shigella* spp., or *E. coli* O157:H7). Seven of these outbreaks occurred in lakes, one in a river, and six in pools.

Levy et al., 1998

The Centers for Disease Control (Levy *et al.*, 1998) reported 37 outbreaks in the US in 1995-1996. Of these, 22 were gastroenteritis outbreaks; causes included *Cryptosporidium parvum* (6), *Giardia* (1), *E. coli* O157:H7 (6), *Shigella sonnei* (3), and *Salmonella* serotype Java (1).

Thirteen of the 22 gastroenteritis outbreaks were associated with lake water, eight with swimming or wading pools, and one with a hot spring. There were nine dermatitis outbreaks, of which two were lake-associated (swimmer's itch caused by *Schistosoma* species) and seven were hot tub-associated (*Pseudomonas*). The final six were single cases of primary amebic meningoencephalitis (all fatal, five in Texas and one in Florida, associated with a shallow lake, river, pond, or canal), caused by *Naegleria fowleri*.

Human feces appeared to be related to outbreaks associated with several lake-associated outbreaks.

Prüss, 1998

This evaluation of health risks associated with poor microbiological quality of recreational water reviews 22 epidemiological investigations, including six studies of fresh waters and one of fresh and marine waters.

Warrner et al., 1996

This outbreak, associated with *E. coli* O157:H7, involved 12 individuals who had visited an Illinois state park with a lake swimming beach.

Return to Top

Return to Regulations and Guidance for Beaches

References

- American Public Health Association, 1985. *Standard Methods for the Examination of Water and Wastewater*.
- Cabelli, VJ, 1983. *Health Effects Criteria for Marine Recreational Waters*. Health Effects Research Laboratory, Office of Research and Development, US Environmental Protection Agency, EPA 600/1-80-031, August.
- Calderon, RL, EW Mood, and AP Dufour, 1991. Health effects of swimming and nonpoint sources of contaminated water. *Intl J. Environ. Health Res.* 1: 21-31.
- California Code of Regulations, Title 17, Section 7958.
- California State Water Resources Control Board, 1993. California Inland Surface Waters Plan, Water Quality Control Plan for Inland Surface Waters of California, May.
- California State Water Resources Control Board, 1997. California Ocean Plan, Water Quality Control Plan for Ocean Waters of California, July.
- Cheung, WHS, KCK Chang, RPS Hung, JWL Kleevens, 1990. Health effects of beach water pollution in Hong Kong, *Epidemiol. Infect.* 105: 139-162.
- Corbett, SJ, GL Rubin, GK Curry, and DG Kleinbaum, The health effects of swimming at Sydney beaches, *Am. J. Publ. Health* 83: 1701-1706, 1993.
- Dufour, AP, 1984. *Health Effects Criteria for Fresh Recreational Waters*. Health Effects Research Laboratory, Office of Research and Development US Environmental Protection Agency. EPA 600/1-84-004, August.
- Fresno County Community Health Department, 1996. *Recreation Water Facility Cryptosporidiosis Outbreak Investigation, Summer 1996, Fresno County, California*, Health Services Agency, October 24.
- Fleisher, JM, F Jones, D Kay, R Stanwell-Smith, and R Morano, 1993. Water and non-water-related risk factors for gastroenteritis among bathers exposed to sewage-contaminated marine waters. *Intl. J. Epid.*, 22: 698-707.
- Fleisher, JM, D Kay, RL Salmon, F Jones, MD Wyer, and AF Godfree, 1996. Marine waters contaminated with domestic sewage: Nonenteric illnesses associated with bather exposure in the United Kingdom, *Am. J. Publ. Health* 86: 1228-1234.
- Haile, RW, J Alamillo, K Barrett, R Cressey, J Dermond, C Ervin, A Glasser, N Harawa, P. Harmon, J Harper, C McGee, RC Millikan, M Nides, JS Witte, 1996. *An Epidemiological Study of Possible Adverse Health Effects of Swimming in Santa Monica Bay, Final Report*. May 7.
- Haile, RW and J Witte, undated. Addendum to "An Epidemiological Study Of Possible Adverse Health Effects Of Swimming in Santa Monica Bay," Description of Additional Analyses.
- Kay, D, JM Fleisher, RL Salmon, F Jones, AF Godfree, Z Zelenauch-Jacquotte, and R Shore, 1994. Predicting likelihood of gastroenteritis from sea bathing: Results from randomized exposure, *Lancet* 344: 905-908.

Kramer, MH, BL Herwaldt, GF Craun, RL Calderon, and DD Juranek, 1996. Surveillance for Waterborne-Disease Outbreaks—United States, 1993-1994. *Morbidity and Mortality Weekly Report* 45, No. SS-1, Centers for Disease Control, Public Health Service, US Department of Health and Human Services, April 12, 1996.

Levy, DA, MS Bens, GF Craun, RL Calderon, and BL Herwaldt, 1998. Surveillance for Waterborne-Disease Outbreaks—United States, 1995-1996. *Morbidity and Mortality Weekly Report* 47, No. SS-5, Centers for Disease Control, Public Health Service, US Department of Health and Human Services, December 11, 1998.

Los Angeles County, 1997, Ocean Water Regulatory & Monitoring Protocol.

National Technical Advisory Committee, Federal Water Pollution Control Administration, 1968. *Water Quality Criteria*. US Department of the Interior, April 1.

Prüss, A, 1998. Review of Epidemiological Studies on Health Effects from Exposure to Recreational Water, *Intl. J. Epid.*, 27: 1-9.

Santa Monica Bay Restoration Project, 1995, See Haile, RW, *et al.*, 1996.

Spear, RC, H Xu, S Selvin, and RC Cooper, 1996. An Analysis of Marine Bacterial Indicator Monitoring Data, A Report to the State Water Resource Control Board. Environmental Engineering and Health Sciences Laboratory, UC Berkeley, October.

US Environmental Protection Agency, 1976. *Quality Criteria for Water*.

US Environmental Protection Agency, 1986. *Ambient Water Quality Criteria for Bacteria*. Office of Water Regulations and Standards, Criteria and Standards Division, EPA 440/5-84-002, January.

US Environmental Protection Agency, 1999. ***Action Plan for Beaches and Recreational Waters***. Office of Research and Development, Office of Water, EPA/600/R-98/079, March.

Warrner, M, K Kuo, L Williams, B Adam, C Langkop, R Ruden, B Francis, T Haupt, Lake-Associated Outbreak of Escherichia coli O157:H7--Illinois, 1995, *Morbidity and Mortality Weekly Report* 45, No. 21, pages 437-9, Centers for Disease Control, Public Health Service, US Department of Health and Human Services, May 31, 1996.

[Return to Top](#)

[Return to Beaches Index](#)

[Home](#)



California
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Guidance for Fresh Water Beaches (Draft)

Last Update: February 11, 2000

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CONTENTS

Glossary

1.0 Introduction

- 1.1 Sources of Microbiological Contamination of Recreational Waters

2.0 Protocol Development

- 2.1 Sanitary Survey
- 2.2 Sewage Spills
- 2.3 Stormwater Runoff
- 2.4 Sampling and Analysis Plan
- 2.5 Laboratories and Laboratory Analyses
- 2.6 Posting, Closure and Notification Procedure

3.0 Corrective Action

4.0 Sewage Spills and Beach Closure

5.0 Indicator Organism Levels and Posting/Closure

- 5.1 Single Sample Values
- 5.2 Thirty-Day Average Values

6.0 Reopening Closed Areas

7.0 Prohibition of Diapers from Beaches and Recreational Waters

8.0 Public Notification

- 8.1 Signs
- 8.2 Press Releases
- 8.3 Electronic Access
- 8.4 Other Information
- 8.5 Notification Associated with a Rainfall Event
- 8.6 Notification of Drinking Water Systems

Appendices

Appendix A, State Regulations for Recreational Waters and Beaches

Appendix B, US EPA Guidance for Recreational Waters and Beaches

Appendix C, Local Guidance and Ordinances

Appendix D, Adequacy of Existing Standards and Guidance

Appendix E, Epidemiological Studies Related to Ocean Water and Fresh Water Recreation

References

Glossary

Closure: The placement of signs at an area of a public beach that informs the public that the area is closed to swimming and water contact. These signs should indicate the nature of the public health

concern (e.g., sewage spill), and should, by nature of their language, color, and design, enable the recreating public to differentiate from advisories provided by posting. Closure is envisioned to occur when health risks are considered greater than those associated with posting, as with sewage spill areas at which monitoring results show that multiple indicator organism standards are exceeded, single sample and 30-day average values.

Posting: The placement of a sign or signs at an area of a public beach that informs the public of contamination of recreational water and the risk of possible illness, and advises against swimming water contact (see Section 8.2). The placement of signs may be temporary, as a result of monitoring indicates a single microbiological indicator standard is exceeded (e.g., or more permanent, where monitoring indicates regular or sporadic contamination (e.g., a storm drain, or a water body with water circulation), or where sources of contamination are identifiable and can be explained (e.g., drain water, or residential wild or domestic animal populations).

Storm drain: A conveyance through which water flows onto or adjacent to a public beach, and in rivers, creeks, and streams, whether in natural or in man-made channels. The presence of a storm drain that flows in the summer is one criterion that identifies a coastal public beach as being subject to certain regulatory requirements.

1.0 Introduction

The purpose of this document is to provide guidance for local health agencies with regard to the sanitation and healthfulness of recreational waters and beaches. It includes guidance for developing a protocol for recreational waters, a discussion of recommended levels of contamination for public notification and beach closure, levels for reopening closed beaches, and suggested language for public notification. It also includes other recommendations related to beach cleanliness.

The **appendices** to this guidance include a review of current standards and guidance for ocean water recreation, as well as other related material. Appendices A, B, and C present state statutes, regulations, federal guidance, and local guidance and ordinances, respectively. Appendix D discusses microbiological indicator organisms in standards and guidance. Appendix E provides a brief review of epidemiological studies associated with ocean and fresh water recreation.

1.1 Sources of Microbiological Contamination of Recreational Waters

Microbiological contamination of recreational waters is generally associated with human sewage or other human wastes. So long as recreational areas are isolated from those wastes, contamination by disease-causing microorganisms is unlikely. However, there are a number of pathways by which such contamination may occur.

Sewage—Potential sources of microbiological contamination of recreational waters may be associated with system failures in human sewage treatment facilities, leaking sewer lines, or with rainfall and a resulting surface water runoff.

When excessive rainfall occurs and sewage systems are not able to process the volume of water that enters them, flooding may occur and releases of untreated sewage may occur.

Treatment processes that include secondary treatment followed by filtration and disinfection will be more protective of public health than those that do not include the latter steps.

Other Sources of Sewage—Other sewage retaining systems that are specific for recreational areas can be a potential source of microbiological contamination of recreational waters if they are poorly maintained or if their contents are otherwise released through accident, error, or deliberate action. Sources of possible contamination include releases from boat and recreational vehicle holding tanks.

pumping stations, sewer line leaks, and portable toilets.

Septic Systems—Leachate from septic systems may be a potential source of microbiological contamination of recreational waters, particularly from septic systems that are poorly maintained during flooding. Although a single home septic system alone may pose a small risk of environmental contamination, in areas where septic systems predominate, shabby maintenance and flooding may be more significant.

Animal Wastes—Animal wastes may also contribute to microbiological contamination of recreational waters, though it is generally assumed that such contamination represents a less substantial hazard than contamination by human sewage. To the extent that animals may be allowed on beaches or recreational properties, such as equestrian trails, their wastes may add to the microbiological burden of recreational waters.

Even the practice of "curbing" one's dog may result in an added microbiological burden during storm surface runoff that ultimately reaches a recreational water body.

Feedlots, dairy farms, pasture land, forests and other "natural" areas, and urban surfaces may be sources of microbiological contamination. Animals, both wild and domestic, may also serve as vectors of microbiological parasites of public health concern, such as *Giardia* and *Cryptosporidium*.

Sewage Sludge—The distribution of treated sewage sludge, provided that treatment adequately destroys any microbiological components that may be present, should not pose a potential for microbiological contamination of recreational waters. Organisms in inadequately treated sewage which should not be disposed of on land, may be present in runoff associated with rainfall or with landscape or agricultural irrigation practices.

Surface Water Runoff—As mentioned previously, surface water runoff can contribute significantly to the census of microbes in a recreational body of water, particularly in times of heavy rains, in which street gutters and storm drain systems that often contain decaying organic matter are flushed out by large volumes of water.

In addition, sanitary sewers systems and septic systems may be overwhelmed by stormwater that enters them. In situations with common storm drains and sewer drains, or leaking sewer drains, high flows are obvious problems.

Dry weather urban runoff may also contain high levels of indicator organisms.

In addition to urban runoff, surface runoff from other land surfaces may also contain microbes, and on which wildlife or domestic animals in dense populations may contribute to high microbial density in runoff.

Swimmer-to-Swimmer Contamination—Another source of microbiological contamination of recreational waters are the individuals who are using those waters for recreation. Constituents of fecal matter may be washed off the body on contact with water, with most of it washed off within a relatively short time after submersion. Hence, swimmers, bathers, waders, surfers, the fishing population, and others who may come into full- or most-body contact may all contribute to contamination to which they are exposed.

Infants and young children, and other individuals may also contribute significantly to microbiological contamination by accidental fecal releases. Others may cause contamination by intentional fecal releases, because of a lack of proper sanitary facilities at or near the recreational area, or because sanitary facilities, though present, are not used.

Recreational users at beaches with limited water circulation will likely be subject to a greater swimmer-to-swimmer contamination than those at beaches where water circulation is greater.

2.0 Protocol Development

Protocols should be developed for the following:

- Sanitary survey
- Sewage spills
- Stormwater runoff
- Sampling and analysis
- Beach posting, closure and reopening procedures

2.1 Sanitary Survey

A sanitary survey should be performed that identifies actual or potential sources of microbiologic contamination of the recreational waters and beach areas. Information that is collected for purposes of the **Drinking Water Source Assessment and Protection (DWSAP) Program** or other waters related activities could contribute to a sanitary survey. The DWSAP Program document contains a **checklist of possible contaminating activities** for surface water sources that may be helpful in regard.

Sources of contamination near recreational areas may indicate a need for increased monitoring of microbiological indicator organisms.

For recreational area with poor water circulation, the sanitary survey should include a discussion of the impact of bather load on recreational areas. Because of the poor water circulation, heavy bather load can cause significant elevation in bacterial counts for total and fecal coliform and enterococcus bacteria.

High use areas with poor water circulation may also indicate a need for increased monitoring of microbiological indicator organisms.

2.2 Sewage Spills

A protocol should be developed that sets forth procedures for closing recreational waters and beaches in the event of a sewage spill, including language that is used in public notification and signage, monitoring requirements for reopening the recreational waters and beach areas (e.g., consecutive sampling indicates that standards are being met and area can be reopened for recreational use). The protocol should also indicate the extent of beach closure in terms of distance, based on the amount of sewage estimated to be discharged or spilled.

2.3 Stormwater Runoff

A protocol should be developed that sets forth procedures for public notification about beach contamination whenever significant amounts of rainfall result in urban runoff that enters recreational waters and beach areas.

The public notification should include press releases and updates of a telephone hotline that is accessible to the public. Other means of public access may also be utilized. The notification should inform the public that body contact with stormwater runoff should be avoided for a minimum of 72 hours following significant rainfall because of microbiological contamination. The 72-hour period should be adequate to dissipate microbiological contamination.

The protocol should include the language that is used in public notification and the means by which information is distributed.

2.4 Sampling and Analysis Plan

A plan should be developed that includes location of sampling sites, frequency of sampling, duration of sampling period, and depth of sampling. The plan should also include other pertinent information such as containers for sampling, packaging samples for transport, references for analytic methods, type of data, requirements for repeat sampling. The plan should be developed in conjunction with the Public Health Laboratory.

Location of Sampling Sites—Sampling sites should include areas used for water contact sports. In addition, areas known to be regularly or chronically contaminated should be included in the sampling plan.

Frequency of Sampling—Sampling no less frequently than weekly is recommended. However, a minimum frequency of sampling should be established locally, based upon historical records, use of current situations, and the potential of health hazards.

When samples are above standards or guidance levels, more frequent or daily sampling is appropriate to determine whether the area should be closed to recreational use.

Subsequent sampling is also needed to determine when to reopen the recreational area.

Time of Sampling—Sampling should occur at each location at generally the same time of day.

For crowded beaches at which bather-to-bather contamination may be a significant route of microbiological exposure, sampling when recreational use is highest may be appropriate (e.g., mid-afternoon).

Duration of Sampling Period—The sampling period should cover the period of recreational use. For example, April through October.

Depth of Sampling —Samples should be taken from just below the water surface, in ankle- to knee-depth water, approximately 12 to 24 inches deep.

Sampling from boats is inadequate for beach monitoring, since water depths would exceed those common to beach-related recreational water sports activities, especially for young children.

Indicator Organisms —Indicator organisms should include total coliform bacteria and fecal coliform bacteria, and either enterococci bacteria or *Escherichia coli*.

2.5 Laboratories and Laboratory Analyses

All samples are to be submitted for analyses to a laboratory certified by the Department of Health Services' Environmental Laboratory Accreditation Program (ELAP), pursuant to Health and Safety Section 100825, in microbiology for methods appropriate for the analysis of the sample type.

Transportation conditions, holding time limits, and analysis of samples shall be in accordance with methods that appear on the certificate listing for microbiology of ELAP.

Analyses should be completed expeditiously after they are received in the laboratory. Preliminary

should be available from the laboratory as soon as possible, and, if they exceed the standards for microbiological indicator organism, the laboratory should telephone the appropriate local agency. Results should be provided within one week after sampling.

Use of *Escherichia coli* as a surrogate for fecal coliforms—When a test method measures *E. coli*, it should be used as a surrogate for fecal coliforms, laboratories should split samples between such a method and either the multiple tube fermentation or membrane filtration method with standard confirmation steps, and run the two tests in parallel, to identify an appropriate correction factor to apply to the derived values (e.g., *E. coli* per 100 ml x 1.2 = fecal coliforms per 100 ml). Such parallel testing should include enough samples to develop a scientifically credible correlation between the two methods. Testing should occur at least once per year (for example, early summer) or twice each year (for example, spring and late summer), and ideally should be done for each type of water source that is subject to the sampling program (for example, lake beach and river beach). The most recently derived correction factor should be applied to the *E. coli* values to determine compliance with the fecal coliform standard. Laboratories should retain the results of the parallel testing in their files, consistent with their record retention procedures.

Data Reporting—The sampling and analysis plan should indicate how data are to be reported, particularly if they are outside the reporting range. For example, samples below the testing range should report the most probable number (MPN), e.g., <20 MPN, should be reported as "<20 MPN" and not as "

The sampling and analysis plan should also indicate how data outside the testing range are used in the calculation of 30-day averages. For example, a sample that is <20 MPN may appropriately be designated "10 MPN" (half the upper range for the sample) for purposes of assigning a numeric value that can be used for determining the monthly values.

2.6 Posting, Closure and Reopening Procedure

The protocol should include procedures for posting and/or closing beaches and recreational areas, notification, and procedures for determining whether posting and/or closure should continue.

3.0 Corrective Action

When recreational waters fail to meet guidance levels, the local health officer may choose to take corrective action. Such actions may include, after taking into consideration the causes for the elevation of microbiological indicators, posting the beach with warning signs, closing the beach or otherwise restricting its use until corrective action has been taken and guidance levels are met.

4.0 Sewage Spills and Closing Recreational Beaches

Immediate beach closure is the appropriate corrective action whenever sewage releases or spills occur. The closure should continue until after the spill or release has been stopped, and until monitoring indicates that the contamination levels meet appropriate guidance levels (see Section 5.0)

5.0 Indicator Organism Levels and Posting/Closure

Appendices A and B present existing state and federal numeric standards and guidance for indicator organisms. Appendix C presents a brief summary of local guidance and ordinances.

Decisions about posting and closing beaches should be based upon the most recent single sample. Thirty-day averages allow determinations to be made of the natural fluctuations of the numbers of indicator organisms. Longer term evaluations also provide an understanding of the presence of indicator organisms, in terms of their association with rainfall, stormwater runoff, dry urban runoff, recreational use, or other conditions specific to a particular beach or recreational area.

Areas that are highly or consistently contaminated require special attention. For example, portions of beaches that are associated with areas that fail to meet standards more often than not, because of natural or man-made conditions, may be appropriate for posting and/or closing on a long-term basis. Creeks, streams, rivers, whether natural or in man-made channels, may contain elevated levels of indicator organisms, particularly if their flow is influenced by stormwater or dry weather urban runoff.

5.1 Single Sample Values

Beach posting is recommended when indicator organisms exceed any of the following levels:

- o Total coliforms: 10,000 per 100 ml
- o Fecal coliforms: 400 per 100 ml

In addition, either of the following:

- o Enterococcus: 61 per 100 ml, or
- o *E. coli*: 235 per 100 ml

5.2 Thirty-Day Average Values

Additional sanitary surveys and other related evaluations, including more frequent sampling if levels appear to be on an increasing trend, are recommended when indicator organisms exceed any of the following, based on the log mean of at least 5 equally spaced samples in a 30-day period:

- o Total coliforms: 1,000 per 100 ml
- o Fecal coliforms: 200 per 100 ml

In addition, either of the following, based on the log mean of at least 5 equally spaced samples in a 30-day period, may be used:

- o Enterococcus: 33 per 100 ml, or
- o *E. coli*: 126 per 100 ml

6.0 Reopening Closed Beaches

The levels of Section 5.0 should be used to determine the appropriateness of continuing to post or close beaches or recreational areas, or portions thereof.

7.0 Prohibition of Diapers from Beaches and Recreational Waters

Because of the likelihood of contamination of recreational waters by fecal matter, diaper-wearing should be prohibited from water contact.

Public notification may be used to inform parents and others about the prohibition of individuals wearing diapers from water contact. Methods of public notification may include, but are not limited to, signs, notices, or flyers.

8.0 Public Notification

Notification may be provided to the public by signs, press releases, and electronic access.

Appropriate language for signs and their placement along a beach is best determined by local experience.

8.1 Signs

Signs should be present near the portion of the recreational area at which water contact will occur elsewhere (e.g., along walkways to the beach, park entrances) where they are likely to be read. Signs should be large enough to be clearly seen and legible. They should be posted in English and other language(s) as appropriate.

Other signage than those examples given below may be appropriate, as determined by local agency variation of the international sign, with a graphic depiction of a swimmer in a red circle with a diagonal hash mark, may be useful in some locations. Signs in a second language may be appropriate if a percentage of recreational water users only speak that language.

Signs for Beach Posting Associated with Storm Drains—If a storm drain at a recreational area is chronically contaminated, the area affected by the storm drain should be posted with language as follows:

**WARNING! STORM DRAIN WATER
MAY CAUSE ILLNESS.
NO SWIMMING IN STORM DRAIN WATER**

or

**WARNING!
CONTAMINATED STORM DRAIN WATER.
NO SWIMMING IN STORM DRAIN WATER**

Signs for Beach Posting Not Associated with Storm Drains—If a beach or recreational area is contaminated, the area should be posted with language similar to the following:

**WARNING!
CONTAMINATED WATER
SWIMMING NOT ADVISED**

Signs for Beach Posting Associated with Contamination by Populations of Animals—If a recreational area is contaminated with animal waste, the area should be posted with language similar to the following:

**WARNING!
WATER CONTAMINATED BY WILDLIFE
SWIMMING NOT ADVISED**

or

**WARNING!
CONTAMINATED WATER BY ANIMALS
SWIMMING NOT ADVISED**

or

**WARNING!
CONTAMINATED WATER BY BIRDS
SWIMMING NOT ADVISED**

Signs Indicating Beach Closure—If a beach or recreational area is closed because of a sewage or other similar contamination, signs should be used to indicate the closure. Signs for closure should be easily recognized (by virtue of their color, shape, wording, symbols) as different from those used for posting. Language should be similar to the following:

**WARNING!
UNTREATED SEWAGE SPILL
BEACH CLOSED**

or

**WARNING! CLOSED TO SWIMMING.
BEACH/SWIMMING AREA IS CONTAMINATED
AND MAY CAUSE ILLNESS**

8.2 Press Releases

Notification of beach postings or closures because of rainfall and urban runoff, sewage spills, or other public health concerns by print and electronic media is appropriate. Such notification should be considered supplemental to posting of warning or closure signs, if those activities are required.

All press releases should come from the health authority.

8.3 Electronic Access

Notification of beach postings or closures because of rainfall and urban runoff, sewage spills, or other public health concerns by means of recorded messages accessible by a telephone hotline is recommended. Additional public information may be provided by electronic bulletin boards, the Internet and local radio and television.

8.4 Other Information

To minimize person-to-person microbiological contamination, local health agencies may provide educational programs and present information on sanitary practices, consisting of notices posted at beach/park entrances and flyers given to individuals.

An example of such information is alerting the public that children should not be allowed to wear swimwear in recreational waters.

Because of the likelihood of microbiological contamination of recreational waters by the recreationists themselves, a public education campaign (postings, brochures, public service announcements) may be implemented. Such a program could encourage good hygiene practices, avoidance of swimming near control (where feasible) of accidental fecal releases among infants and young children, (including recommendations for no diaper wearing in recreational waters, as discussed in Section 7.0). It could also discuss the increased probability of sharing pathogenic organisms when large numbers of people are in recreational waters.

8.5 Notification Associated with a Rainfall Event

In the event of rainfall that occurs during recreational months, local health officers may choose to use a combination of posted warnings and/or closure signs, telephone hotline information, and press releases to advise against water contact for 72 hours after rainfall ceases (see Section 2.3).

8.6 Notification of Drinking Water Systems

When a beach posting, closure or other restriction or public notification occurs because guidance for microbiological indicators are not met in a freshwater body that is used as a source of drinking water by a public water system, the public water system should be notified by the local health officer.

[Return to Beaches Index](#)

[Home](#)



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Guidance for Salt Water Beaches (Draft)

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CONTENTS

Glossary

1.0 Introduction

1.1 Sources of Microbiological Contamination of Recreational Waters

2.0 Protocol Development

2.1 Sanitary Survey

2.2 Sewage Spills

2.3 Stormwater Runoff

2.4 Sampling and Analysis Plan

2.5 Laboratories and Laboratory Analyses

2.6 Posting, Closure and Notification Procedure

3.0 Corrective Action

4.0 Sewage Spills and Beach Closure

5.0 Indicator Organism Levels and Posting/Closure

5.1 Single Sample Values

5.2 Thirty-Day Average Values

6.0 Reopening Closed Areas

7.0 Prohibition of Diapers from Beaches and Recreational Waters

8.0 Public Notification

8.1 Signs

8.2 Press Releases

8.3 Electronic Access

8.4 Other Information

8.5 Notification Associated with a Rainfall Event

Appendices

Appendix A, State Regulation of Recreational Waters and Beaches

Appendix B, US EPA Guidance for Recreational Waters and Beaches

Appendix C, Local Guidance and Ordinances

Appendix D, Adequacy of Existing Standards and Guidance

Appendix E, Epidemiological Studies Related to Ocean Water and Fresh Water Recreation

References

Glossary

AB 411: Assembly Bill 411 (Statutes of 1997, Chapter 765), amended Health and Safety Code Sections 115880, 115885, and 115915. These amendments include requirements for the Department of Health Services (DHS) to adopt **regulations for public beaches** (Health

and Safety Code Section 155880—see **Appendix A**). Particular provisions apply to public beaches that are visited by more than 50,000 people annually and are adjacent to storm drains that flow in the summer. Health and Safety Code Sections 115885 and 115915 include requirements for local health officers.

Closure: The placement of signs at an area of a public beach that informs the public that the area is closed to swimming and water contact. These signs should indicate the nature of the public health concern (e.g., sewage spill), and should, by nature of their language, color, and design, enable the recreating public to differentiate from advisories provided by posting. Closure is envisioned to occur when health risks are considered greater than those associated with posting, as with sewage spills or at areas at which monitoring results show that multiple indicator organism standards are exceeded, for both single sample and 30-day average values. Closure is required by Health and Safety Code Section 115885(f) when an untreated sewage release is known to have reached recreational waters.

Posting: The placement of a sign or signs at an area of a public beach that informs the public of contamination of recreational water and the risk of possible illness, and advises against swimming and/or water contact (see Section 8.2). The placement of signs may be temporary, as a result of monitoring that indicates a single microbiological indicator standard is exceeded (e.g., for a public beach subject to AB 411), or more permanent, where monitoring indicates regular or sporadic contamination (e.g., a storm drain), or where sources of contamination are identifiable and can be explained (e.g., storm drain water, or residential marine mammals or seabirds). Posting is required by Health and Safety Code Section 115915(a) for certain public beaches whenever standards for microbiological indicator organisms are exceeded.

Storm drain: A conveyance through which water flows onto or adjacent to a public beach, and includes rivers, creeks, and streams, whether in natural or in man-made channels. The presence of a storm drain that flows in the summer is one criterion that identifies a public beach as being subject to AB 411.

1.0 Introduction

The purpose of this document is to provide guidance for local health agencies with regard to the sanitation and healthfulness of recreational waters and beaches. It includes guidance for developing a protocol for recreational waters, proposed standards for microbiological indicator organisms, discussions of beach posting, closure, and reopening, comments about public notification, and suggested language for signs used for posting and closure. It also includes other recommendations related to beach cleanliness.

The **appendices** to this guidance include a review of current standards and guidance for ocean and fresh water recreation, as well as other related material. Appendices A, B, and C present state statutes and regulations, federal guidance, and local guidance and ordinances, respectively. Appendix D discusses the microbiological indicator organisms in standards and guidance. Appendix E provides a brief review of epidemiological studies associated with ocean and fresh water recreation.

1.1 Sources of Microbiological Contamination of Recreational Waters

Microbiological contamination of recreational waters is generally associated human sewage or non-human wastes. So long as recreational areas are isolated from those wastes, contamination by disease-causing microorganisms is unlikely. However, there are a number of pathways by which such contamination may occur.

Sewage—Potential sources of microbiological contamination of recreational waters may be associated with system failures in human sewage treatment facilities, leaking sewer lines, or

with rainfall and resulting surface water runoff.

When excessive rainfall occurs and sewage systems are not able to process the volume of water that enters them it, flooding may occur and releases of untreated sewage may occur.

Treatment processes that include secondary treatment followed by filtration and disinfection will be more protective of public health than those that do not include the latter steps.

Other Sources of Sewage—Other sewage retaining systems that are specific for recreational areas may be a potential source of microbiological contamination of recreational waters if they are poorly maintained or if their contents are otherwise released through accident, error, or deliberate action. Sources of possible contamination include releases from boat and recreational vehicle holding tanks, pumping stations, sewer line leaks, and portable toilets.

Septic Systems—Leachate from septic systems may be a potential source of microbiological contamination of recreational waters, particularly from septic systems that are poorly maintained, or during flooding. Although a single home septic system alone may pose a small risk of environmental contamination, in areas where septic systems predominate, shabby maintenance and flooding may be more significant.

Animal Wastes—Animal wastes may also contribute to microbiological contamination of recreational waters, though it is generally assumed that such contamination represents a less substantial human risk than contamination by human sewage. To the extent that animals may be allowed on beaches or other recreational properties, such as equestrian trails, their wastes may add to the microbiological burden of recreational waters.

Even the practice of "curbing" one's dog may result in an added microbiological burden during times of surface runoff that ultimately reaches a recreational water body.

Feedlots, dairy farms, pasture land, forests and other "natural" areas, and urban surfaces may be sources of microbiological contamination. Animals, both wild and domestic, may also serve as vectors for microbiological parasites of public health concern, such as *Giardia* and *Cryptosporidium*.

Sewage Sludge—The distribution of treated sewage sludge, provided that treatment adequately destroys any microbiological components that may be present, should not pose a potential for microbiological contamination of recreational waters. Organisms in inadequately treated sewage sludge, which should not be disposed of on land, may be present in runoff associated with rainfall or with landscape or agricultural irrigation practices.

Surface Water Runoff—As mentioned previously, surface water runoff can contribute significantly to the census of microbes in a recreational body of water, particularly in times of heavy rains, in which street gutters and storm drain systems that often contain decaying organic matter are flushed out by large volumes of water.

In addition, sanitary sewers systems and septic systems may be overwhelmed by stormwater that may enter them. In situations with common storm drains and sewer drains, or leaking sewer drains, heavy rains are obvious problems.

Dry weather urban runoff may also contain high levels of indicator organisms.

In addition to urban runoff, surface runoff from other land surfaces may also contain microbes, and land on which wildlife or domestic animals are in dense populations may contribute to high microbial densities in runoff.

Swimmer-to-Swimmer Contamination—Another source of microbiological contamination of marine recreational waters are the individuals who are using those waters for recreation. Constituents of residual fecal matter may be washed off the body on contact with water, with most of it washed off within a relatively short time after submersion. Hence, swimmers, bathers, waders, surfers, the fishing population, and others who may come into full- or most-body contact may all contribute to contamination to which they are exposed.

Infants and young children, and other individuals may also contribute significantly to microbiological contamination by accidental fecal releases. Others may cause contamination by intentional fecal releases, because of a lack of proper sanitary facilities at or near the recreational area, or because such facilities, though present, are not used.

Recreational users at beaches with limited tidal influence or wave action will likely be subject to a greater swimmer-to-swimmer contamination than those at beaches with more tidal exchange and more wave action, where water circulation would be greater.

2.0 Protocol Development

Protocols should be developed for the following:

- Sanitary survey
- Sewage spills
- Stormwater runoff
- Sampling and laboratory analyses
- Beach posting, closure and reopening procedures

2.1 Sanitary Survey

A sanitary survey should be performed that identifies actual or potential sources of microbiological contamination of the recreational waters and beach areas. Information that is collected for purposes of the **Drinking Water Source Assessment and Protection (DWSAP) Program** or other watershed-related activities could contribute to a sanitary survey. The DWSAP Program document contains a **checklist of possible contaminating activities** for surface water sources that may be helpful in this regard.

Sources of contamination near recreational areas may indicate a need for increased monitoring of microbiological indicator organisms.

For recreational area with poor water circulation (e.g., the Salton Sea or certain bay or estuarine situations), the sanitary survey should include a discussion of the impact of bather load on recreational areas. Because of the poor water circulation, heavy bather loads can cause significant elevation in bacterial counts for total and fecal coliform and enterococcus bacteria.

High use areas with poor water circulation may also indicate a need for increased monitoring of microbiological indicator organisms.

2.2 Sewage Spills

A protocol should be developed that sets forth procedures for closing recreational waters and beach areas in the event of a sewage spill, including language that is used in public notification and signage, and monitoring requirements for reopening the affected recreational waters and beach areas (e.g., sampling indicates that standards are being met). The protocol

should also indicate the extent of beach closure in terms of distance, based on the amount of sewage estimated to be discharged or spilled.

2.3 Stormwater Runoff

A protocol should be developed that sets forth procedures for public notification about beach contamination whenever significant amounts of rainfall result in urban runoff that enters recreational waters and beach areas.

The public notification should include press releases and updates of a telephone hotline that is accessible to the public. Other means of public access may also be utilized. The notification should inform the public that body contact with stormwater runoff should be avoided for a minimum of 72 hours following significant rainfall because of microbiological contamination. The 72-hour period should be adequate to dissipate microbiological contamination.

The protocol should include the language that is used in public notification and the means by which the information is distributed.

2.4 Sampling and Analysis Plan

A sampling and analysis plan should be developed that includes location of sampling sites, frequency of sampling, duration of sampling period, and depth of sampling. The plan should also include other pertinent information, such as containers for sampling, packaging samples for transport, references for analytic methods, reporting of data, requirements for repeat sampling. The plan should be developed in conjunction with the local Public Health Laboratory.

Location of Sampling Sites—Sampling sites should include areas used for water contact sports. In addition, areas known to be regularly or chronically contaminated, *e.g.*, stormwater drains, should be included in the sampling plan.

Frequency of Sampling—Sampling no less frequently than weekly is recommended, and is required by AB 411 (see Appendix A). However, a minimum frequency of sampling should be established locally, based upon historical records, usage, current situations, and the potential of health hazards.

When samples are above standards or guidance levels, more frequent or daily sampling is appropriate, to determine whether the area should be closed to recreational use. Subsequent sampling is also needed to determine when to reopen the recreational area.

Time of Sampling—Sampling should occur at each location at generally the same time of day.

For crowded beaches at which bather-to-bather contamination may be a significant route of microbiological exposure, for example, where the wave and tidal actions that tend to refresh open ocean beaches are lacking, sampling when recreational use is highest may be appropriate (*e.g.*, mid-afternoon).

Duration of Sampling Period—The sampling period should cover the period of recreational use. AB 411 requires sampling from April 1 through October 31.

Depth of Sampling—Samples should be taken from just below the water surface, in ankle- to

knee-depth water, approximately 12 to 24 inches deep.

Sampling from boats is inadequate for beach monitoring, since water depths would exceed those common to beach-related recreational water sports activities, especially for young children. However, local health agencies may desire to assess water quality away from the shore in additional areas where surfing, windsurfing, or other activities may occur.

Indicator Organisms—Indicator organisms should include total coliform bacteria, fecal coliform bacteria, and enterococcus bacteria. These three are required by AB 411.

2.5 Laboratories and Laboratory Analyses

All samples are to be submitted for analyses to a laboratory certified by the Department of Health Services' Environmental Laboratory Accreditation Program (ELAP), in microbiology for methods appropriate for the analysis of the sample type. [See **recommended analytical methods for recreational marine water for AB 411.**]

Transportation conditions, holding time limits, and analysis of samples shall be in accordance with those methods that appear on the certificate listing for microbiology of ELAP.

Analyses should be completed expeditiously after they are received in the laboratory. Preliminary results should be available from the laboratory as soon as possible, and, if they exceed the standards for microbiological indicator organism, the laboratory should telephone the appropriate local agency. Written results should be provided within one week after sampling.

Use of *Escherichia coli* as a surrogate for fecal coliforms—When a test method measures *E. coli* to be used as a surrogate for fecal coliforms, laboratories should split samples between such a method and either the multiple tube fermentation or membrane filtration method with standard confirmation steps, and run the two tests in parallel, to identify an appropriate correction factor to apply to the *E. coli*-derived values (e.g., *E. coli* per 100 ml x 1.2 = fecal coliforms per 100 ml). Such parallel testing should include enough samples to develop a scientifically credible correlation between the two methods. It should occur at least once per year (for example, early summer) or twice each year (for example, early spring and late summer), and ideally should be done for each type of water source that is subject to the sampling program (for example, ocean beach and estuarine beach). The most recently derived correction factor should be applied to the *E. coli* values to determine compliance with the fecal coliform standard. Laboratories should retain the results of the parallel testing in their files, consistent with their record retention procedures.

Data Reporting—The sampling and analysis plan should indicate how data are to be reported, particularly if they are outside the reporting range. For example, samples below the testing range for the most probable number (MPN), e.g., <20 MPN, should be reported as "<20 MPN" and not as "zero."

The sampling and analysis plan should also indicate how data outside the testing range are used in the calculation of 30-day averages. For example, a sample that is <20 MPN may appropriately be designated "10 MPN" (half the upper range for the sample) for purposes of assigning a numeric value that can be used for determining the monthly values.

2.6 Posting, Closure and Reopening Procedure

The protocol should include procedures for posting and closing beaches and recreational areas, public notification, and procedures for determining whether posting and/or closure

should continue.

3.0 Corrective Action

When recreational waters fail to meet standards or guidance, the local health officer may need to take corrective action. In some cases, the actions of the local health officer are discretionary, in that after taking into consideration the causes for the elevation of microbiological indicators, he or she may close, post with warning signs, or otherwise restrict use of the recreational area until corrective action has been taken and standards or guidance levels are met.

In other situations, such as ocean beaches that are subject to the provisions of AB 411, the local health officer does not have such discretion.

4.0 Sewage Spills and Closing Recreational Beaches

Immediate beach closure is the appropriate corrective action whenever sewage releases or spills occur. The closure should continue until after the spill or release has been stopped, and until monitoring indicates that the contamination levels meet appropriate standards (see Section 5.0)

5.0 Indicator Organism Levels and Posting/Closure

Appendices A and B present existing state and federal numeric standards and guidance for indicator organisms. Appendix C presents a brief summary of local guidance and ordinances.

Decisions about posting and closing beaches should be based upon the most recent single samples. Thirty-day averages allow determinations to be made of the natural fluctuations of the numbers of those organisms. Longer term evaluations also provide an understanding of the presence of indicator organisms, in terms of their association with rainfall, stormwater runoff, dry urban runoff, recreational use, or other conditions specific to a particular beach or recreational area. The proposed AB 411 regulations instruct the local health officer to utilize both single sample and 30-day averages in determining whether to close or otherwise restrict the use of a beach or a portion thereof.

Areas that are consistently contaminated may be appropriate for long-term or permanent posting. Those that are highly contaminated with exceedances of single sample and 30-day standards for multiple indicator organisms may be appropriate for closure.

5.1 Single Sample Values

Beach posting is recommended (and required for certain beaches under Health and Safety Code Section 115915 and the **AB 411-implementing regulations**) when indicator organisms exceed any of the following levels:

- o Total coliforms: 10,000 per 100 ml
- o Total coliforms: 1,000 per 100 ml, if the ratio of fecal/total coliforms is greater and 0.1. The fecal/total ratio is an indicator of health risk, and a ratio that increases from 0.1 towards 1.0 may indicate a greater risk of illness.
- o Fecal coliforms: 400 per 100 ml
- o Enterococcus: 104 per 100 ml

5.2 Thirty-Day Average Values

Additional sanitary surveys and other related evaluations, including more frequent sampling if levels appear to be on an increasing trend, are recommended when indicator organisms exceed any of the levels given below, based on the log mean of at least 5 equally spaced samples in any 30-day period:

- o Total coliforms: 1,000 per 100 ml
- o Fecal coliforms: 200 per 100 ml
- o Enterococcus: 35 per 100 ml

6.0 Reopening Closed Beaches

The standards of Section 5.0 should be used to determine the appropriateness of continuing to post or close beaches or recreational areas, or portions thereof.

7.0 Prohibition of Diapers from Beaches and Recreational Waters

Because of the likelihood of contamination of recreational waters by fecal matter, diaper-wearing infants should be prohibited from water contact.

Public notification may be used to inform parents and others about the prohibition of individuals wearing diapers from water contact. Methods of public notification may include, but are not limited to, signs, notices, or flyers.

8.0 Public Notification

Notification may be provided to the public by signs, press releases, and electronic access. Health and Safety Code Section 115885(c)(2) requires the local health officer to establish a telephone hotline to provide public information

Appropriate language for signs and their placement along a beach is best determined by local experience, although Health and Safety Code Section 115915 does have some specific posting requirements.

8.1 Signs

Signs should be present near the portion of the recreational area at which water contact will occur, and elsewhere (e.g., along walkways to the beach, park entrances) where they are likely to be read. Signs should be large enough to be clearly seen and legible. They should be posted in English and other language(s) as appropriate.

Other signage than those examples given below may be appropriate, as determined by local agencies. A variation of the international sign, with a graphic depiction of a swimmer in a red circle with a diagonal hash mark, may be useful in some locations. Signs in a second language may be appropriate if a large percentage of recreational water users only speak that language.

Signs for Beach Posting Associated with Storm Drains—If a storm drain at a recreational area is chronically contaminated, the area affected by the storm drain should be posted with language similar to the following:

WARNING!
STORM DRAIN WATER MAY CAUSE ILLNESS.
NO SWIMMING IN STORM DRAIN WATER

or

**WARNING!
CONTAMINATED STORM DRAIN WATER.
NO SWIMMING IN STORM DRAIN WATER**

Signs for Beach Posting Not Associated with Storm Drains—If a beach or recreational area is contaminated, the area should be posted with language similar to the following:

**WARNING!
CONTAMINATED WATER
SWIMMING NOT ADVISED**

Signs for Beach Posting Associated with Contamination by Populations of Marine Mammals or Seabirds—If a beach or recreational area is contaminated by marine animals or birds, the area should be posted with language similar to the following:

**WARNING!
WATER CONTAMINATED BY MARINE MAMMALS
SWIMMING NOT ADVISED**

or

**WARNING!
CONTAMINATED WATER BY BIRDS
SWIMMING NOT ADVISED**

Signs Indicating Beach Closure—If a beach or recreational area is closed because of a sewage spill or other similar contamination, signs should be used to indicate the closure. Signs for closure should be easily recognized (by virtue of their color, shape, wording, symbols) as of different from those used for posting. Language should be similar to the following:

**WARNING!
UNTREATED SEWAGE SPILL
BEACH CLOSED**

or

**WARNING!
CLOSED TO SWIMMING.
BEACH/SWIMMING AREA IS CONTAMINATED
AND MAY CAUSE ILLNESS**

8.2 Press Releases

Notification of beach postings or closures because of rainfall and urban runoff, sewage spills, or other public health concerns by print and electronic media is appropriate. Such notification should be considered supplemental to posting and closure, if those activities are required.

All press releases should come from the health authority.

8.3 Electronic Access

Notification of beach postings or closures because of rainfall and urban runoff, sewage spills, or other public health concerns by means of recorded messages accessible by a telephone hotline is recommended (and required by AB 411). Additional public information may be provided by electronic bulletin boards, the Internet, and local radio and television.

8.4 Other Information

To minimize person-to-person microbiological contamination, local health agencies may provide visitor education programs and present information on sanitary practices, consisting of notices posted at the beach/park entrances and flyers given to individuals.

An example of such information is alerting the public that children should not be allowed to wear diapers in recreational waters.

Because of the likelihood of microbiological contamination of recreational waters by the recreating public themselves, a public education campaign (postings, brochures, public service announcements) might be implemented. Such a program could encourage good hygiene practices, avoidance of swimming while ill, control (where feasible) of accidental fecal releases among infants and young children (including recommendations for no diaper wearing in recreational waters, as discussed in Section 7.0). It could also discuss the increased probability of sharing pathogenic organisms when large numbers of people share recreational waters.

8.5 Notification Associated with a Rainfall Event

In the event of rainfall that occurs between April 1 and October 31 and leads to runoff that reaches public beaches subject to AB 411, local health officers may choose to utilize a combination of posted warnings and telephone hotline information required for AB 411-regulated beaches adjacent to storm drains, and press releases that advise against water contact for 72 hours after rainfall ceases (see Section 2.3). In this way the local health officers can meet their obligation to post warnings around storm drains and provide information via their hotlines, but are able to make use of their discretion in taking corrective action at beaches not adjacent to storm drains. Such an approach is reasonable, and assures that local health agencies need not expend valuable and limited resources by posting and taking down warnings with changing weather.

[Return to Beaches Index](#)

[Home](#)